

Appendix H

ECOTOX Literature

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Explanation of OPP Acceptability Criteria and Rejection Codes for ECOTOX Data

Studies located and coded into ECOTOX must meet acceptability criteria, as established in the *Interim Guidance of the Evaluation Criteria for Ecological Toxicity Data in the Open Literature, Phase I and II*, Office of Pesticide Programs, U.S. Environmental Protection Agency, July 16, 2004. Studies that do not meet these criteria are designated in the bibliography as “Accepted for ECOTOX but not OPP.” The intent of the acceptability criteria is to ensure data quality and verifiability. The criteria parallel criteria used in evaluating registrant-submitted studies. Specific criteria are listed below, along with the corresponding rejection code.

- The paper does not report toxicology information for a chemical of concern to OPP; (Rejection Code: NO COC)
- The article is not published in English language; (Rejection Code: NO FOREIGN)
- The study is not presented as a full article. Abstracts will not be considered; (Rejection Code: NO ABSTRACT)
- The paper is not publicly available document; (Rejection Code: NO NOT PUBLIC (typically not used, as any paper acquired from the ECOTOX holding or through the literature search is considered public))
- The paper is not the primary source of the data; (Rejection Code: NO REVIEW)
- The paper does not report that treatment(s) were compared to an acceptable control; (Rejection Code: NO CONTROL)
- The paper does not report an explicit duration of exposure; (Rejection Code: NO DURATION)
- The paper does not report a concurrent environmental chemical concentration/dose or application rate; (Rejection Code: NO CONC)
- The paper does not report the location of the study (e.g., laboratory vs. field); (Rejection Code: NO LOCATION)
- The paper does not report a biological effect on live, whole organisms; (Rejection Code: NO IN-VITRO)
- The paper does not report the species that was tested; and this species can be verified in a reliable source; (Rejection Code: NO SPECIES)
- The paper does not report effects associated with exposure to a single chemical. (Rejection Code: NO MIXTURE). It should be noted that all papers including data on pesticide mixtures are considered.

Additionally, efficacy studies on target species and toxicological data on a subset of target species (*i.e.*, plants and terrestrial insects excluding bees, butterflies, beetles, and non-insect invertebrates such as soil arthropods and worms) are excluded and coded as NO TARGET.

Data that originated from the OPP Pesticide Ecotoxicity Database is coded as NO EFED. These data are already available to the chemical team.

Acceptable for EcoTox and OPP

Amin, W. A., Fatma, A. M., and Budai, C. S. (1992). Effect of Trifluralin and Certain Pesticides for Management of *Meloidogyne incognita* on Tomato. *Indian J.Nematol.* 22: 89-92.

EcoReference No.: 84381

Chemical of Concern: DZ,CBF,OML,TFN,SFR,ADC; Habitat: T; Effect Codes: POP,GRO,REP; Rejection Code: LITE EVAL CODED(OML,TFN,DZ,CBF,ADC),OK(SFR).

Armson, A., Kamau, S. W., Grimm, F., Reynoldson, J. A., Best, W. M., MacDonald, L. M., and Thompson, R. C. A. (1999). A Comparison of the Effects of a Benzimidazole and the Dinitroanilines Against *Leishmania infantum*. *Acta Trop.* 73: 303-311.

EcoReference No.: 104651

Chemical of Concern: OYZ,TFN,PDM,BFL; Habitat: T; Effect Codes: BCM,POP; Rejection Code: LITE EVAL CODED(PDM,TFN),OK(OYZ).

Armson, A., Meloni, B. P., Reynoldson, J. A., and Thompson, R. C. A. (1999). Assessment of Drugs Against *Cryptosporidium parvum* Using a Simple In Vitro Screening Method. *FEMS Microbiol.Lett.* 178: 227, 233 (doi: 10.1016/S0378-1097(99)00361-4).

EcoReference No.: 110229

Chemical of Concern: TTC,TFN,NCZ; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(TFN),OK(TTC).

Arrowood, M. J., Mead, J. R., Xie, L. T., and You, X. (1996). In Vitro Anticryptosporidial Activity of Dinitroaniline Herbicides. *FEMS Microbiol.Lett.* 136: 245-249.

EcoReference No.: 104391

Chemical of Concern: TFN,PDM; Habitat: T; Effect Codes: GRO,MOR; Rejection Code: LITE EVAL CODED(PDM,TFN).

Bailey, H. C. and Liu, D. H. W. (1980). *Lumbriculus variegatus*, a Benthic Oligochaete, as a Bioassay Organism. In: J.C.Eaton, P.R.Parrish, and A.C.Hendricks (Eds.), *Aquatic Toxicology and Hazard Assessment, 3rd Symposium, ASTM STP 707, Philadelphia, PA* 205-215.

EcoReference No.: 6502

Chemical of Concern: DDT,24DXY,TNT,MLN,Hg,Zn,CuS,Cr,Pb,Cd,CHD,CBL,MXC,ZnCl₂,TFN; Habitat: A; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(24DXY,CBL,CuS,OW-TRV-Cu,MLN,ZnCl₂,TFN),OK(ALL CHEMS).

Bakalivanov, D. and Kostov, O. (1981). Soil Microbiological Assessment of Toxicity of Alkanoate, Amide and Other Herbicides. *Acta Microbiol.Acad.Sci.Hung.* 28: 141-146.

EcoReference No.: 90511

Chemical of Concern: 24D,MCPA,BMC,TFN,PCH,ACR; Habitat: T; Effect Codes: POP,MOR; Rejection Code: LITE EVAL CODED(BMC,24D,ACR,TFN).

Beck, S. L. (1993). Additional Endpoints and Overview of a Mouse Skeletal Variant Assay for Detecting Exposure to Teratogens. *Teratology* 47: 147-157.

EcoReference No.: 82909

Chemical of Concern: TFN,Captan,Maneb,DM; Habitat: T; Effect Codes: GRO; Rejection Code: LITE EVAL CODED(Maneb,Captan,TFN,DM),NO COC(ASCN).

Beck, S. L. (1981). Assessment of Adult Skeletons to Detect Prenatal Exposure to 2,4,5-T or Trifluralin in Mice.

Teratology 23: 33-55.

EcoReference No.: 80990

Chemical of Concern: TFN; Habitat: T; Effect Codes: MOR,REP,GRO; Rejection Code: LITE EVAL CODED(TFN).

Beck, S. L. (1978). Concentration and Toxicity of Trifluralin in CD-1 Mice, Presented Intragastrically or Intraperitoneally. *Bull.Environ.Contam.Toxicol.* 20: 554-560 .

EcoReference No.: 109577

Chemical of Concern: TFN; Habitat: T; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(TFN).

Beskid, J. C. (1988). Effects of Treflan on Embryonic Development of Bobwhite Quail. *M.S.Thesis, Frostburg State Univ., Frostburg, MD* 42 p.

EcoReference No.: 62941

Chemical of Concern: TFN; Habitat: T; Effect Codes: GRO,REP,MOR,BCM,CEL; Rejection Code: LITE EVAL CODED(TFN).

Blakley, B. R., Yole, M. J., Brousseau, P., Boermans, H., and Fournier, M. (1998). Effect of 2,4-Dichlorophenoxyacetic Acid, Trifluralin and Triallate Herbicides on Immune Function. *Vet.Hum.Toxicol.* 40: 5-10.

EcoReference No.: 93627

Chemical of Concern: TRL,TFN,DMDP; Habitat: T; Effect Codes: GRO,PHY; Rejection Code: LITE EVAL CODED(DMDP,TFN).

Bland, C. E., Ruch, D. G., Salser, B. R., and Lightner, D. V. (1976). Chemical Control of Lagenidium, a Fungal Pathogen of Marine Crustacea. *NOAA Office of Sea Grant, Dep.of Commerce, State of North Carolina* 445-472.

EcoReference No.: 18810

Chemical of Concern: PNB,CuS,MZB,Captan,CAP,BMY,TFN; Habitat: A; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(Captan,CAP,MZB,BMY,TFN),OK(PNB,CuS).

Bowman, J. E. and Sinclair, J. B. (1986). Effect of Herbicides and Oat Amendment on Soybean Disease Development and Seed Quality. *J.Phytopathol.* 117: 252-259.

EcoReference No.: 109658

Chemical of Concern: TFN; Habitat: T; Effect Codes: GRO,REP; Rejection Code: LITE EVAL CODED(TFN).

Bretag, T. W. and Kollmorgen, J. F. (1986). Effects of Trifluralin, Benomyl and Metalaxyl on the Incidence and Severity of Root Disease in Annual Medicago spp., and Evaluation of Cultivars for Resistance to Root Rot. *Aust.J.Exp.Agric.* 26: 65-70.

EcoReference No.: 110037

Chemical of Concern: BMY,TFN,MLX; Habitat: T; Effect Codes: MOR,GRO,PHY; Rejection Code: LITE EVAL CODED(TFN),OK(BMY,MLX).

Brown, L. S. and Lean, D. R. S. (1995). Toxicity of Selected Pesticides to Lake Phytoplankton Measured Using Photosynthetic Inhibition Compared to Maximal Uptake Rates of Phosphate and Ammonium. *Environ.Toxicol.Chem.* 14: 93-98.

EcoReference No.: 13724

Chemical of Concern: 24DXY,ATZ,DBN,DU,PMT,SZ,TFN,PPZ,Captan,DCPA,PPN; Habitat: A; Effect Codes: BCM; Rejection Code: LITE EVAL CODED(24DXY,Captan,ATZ,SZ,PPZ,DU,DCPA,PPN,PMT,TFN).

Bulcke, R. A. J. and Stryckers, J. M. T. (1977). Bioassays for the Detection of Herbicides and Algicides in Water. *Meded.Fac.Landbouww.Univ.Gent* 42: 1625-1634.

EcoReference No.: 91692
Chemical of Concern: DU,CZE,PZM,TFN; Habitat: AT; Effect Codes: GRO,POP,CEL; Rejection Code: LITE EVAL CODED(TFN),OK(PZM,DU).

Burpee, L. L. and Cole, H. Jr. (1978). The Influence of Alachlor, Trifluralin, and Diazinon on the Development of Endogenous Mycorrhizae in Soybeans. *Bull.Environ.Contam.Toxicol.* 19: 191-197.

EcoReference No.: 56262
Chemical of Concern: ACR,DZ,TFN; Habitat: T; Effect Codes: GRO,BCM,POP; Rejection Code: LITE EVAL CODED(DZ,ACR),OK(TFN).

Byrd, R. A., Markham, J. K., and Emmerson, J. L. (1995). Developmental Toxicity of Dinitroaniline Herbicides in Rats and Rabbits: I. Trifluralin. *Fundam.Appl.Toxicol.* 26: 181-190.

EcoReference No.: 109382
Chemical of Concern: TFN; Habitat: T; Effect Codes: BEH,GRO,REP; Rejection Code: LITE EVAL CODED(TFN).

Caldwell, R. S. (1977). Biological Effects of Pesticides on the Dungeness Crab. *EPA-600/3-77-131, U.S.EPA, Gulf Breeze, FL* 143 p. (NTIS/PB-276978).

EcoReference No.: 6793
Chemical of Concern: CBF,CHD,MLN,MXC,24DXY,Captan,PPN,TFN,TBF; Habitat: A; Effect Codes: GRO,MOR,CEL,ACC,BEH; Rejection Code: LITE EVAL CODED(24DXY,TBF,CBF,MLN,Captan,PPN,TFN),OK(CHD,MXC).

Carson, M. L., Arnold, W. E., and Todt, P. E. (1991). Predisposition of Soybean Seedlings to Fusarium Root Rot with Trifluralin. *Plant Dis.* 75: 342-347.

EcoReference No.: 109383
Chemical of Concern: TFN; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(TFN).

Cerkauskas, R. F., Verma, P. R., and McKenzie, D. L. (1986). Effects of Herbicides on In Vitro Growth and Carpogenic Germination of *Sclerotinia sclerotiorum*. *Can.J.Plant Pathol.* 8: 161-166.

EcoReference No.: 98275
Chemical of Concern: 24D,24DB,ACR,ATZ,BMN,CZE,DFPM,EPTC,EFL,FZFB,GYPI,MBZ,SXD,TFN; Habitat: T; Effect Codes: GRO,REP,POP; Rejection Code: LITE EVAL CODED(EPTC,ATZ,24D,GYPI,ACR,TFN),OK(24DB,SXD).

Cholakakis, J. M., Wong, L. C. K., and Lee, C. C. (1978). Study of the Chemical and Behavioral Toxicology of Substitute Chemicals in Microtine Rodents. *EPA-600/3-78-082, U.S.EPA, Corvallis, OR* 54 p. (NTIS/PB-288416).

EcoReference No.: 70756
Chemical of Concern: PNB,TFN,24D,MP,PRN,PPN,PNB,SZ,DLD; Habitat: T; Effect Codes: MOR,PHY; Rejection Code: LITE EVAL CODED(SZ,MP,24D,TFN,PPN).

Couch, J. A. (1984). Histopathology and Enlargement of the Pituitary of a Teleost Exposed to the Herbicide

Trifluralin. *J Fish Dis* 7: 157-163.

EcoReference No.: 48406

Chemical of Concern: TFN; Habitat: A; Effect Codes: PHY; Rejection Code: LITE EVAL CODED(TFN).

De, R. K., Mandal, R. K., Sarkar, S., and Ghorai, A. K. (2007). Non-Target Effect of Herbicides on *Macrophomina phaseolina* Causing Stem Rot of Jute. *Environ.Ecol.* 25S: 475-478.

EcoReference No.: 100606

Chemical of Concern: TFN; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(TFN),NO COC(QZFE).

El-Khadem, M., Nagib, M. M., and Tewfik, M. S. (1973). The Effect of Certain Nitro-Herbicides on the Growth of Some Soil-Inhabiting Fungi. *Zentbl.Bakteriol.Parasitenkd.Infektionskr.Hyg.Abt.2* 128: 780-786.

EcoReference No.: 109659

Chemical of Concern: TFN; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(TFN).

Fabacher, D. L., Kulkarni, A. P., and Hodgson, E. (1980). Pesticides as Inducers of Hepatic Drug-Metabolizing Enzymes - I. Mixed Function Oxidase Activity. *Gen.Pharmacol.* 11: 429-435.

EcoReference No.: 92612

Chemical of Concern: CHD,CPY,ES,MLN,PMR,24D,PPB,TFN,FNV,TBF; Habitat: T; Effect Codes: GRO,BCM; Rejection Code: LITE EVAL CODED(CPY,24D,TBF,FNV,ES,MLN,TFN),OK(PMR,PPB).

Fairchild, J. F., Ruessler, D. S., Haverland, P. S., and Carlson, A. R. (1997). Comparative Sensitivity of *Selenastrum capricornutum* and *Lemna minor* to Sixteen Herbicides. *Arch.Environ.Contam.Toxicol.* 32: 353-357.

EcoReference No.: 18093

Chemical of Concern: 24DXY,ACR,ATZ,BMN,MBZ,MTL,PAQT,SZ,DMM,TFN,EPTC,PQT,DQTBr; Habitat: A; Effect Codes: POP; Rejection Code: LITE EVAL CODED(EPTC,24DXY,ATZ,MTL,SZ,ACR,PQT,TFN,DQTBr).

Farag, R. S., El-Leithy, M. A., Basyony, A. E., and Daw, Z. Y. (1987). Growth and Aflatoxin Production by *Aspergillus parasiticus* in a Medium Containing Plant Hormones, Herbicides or Insecticides. *J.Food Prot.* 50: 1044-1047.

EcoReference No.: 89314

Chemical of Concern: IAA,PAQT,PDM,TFN,MLN,AZ,PIRM; Habitat: T; Effect Codes: POP,BCM; Rejection Code: LITE EVAL CODED(MLN,AZ,PAQT,TFN),OK(IAA,PDM,PIRM).

Felix, H. R., Chollet, R., and Harr, J. (1988). Use of the Cell Wall-Less Alga *Dunaliella bioculata* in Herbicide Screening Tests. *Ann.Appl.Biol.* 113: 55-60.

EcoReference No.: 13100

Chemical of Concern: 24DXY,ACR,ATZ,DBN,DU,GYP,NFZ,OXF,OYZ,TFN,SXD,ASM,AMTL,PAQT,NFZ,EPTC,FZFB,ACF,C SF,PQT; Habitat: A; Effect Codes: MOR,POP; Rejection Code: LITE EVAL CODED(ATZ,OXF,EPTC,OYZ,DU,ACR,PQT,TFN),NO ENDPOINT(GYP,NFZ,24D).

Foureman, P. A. (1988). The TX; Y Test for the Detection of Nondisjunction and Chromosome Breakage in *Drosophila melanogaster*: I. Analysis of Spontaneous Events and Results of Male Exposure. *Mutat.Res.* 203: 427, 444 (doi: 10.1016/0165-1161(88)90015-5).

EcoReference No.: 110053

Chemical of Concern: TFN; Habitat: T; Effect Codes: CEL,REP; Rejection Code: LITE EVAL

CODED(TFN).

Foureman, P. A. (1988). The TX; Y Test for the Detection of Nondisjunction and Chromosome Breakage in *Drosophila melanogaster*: II. Results of Female Exposures. *Mutat.Res.* 203: 309, 316 (doi: 10.1016/0165-1161(88)90020-9).

EcoReference No.: 110054

Chemical of Concern: TFN; Habitat: T; Effect Codes: CEL; Rejection Code: LITE EVAL CODED(TFN).

Fracek, S. and Margulis, L. (1979). Colchicine, Nocodazole and Trifluralin: Different Effects of Microtubule Polymerization Inhibitors on the Uptake and Migration of Endosymbiotic Algae in *Hydra viridis*. *Cytobios* 25: 7-16.

EcoReference No.: 15834

Chemical of Concern: TFN; Habitat: A; Effect Codes: BEH,PHY,MOR; Rejection Code: LITE EVAL CODED(TFN).

Francis, P. C., Emmerson, J. L., Adams, E. R., and Owen, N. V. (1991). Oncogenicity Study of Trifluralin in B6C3F1 Mice. *Food Chem.Toxicol.* 29: 549-555.

EcoReference No.: 110038

Chemical of Concern: TFN; Habitat: T; Effect Codes: PHY,MOR,BEH,BCM,CEL; Rejection Code: LITE EVAL CODED(TFN).

Gardner, C. and Northam, M. (1997). Use of Prophylactic Treatments for Larval Rearing of Giant Crabs *Pseudocarcinus gigas* (Lamarck). *Aquaculture* 158: 203-214.

EcoReference No.: 68361

Chemical of Concern: OXT,TFN,CBD,FML; Habitat: A; Effect Codes: MOR,GRO; Rejection Code: LITE EVAL CODED(OXT,CBD,TFN),NO COC(CuOS).

Gardner, W. A. and Storey, G. K. (1985). Sensitivity of *Beauveria bassiana* to Selected Herbicides. *J.Econ.Entomol.* 78: 1275-1279.

EcoReference No.: 70790

Chemical of Concern:

SZ,PZM,ACF,ACR,BT,DFP,DU,FZF,GYP,MTL,MBZ,OYZ,OXF,PQT,PND,PPZ,SXD,TRB,TFN,24D;
Habitat: T; Effect Codes: GRO,POP; Rejection Code: LITE EVAL CODED(DU,PQT,ACR,TFN),OK(SZ,PZM,BT,GYP,MTL,OYZ,OXF,PPZ,SXD,24D).

Gebel, T., Kevekordes, S., Pav, K., Edenharter, R., and Dunkelberg, H. (1997). In Vivo Genotoxicity of Selected Herbicides in the Mouse Bone-Marrow Micronucleus Test. *Arch.Toxicol.* 71: 193-197.

EcoReference No.: 100768

Chemical of Concern: TBZ,PDM,ACR,ATZ,GFSNH,TFN; Habitat: T; Effect Codes: CEL,MOR; Rejection Code: LITE EVAL CODED(GFSNH,ATZ,ACR,TFN,PDM,TBZ).

Golab, T., Herberg, R. J., Day, E. W., Raun, A. P., Holzer, F. J., and Probst, G. W. (1969). Fate of Carbon-14 Trifluralin in Artificial Rumen Fluid and in Ruminant Animals. *J.Agric.Food Chem.* 17: 576-580.

EcoReference No.: 36819

Chemical of Concern: TFN; Habitat: T; Effect Codes: ACC; Rejection Code: LITE EVAL CODED(TFN).

Hamer, M. J. and Heimbach, F. (1996). Ring Testing a Standardised Test Method for a Toxicity Test on Sediment-Dwelling *Chironomus riparius* by Spiking the Overlying Water. In: *M.Munawar and G.Dave (Eds.), Ecovision World Monogr.Ser.: Development and Progress in Sediment Quality Assessment: Rationale,*

Challenges, Techniques and Strategies, 1st Int.Symp.on Sediment Quality Assessment, Aug.22-25, 1994, Goteborg, Sweden 195-202.

EcoReference No.: 109655

Chemical of Concern: HCCH,TFN; Habitat: A; Effect Codes: MOR,GRO; Rejection Code: LITE EVAL CODED(TFN),OK(HCCH).

Hasegawa, R. and Ito, N. (1992). Liver Medium-Term Bioassay in Rats for Screening of Carcinogens and Modifying Factors in Hepatocarcinogenesis. *Food Chem.Toxicol.* 30: 979-992.

EcoReference No.: 75839

Chemical of Concern:

TBF,DMETH,DHB,TDF,VCZ,NaPP,TFN,ILL,PL,GYP,PMR,DDT,DM,DCNA,CYP,DMZ,ACR,AND,ATZ,MLN,PAH; Habitat: T; Effect Codes: CEL; Rejection Code: LITE EVAL CODED(MLN,ATZ,GYP,PMR,NaPP,TFN,DHB,DMZ,VCZ,DM,CYP,ACR),NO REVIEW(FNV,EFV,Folpet).

Hill, E. F. and Camardese, M. B. (1986). Lethal Dietary Toxicities of Environmental Contaminants and Pesticides to Coturnix. *U.S.Fish Wildl.Serv., Fish Wildl.Tech.Rep.No.2* 147 p.

EcoReference No.: 50181

Chemical of Concern:

24D,24DXY,ACP,ADC,AMSV,AMTL,AND,ARM,ATN,ATZ,AZ,BMC,BMN,BMY,Captan,CBF,CBL,CdCl₂,CHD,CMPH,CPY,CPYM,CrS,DBN,DCF,DCTP,DDT,DDVP,DEM,DFPM,DINO,DLD,DMB,DMT,DQTB r,DS,DU,DZ,EN,EP,ES,ETN,FMP,FNF,FNT,FNTH,FTTCL,GYP,HCCH,HgCl₂,HPT,IFP,K₂Cr₂O₇,LNR,Maneb,MCB,MCPB,MDT,MLN,MLT,MOM,MP,MRX,MSMA,MTAS,MTM,MVP,MXC,Naled,Ni,OXD,Pb,PbN,PCB,PCL,PCP,PHSL,PMR,PPB,PPHD,PPN,PPX,PQT,PRN,PRT,PSM,PYN,RSM,RTN,SPS,STAR,SZ,TBO,TCF,TEPP,TFN,THM,TMP,TVMP, TVP,TXP,V,Zineb,Ziram,ZnP; Habitat: T; Effect Codes: MOR,BEH; Rejection Code: LITE EVAL CODED(ACP,ADC,ATN,ATZ,AZ,BMC,BMY,Captan,CBF,CBL,CMPH,CPY,CPYM,DCF,DCTP,DDVP,DMT,DQTB r,DS,DU,DZ,EP,ES,FMP,FNF,FNT,FTTCL,GYP,MCB,MDT,MLN,MLT,MOM,MP,MTAS,MTM,MVP,Naled,OXD,PMR,PPN,PQT,PRN,PRT,PSM,RTN,SZ,TBO,TCF,TFN,TMP,TVP,Ziram,24D),OK(ES,MVP,PPN,TEPP).

Hoffman, D. J. and Albers, P. H. (1984). Evaluation of Potential Embryotoxicity and Teratogenicity of 42 Herbicides, Insecticides, and Petroleum Contaminants to Mallard Eggs. *Arch.Environ.Contam.Toxicol.* 13 : 15-27.

EcoReference No.: 35249

Chemical of Concern:

ACP,CBL,DZ,DMT,EN,HCCH,MLN,MOM,Naled,PRN,PMR,PSM,SPS,TMP,TXP,AMTL,ATZ,BMN,MCPA,24DXY,DMB,GYP,PAQT,PCL,PRO,PPN,TFN,ALSV,DDVP,PQT,TDC; Habitat: T; Effect Codes: MOR,GRO; Rejection Code: LITE EVAL CODED(PMR,GYP,PSM,24DXY,Naled,MLN,CBL,ACP,PRO,DZ,ATZ,MOM,DMT,DMB,ALSV,TMP,DDVP,PPN,PQT,TFN,TDC),NO MIXTURE(BMN,MCPA).

Hudson, R. H., Tucker, R. K., and Haegle, M. A. (1984). Handbook of Toxicity of Pesticides to Wildlife. *Resour.Publ.No.153, Fish Wildl.Serv., 2nd Edition, U.S.D.I., Washington, DC* 90 p.

EcoReference No.: 50386

Chemical of Concern:

ACP,ACL,ACR,ADC,AND,ATN,AMTL,ANZ,ATZ,4AP,AZ,BFL,BTY,Captan,CBL,CBF,CHD,CPH,CQTC,CPYM,CMPH,CZE,24D,DCNA,DDT,DDVP,DEF,DEM,DZ,DBN,DLN,DCF,DCTP,DFZ,DINO,DLD,DMT,DQTB r,DS,DU,ES,EDT,EN,EP,ETN,FMP,FNT,FNTH,FMU,FO,Folpet,FNF,HPT,PSM,HCCH,MLN,MDT,MCB,MOM,MTM,MTPN,MXC,MP,MVP,MRX,NaFA,NABAM,Naled,OXD,PMA,PNB,PPHD,PPX,PQT,PRN,PCP,PNB,PRT,PCL,PSM,PYT,RSM,RTN,STAR,STCH,TBF,TCDD,TFM,T1,TMP,TZL,TVP,TZL,THM,TXP,TCF,TFN,VCZ,ZnP,Zineb,PCB; Habitat: T; Effect Codes: MOR; Rejection Code: LITE EVAL

CODED(ACL,ACR,ADC,ATN,BTY,Captan,CQTC,TBF,DBN,DLN,DCF,DFZ,DINO,DQTBBr,CPYM,ES,FNT,FO,MCB,MLN,MOM,MP,MVP,PQT,TCF,TFN,24D,CPY,DS,PSM,ATZ,DU,MDT,PRT,RTN,EP,DZ,TMP,CMPH,DCTP,TVPM,FMP,MTM,ACP,Naled,DDVP,DMT,AZ,CBF,PPX,VCZ).

Jayanarayan, K. G. and Dey, C. S. (2005). Altered Tubulin Dynamics, Localization and Post-Translational Modifications in Sodium Arsenite Resistant *Leishmania donovani* in Response to Paclitaxel, Trifluralin and a Combination of both and Induction of Apoptosis-like Cell Death. *Parasitology* 131: 215-230.

EcoReference No.: 109940

Chemical of Concern: TFN; Habitat: T; Effect Codes: BCM,MOR; Rejection Code: LITE EVAL CODED(TFN).

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EcoReference No.: 12280

Chemical of Concern: TFN,TRL,PRT,FNF,CBF,ATZ; Habitat: A; Effect Codes: MOR,POP,GRO; Rejection Code: LITE EVAL CODED(ATZ,CBF,PRT,TFN).

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EcoReference No.: 40147

Chemical of Concern: 24DXY,PMR,TFN,GYPI,PRO; Habitat: T; Effect Codes: CEL; Rejection Code: LITE EVAL CODED(PRO,24DXY,GYPI,TFN),TARGET(PMR).

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EcoReference No.: 74251

Chemical of Concern: MLT,TBC,TFN,BT; Habitat: T; Effect Codes: CEL; Rejection Code: LITE EVAL CODED(MLT,TBC,TFN,BT).

Khalifa, M. A. S., El-Deeb, S. T., Kadous, E. A., Hassan, A., and Soliman, F. S. (1987). Herbicide-Plant Disease Relationships: Effect of Soil Herbicides on Rhizoctonia Damping-off on Cotton Seedlings. *Med.Fac.Landbouww.Rijksuniv.Gent.* 52: 1233-1244.

EcoReference No.: 95401

Chemical of Concern: PDM,LNR,BTL,TFN,FMU,ATZ,CZE; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(LNR,ATZ,TFN),OK(PDM).

Khalil, Z., Shabana, E. F., Kobbia, I. A., and Zaki, F. T. (1993). Phosphatase Activities and Phosphorus Fractions in Two Periphytic Cyanobacteria, in Response to Some Pesticides. *Egypt.J.Microbiol.* 26: 429-441.

EcoReference No.: 93338

Chemical of Concern: DMT,CPY,TFN; Habitat: A; Effect Codes: BCM; Rejection Code: LITE EVAL CODED(DMT,CPY,TFN).

Kim, D. G. and Riggs, R. D. (1998). Effects of Some Pesticides on the Growth of ARF18 and Its Pathogenicity to *Heterodera glycines*. *J.Nematol.* 30: 201-205.

EcoReference No.: 70527

Chemical of Concern:

FPP,KFAT,DZ,TPM,MYC,MZB,FML,DLN,CTN,PNB,SXD,CBL,DCNA,MLN,CHX,DCF,GYPI,PAQT,TFN,ADC; Habitat: T; Effect Codes: GRO,POP; Rejection Code: LITE EVAL

CODED(DZ,DCNA,SXD,CBL,GYPI,MLN,PAQT),OK(FPP,MLN,DCF,TFN,ADC),TARGET(MYC,MZB,CTN).

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EcoReference No.: 75051

Chemical of Concern: DMT,TFN,DINO,CPY; Habitat: A; Effect Codes: PHY,BCM; Rejection Code: LITE EVAL CODED(DMT,CPY,TFN).

Kobbia, I. A., Shabana, E. F., Khalil, Z., and Zaki, F. T. (1991). Growth Criteria of Two Common Cyanobacteria Isolated from Egyptian Flooded Soil, as Influenced by Some Pesticides. *Water Air Soil Pollut.* 60: 107-116.

EcoReference No.: 67667

Chemical of Concern: DMT,TFN,DINO,CPY; Habitat: A; Effect Codes: POP,BCM,PHY; Rejection Code: LITE EVAL CODED(DMT,CPY,TFN).

Kremer, R. J. and Schulte, L. K. (1989). Influence of Chemical Treatment and *Fusarium oxysporum* on Velvetleaf (*Abutilon theophrasti*). *Weed Technol.* 3: 369-374.

EcoReference No.: 106960

Chemical of Concern: CBF,BTY,EPTC,TFN,KN03,NaN3,EPH; Habitat: T; Effect Codes: GRO,MOR,PHY,POP; Rejection Code: LITE EVAL CODED(CBF,BTY,EPTC,TFN).

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EcoReference No.: 92613

Chemical of Concern: TBF,TFN,ES,CHD,MLN,CPY,PPB,24D,PMR,TVP; Habitat: T; Effect Codes: BCM; Rejection Code: LITE EVAL CODED(PMR,CPY,24D,ES,MLN,TBF,TFN),OK(PPB,TVP).

Lio-Po, G. D. and Sanvictores, E. G. (1986). Tolerance of *Penaeus monodon* Eggs and Larvae to Fungicides Against *Lagenidium* sp. and *Haliphthoros philippinensis*. *Aquaculture* 51: 161-168.

EcoReference No.: 4581

Chemical of Concern: 24DXY,CTN,TFN,DBAC,24DB; Habitat: A; Effect Codes: MOR,GRO; Rejection Code: LITE EVAL CODED(24DXY,DBAC,CTN,TFN),OK(24DB).

Liu, D. H. W. and Lee, J. M. (1975). Toxicity of Selected Pesticides to the Bay Mussel (*Mytilus edulis*). *EPA-660/3-75-016, U.S.EPA, Corvallis, OR* 102 p. (NTIS/PB-243221).

EcoReference No.: 8127

Chemical of Concern: MXC,CBL,MLN,TFN,24DXY; Habitat: A; Effect Codes: GRO,MOR; Rejection Code: LITE EVAL CODED(24DXY,CBL,MLN,TFN),OK(MXC).

Ma, J. and Liang, W. (2001). Acute Toxicity of 12 Herbicides to the Green Algae *Chlorella pyrenoidosa* and *Scenedesmus obliquus*. *Bull.Environ.Contam.Toxicol.* 67: 347-351 .

EcoReference No.: 61984

Chemical of Concern: GFS,CZE,ACO,TFN,FTS,CRME,BSFM,CLT,MTL,BMN,DQTB; Habitat: A; Effect Codes: POP; Rejection Code: LITE EVAL CODED(GFS,FTS,CLT,MTL,TFN),NO COC(MCPP1,ACR).

Ma, J., Lin, F., Wang, S., and Xu, L. (2004). Acute Toxicity Assessment of 20 Herbicides to the Green Alga *Scenedesmus quadricauda* (Turp.) Breb. *Bull.Environ.Contam.Toxicol.* 72: 1164-1171.

EcoReference No.: 101396

Chemical of Concern:

TFN,PDM,ANL,BP,FTS,EMSF,DZP,QZF,HFP,FZFP,CLT,NSF,MTSM,TN,BSFM,CRME; Habitat: A; Effect Codes: POP; Rejection Code: LITE EVAL CODED(TFN,PDM,ANL,BP,FTS,EMSF,DZP,QZF,HFP,FZFP,CLT,NSF,MTSM,TN,BSFM,CRME).

Ma, J., Xu, L., Wang, S., Zheng, R., Jin, S., Huang, S., and Huang, Y. (2002). Toxicity of 40 Herbicides to the Green Alga *Chlorella vulgaris*. *Ecotoxicol.Environ.Saf.* 51: 128-132.

EcoReference No.: 65938

Chemical of Concern:

DFP,QZF,HFP,FNP,FZF,CLT,NSF,TN,EMSF,BSFM,CRME,FTS,BP,ANL,TFN,PDM,BTC,MTL,MLT,AC O,ATZ,SZ,CZE,DU,PAQT,BMN,FXP,QNC,OXF,GYP,GFSNH,PMT,PQT; Habitat: A; Effect Codes: POP; Rejection Code: LITE EVAL CODED(GFSNH,OXF,GYP,FNP,ATZ,MLT,MTL,SZ,QNC,FTS,CLT,DU,PDM,PMT,PQT,TFN).

Macek, K. J., Lindberg, M. A., Sauter, S., Buxton, K. S., and Costa, P. A. (1976). Toxicity of Four Pesticides to Water Fleas and Fathead Minnows: Acute and Chronic Toxicity of Acrolein, Heptachlor, Endosulfan, and Trifluralin to the Water Flea (*Daphnia magna*) and the Fathead Minnow (*Pimephales promelas*). *EPA-600/3-76-099*, U.S.EPA, Duluth, MN 68 p.

EcoReference No.: 632

Chemical of Concern: ACL,TFN,ES,HPT; Habitat: A; Effect Codes: MOR,ACC,REP; Rejection Code: LITE EVAL CODED(ACL,TFN),OK(HPT),NO ENDPOINT,NO CONTROL(ES).

Mansour, S. A. and Mohsen, E. R. (1985). Pesticides and Beneficial Organisms II. The Response of Two Fish Species to Certain Herbicides. *Pesticides* 19: 43-44.

EcoReference No.: 11531

Chemical of Concern: MLT,TFN,PAQT,PPN,PQT; Habitat: A; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(MLT,PPN,PQT,TFN).

McClurg, C. A. and Bergman, E. L. (1972). Influence of Selected Pesticides on Leaf Elemental Content and Yield of Garden Beans (*Phaseolus vulgaris* L.). *J.Environ.Qual.* 1: 200-203.

EcoReference No.: 52039

Chemical of Concern: PCH,DCPA,EPTC,TFN,BMY,DS; Habitat: T; Effect Codes: POP,GRO,BCM,PHY; Rejection Code: LITE EVAL CODED(DS,BMY,TFN),OK(DCPA,EPTC).

Moody, D. E., Narloch, B. A., Shull, L. R., and Hammock, B. D. (1991). The Effect of Structurally Divergent Herbicides on Mouse Liver Xenobiotic-Metabolizing Enzymes (P-450-Dependent Mono-Oxygenases, Epoxide Hydrolases and Glutathione S-Transferases) and Carnitine Acetyltransferase. *Toxicol.Lett.* 59: 175-185.

EcoReference No.: 77500

Chemical of Concern: DPP1,TBC,CFRM,MCP1,ACR,ATZ,MLT,TFN,DMB; Habitat: T; Effect Codes: BCM; Rejection Code: LITE EVAL CODED(DPP1,MCP1,ATZ,CFRM,DMB,ACR,TFN,TBC)OK(MLT).

Moorman, T. B. and Dowler, C. C. (1991). Herbicide and Rotation Effects on Soil and Rhizosphere Microorganisms and Crop Yields. *Agric.Ecosyst.Environ.* 35: 311-325 .

EcoReference No.: 79970

Chemical of Concern: ACR,TFN; Habitat: T; Effect Codes: GRO,POP; Rejection Code: LITE EVAL CODED(ACR,TFN).

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Chemical of Concern: TFN; Habitat: A; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(TFN).
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- EcoReference No.: 10092
Chemical of Concern: OYZ,TFN; Habitat: A; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(TFN),NO ENDPOINT,NO CONTROL(OYZ).
- Nehez, M., Paldy, A., Selyes, A., Korosfalvi, M., Lorinczi, I., and Berencsi, G. (1979). The Mutagenic Effect of Trifluralin-Containing Herbicide on Mouse Bone Marrow In Vivo. *Ecotoxicol.Environ.Saf.* 3: 454, 457 (doi: 10.1016/0147-6513(79)90035-6).
- EcoReference No.: 110035
Chemical of Concern: TFN; Habitat: T; Effect Codes: MOR,CEL; Rejection Code: LITE EVAL CODED(TFN).
- Nehez, M., Paldy, A., Selyes, A., Korosfalvi, M., Lorinczi, I., and Berencsi, G. (1980). The Mutagenic Effect of Trifluralin-Containing Herbicide on Mouse Germ Cells In Vivo. *Ecotoxicol.Environ.Saf.* 4: 263, 266 (doi: 10.1016/0147-6513(80)90028-7) .
- EcoReference No.: 110036
Chemical of Concern: TFN; Habitat: T; Effect Codes: MOR,CEL; Rejection Code: LITE EVAL CODED(TFN).
- Nimmo, D. R., Hamaker, T. L., Matthews, E., and Moore, J. C. (1981). An Overview of the Acute and Chronic Effects of First and Second Generation Pesticides on an Estuarine Mysid. In: *F.J.Vernberg, A.Calabrese, F.P.Thurberg, and W.B.Vernberg (Eds.), Biological Monitoring of Marine Pollutants, Academic Press, Inc., NY* 3-19.
- EcoReference No.: 4891
Chemical of Concern: CBL,MP,PRT,DZ,TFN,TXP,DFZ,TBF; Habitat: A; Effect Codes: REP,MOR; Rejection Code: LITE EVAL CODED(TBF,CBL,DZ,PRT,MP,TFN,DFZ),OK(TXP).
- Oji, O., Sapra, V. T., and Pacumbaba, R. P. (1988). Effect of Nematicide and Herbicide Interactions on Field Population of Cyst Nematode and Agronomic Characters of Soybean. *J.Agron.Crop Sci.* 160: 309-313.
- EcoReference No.: 109607
Chemical of Concern: FMP,ADC,TFN,LNR; Habitat: T; Effect Codes: POP,GRO; Rejection Code: LITE EVAL CODED(TFN,ADC),OK(FMP,LNR).
- Ordog, V. and Kuivasniemi, K. (1989). Studies on the Effect of Cell Division-Inhibiting Herbicides on Unialgal and Mixed Algal Cultures. *Int.Rev.Hydrobiol.* 74: 221-226.
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Chemical of Concern: TFN; Habitat: A; Effect Codes: CEL,GRO; Rejection Code: LITE EVAL CODED(TFN).
- Osman, A. R. and El-Khadem, M. M. (1989). Inhibition of *Fusarium oxysporum* F. sp. *vasinfectum* Spores by Preemergence Herbicides. *Acta Hort.* 255: 77-86.

EcoReference No.: 106174

Chemical of Concern: TFN,DU,PMT,FMU; Habitat: T; Effect Codes: MOR,POP; Rejection Code: LITE EVAL CODED(PMT,TFN),OK(DU).

Pape, R., Kissmehl, R., Glas-Albrecht, R. and Plattner, H. (1991). Effects of Anti-Microtubule Agents on Paramecium Cell Culture Growth. *Eur.J.Protistol.* 27: 283-289 .

EcoReference No.: 75833

Chemical of Concern: RTN,TFN; Habitat: A; Effect Codes: POP; Rejection Code: LITE EVAL CODED(RTN,TFN).

Park, E. K. and Lees, E. M. (2005). Application of an Artificial Sea Salt Solution to Determine Acute Toxicity of Herbicides to *Proisotoma minuta* (Collembola). *J.Environ.Sci.Health Part B* 40: 595-604.

EcoReference No.: 81754

Chemical of Concern: TFN,PDM,MTL,SZ,PMT,PAQT,FMU,DU,ATZ; Habitat: A; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(MTL,SZ,ATZ,DU,PAQT,PMT,TFN,PDM).

Parrish, P. R., Dyar, E. E., Enos, J. M., and Wilson, W. G. (1978). Chronic Toxicity of Chlordane, Trifluralin, and Pentachlorophenol to Sheepshead Minnows (*Cyprinodon variegatus*). *EPA-600/3-78-010, U.S.EPA, Gulf Breeze, FL* 53 p. (NTIS/PB-278269).

EcoReference No.: 2080

Chemical of Concern: PCP,TFN,CHD; Habitat: A; Effect Codes: ACC,BEH,GRO,MOR,REP; Rejection Code: LITE EVAL CODED(PCP,TFN).

Perminova, I. V., Gretsichsheva, N. Y., Petrosyan, V. S., Anisimova, M. A., Kulikova, N. A., Lebedeva, G. F., Matorin, D. N., and Venediktov, P. S. (2001). Impact of Humic Substances on Toxicity of Polycyclic Aromatic Hydrocarbons and Herbicides. *Proc.Workshop Symp.Humic Substances Chemical Contaminants, Int.Humic Subst.Soc., Soil Sci.Soc.Am.Am.Soc.Agron., Oct.26-27, 1997, Anaheim, CA* 275-287.

EcoReference No.: 92473

Chemical of Concern: TFN,ATZ,ANT,PYR,FA; Habitat: AT; Effect Codes: GRO,POP,BEH; Rejection Code: LITE EVAL CODED(ANT,PYR,FA,ATZ,TFN).

Petrie, G. A. (1995). Effects of Chemicals on Ascospore Production by *Leptosphaeria maculans* on Blackleg-Infected Canola Stubble in Saskatchewan. *Can.Plant Dis.Surv.* 75: 45-50.

EcoReference No.: 96995

Chemical of Concern: TFN,MBZ,GYP,TRL,UREA,THM,IPD,VCZ,TBA,ILL,CTN,BMY,TDM,PCZ; Habitat: T; Effect Codes: REP; Rejection Code: LITE EVAL CODED(GYP,TFN),TARGET(CTN,PCZ,BMY,IPD,VCZ).

Poleksic, V. and Karan, V. (1999). Effects of Trifluralin on Carp: Biochemical and Histological Evaluation. *Ecotoxicol.Environ.Saf.* 43: 213-221.

EcoReference No.: 20430

Chemical of Concern: TFN; Habitat: A; Effect Codes: BCM,CEL,GRO,MOR; Rejection Code: LITE EVAL CODED(TFN).

Pontecorvo, G. and Fantaccione, S. (2006). Recombinogenic Activity of 10 Chemical Compounds in Male Germ Cells of *Drosophila melanogaster*. *Ecotoxicol.Environ.Saf.* 65: 93-101.

EcoReference No.: 107551

Chemical of Concern: ATN,TFN,MLH,ACR,AMTL,EN; Habitat: AT; Effect Codes: REP,CEL; Rejection

Code: LITE EVAL CODED(TFN,MLH,ACR),TARGET(ATN) .

Rashid, K. Y. and Kenaschuk, E. O. (1993). Effect of Trifluralin on Fusarium Wilt in Flax. *Can.J.Plant Sci.* 73: 893-901.

EcoReference No.: 109663

Chemical of Concern: TFN; Habitat: T; Effect Codes: GRO,POP; Rejection Code: LITE EVAL CODED(TFN).

Rawlings, N. C., Cook, S. J., and Waldbillig, D. (1998). Effects of the Pesticides Carbofuran, Chlorpyrifos, Dimethoate, Lindane, Triallate, Trifluralin, 2,4-D, and Pentachlorophenol on the Metabolic Endocrine and Reproductive Endocrine System in Ewes. *J.Toxicol.Environ.Health A* 54: 21-36.

EcoReference No.: 61494

Chemical of Concern: TFN,CBF,DMT,24DXY,CPY,PCP,HCCH; Habitat: T; Effect Codes: BCM; Rejection Code: LITE EVAL CODED(24DXY,CPY,CBF,DMT,HCCH,TFN,PCP).

Reinbold, K. A. (1974). Effects of the Synergist Piperonyl-Butoxide on Toxicity and Metabolism of Pesticides in Green Sunfish (*Lepomis cyanellus Rafinesque*). *Ph.D.Thesis, Univ.of Illinois, Urbana-Champaign, IL* 79 p.

EcoReference No.: 8181

Chemical of Concern: CBF,PRT,PPB,TFN,MXC,AND; Habitat: A; Effect Codes: MOR,ACC; Rejection Code: LITE EVAL CODED(PRT,TFN),NO ENDPOINT(CBF,PPB).

Robens, J. F. (1980). Carcinogenicity Studies of Selected Herbicides. *Vet.Hum.Toxicol.* 22: 328-334.

EcoReference No.: 99246

Chemical of Concern: TFN,PCL,DMZ,CQTC,CaCY; Habitat: T; Effect Codes: PHY,MOR; Rejection Code: LITE EVAL CODED(CaCY,DMZ,TFN),OK(CQTC).

Roberts, B. L. and Dorough, H. W. (1984). Relative Toxicities of Chemicals to the Earthworm *Eisenia foetida*. *Environ.Toxicol.Chem.* 3: 67-78.

EcoReference No.: 40531

Chemical of Concern:

DU,FNV,ES,FNF,FML,NCTN,CBD,MLN,PRN,Captan,TPM,PPB,DCTP,ACP,BMY,MBZ,PAQT,BNZ,CH3 I,TFN,NaNO2,AZ,24DXY,NP,Cd,Pb,CuS,DDT,PAH,IDM,DMM,CYP,PMR,CBF,ADC,MOM,CBL,PPX,C PY,NHN,CTC,PQT,NaCl,TDC; Habitat: T; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(PMR,24DXY,FNV,CPY,Captan,MLN,ADC,CBL,NCTN,CBF,MOM,PPB,CuS,CYP,DCTP,DU,AC P,ES,BMY,CBD,PQT,NaCl,TFN,PPX,TDC).

Saghir, S. A., Charles, G. D., Bartels, M. J., Kan, L. H. L., Dryzga, M. D., Brzak, K. A., and Clark, A. J. (2008). Mechanism of Trifluralin-Induced Thyroid Tumors in Rats. *Toxicol.Lett.* 180: 38-45.

EcoReference No.: 109665

Chemical of Concern: TFN; Habitat: T; Effect Codes: GRO,BCM,PHY; Rejection Code: LITE EVAL CODED(TFN).

Sanders, H. O. (1970). Pesticide Toxicities to Tadpoles of the Western Chorus Frog *Pseudacris triseriata* and Fowler's Toad *Bufo woodhousii fowleri*. *Copeia* 2: 246-251 (Author Communication Used) (Publ in Part As 6797).

EcoReference No.: 2891

Chemical of Concern:

TFN,EDT,MLT,TXP,PAQT,24DXY,AND,MUN,Naled,HPT,AZ,HCCH,DLN,PRN,EN,DDT,MXC,PPB,PQ T; Habitat: A; Effect Codes: PHY,BEH,MOR; Rejection Code: LITE EVAL CODED(24DXY,TBF,MLT,PPB,MLN,AZ,Naled,PQT,TFN).

Santiago, L. P. and Recometa, R. D. (1981). Bio-Assay: Evaluation of Three Agricultural Herbicides on the Survival of Nile Tilapia (*Tilapia nilotica*) and Crucian Carp (*Carassius carassius* Anon) Fingerlings. *In: Tech.Rep.No.20, Freshwater Aquacult.Cent., Cent.Luzon State Univ.:* 19-29.

EcoReference No.: 4651

Chemical of Concern: TFN,EPTC; Habitat: A; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(EPTC,TFN).

Sbrilli, G., Bimbi, B., Cioni, F., Pagliai, L., Luchi, F., and Lanciotti, E. (2005). Surface and Ground Waters Characterization in Tuscany (Italy) by Using Algal Bioassay and Pesticide Determinations: Comparative Evaluation of the Results and Hazard Assessment of the Pesticides Impact on Primary Productivity. *Chemosphere* 58: 571-578.

EcoReference No.: 98204

Chemical of Concern: MTL,TFN,DIATZ,PZM,PPX,OXF,MLX,ATZ,SZ,TBZ,ODZ,PDM,FNT; Habitat: A; Effect Codes: POP,BCM; Rejection Code: LITE EVAL CODED(OXF,ATZ,FNT,PZM,TFN),OK(DIATZ,SZ,MTL,MLX).

Shabana, E. F., Khalil, Z., Kobbia, I. A., and Zaki, F. T. (1991). Amino Acid Content and Transaminases Activities in *Anabaena oryzae* and *Nostoc muscorum* as Affected by Some Pesticides. *Egypt.J.Physiol.Sci.* 15: 21-30.

EcoReference No.: 75043

Chemical of Concern: DMT,TFN,DINO,CPY; Habitat: A; Effect Codes: BCM,GRO; Rejection Code: LITE EVAL CODED(DMT,CPY,TFN).

Singh, S., Yadav, J. P. S., Tripathi, N. N., and Kumar, R. (2003). Effect of Insecticides and Herbicides on Root Rot of Cotton Caused by *Rhizoctonia solani* Kuhn. *Ann.Biol.* 19: 179-181.

EcoReference No.: 81980

Chemical of Concern: IMC,PDM,TFN,CPY; Habitat: T; Effect Codes: POP,GRO; Rejection Code: LITE EVAL CODED(CPY,IMC,PDM,TFN),NO COC(ES).

Staak, A., Frost, M., and Kratz, W. (1998). Ecotoxicological Studies on the Impact of the Herbicide Trifluralin on *Porcellio scaber* (Isopoda). *Appl.Soil Ecol.* 9: 405-409.

EcoReference No.: 106088

Chemical of Concern: TFN; Habitat: T; Effect Codes: GRO,ACC,MOR,BEH; Rejection Code: LITE EVAL CODED(TFN).

Svobodova, Z. and Pecena, M. (1988). Changes in the Red and White Blood Picture of Carp After Acute Exposure to Toxic Substances. *Pr. Vyzk.Ustav Ryb.Hydrobiol.Vodnany* 17: 116-128.

EcoReference No.: 3352

Chemical of Concern: TFN,PYZ,Cd,Zn,FRM; Habitat: A; Effect Codes: BCM,CEL,MOR; Rejection Code: LITE EVAL CODED(FRM,PYZ,TFN).

Tierney, K. B., Ross, P. S., Jarrard, H. E., Delaney, K. R., and Kennedy, C. J. (2006). Changes in Juvenile Coho Salmon Electro-Olfactogram During and After Short-Term Exposure to Current-Use Pesticides. *Environ.Toxicol.Chem.* 25: 2809-2817.

EcoReference No.: 89637

Chemical of Concern: CTN,ES,GYP,TFN,24D; Habitat: A; Effect Codes: PHY; Rejection Code: LITE EVAL CODED(CTN,ES,24D,TFN),OK(GYP).

Tu, J. C. and Hamill, A. S. (1986). Differential Effect of Two Groups of Herbicides, Dinitroaniline and Phenoxy, on Pea Root Rot. *Proc.Br.Crop Prot.Conf.- Pests and Diseases* 3: 1049-1053.

EcoReference No.: 77521

Chemical of Concern: MCPB,MCPA,TFN,PDM,OYZ,PMT,CN; Habitat: T; Effect Codes: PHY; Rejection Code: LITE EVAL CODED(PMT,TFN,OYZ,PDM),OK(CN),NO MIXTURE(MCPA,MCPB).

Turgut, C. (2007). The Impact of Pesticides Toward Parrotfeather when Applied at the Predicted Environmental Concentration. *Chemosphere* 66: 469-473.

EcoReference No.: 105140

Chemical of Concern: PYD,RIM,24D,GYP,MP,DMB,TFN,PCZ,PDM; Habitat: A; Effect Codes: GRO,BCM; Rejection Code: LITE EVAL CODED(MP,24D,PDM,TFN),OK(PCZ,DMB,GYP).

Vanninen, I. and Hokkanen, H. (1988). Effect of Pesticides on Four Species of Entomopathogenic Fungi In Vitro. *Ann.Agric.Fenn.* 27: 345-353.

EcoReference No.: 71212

Chemical of Concern: PIM,CYP,GYPI,DMT,MCPA,OML,BMY,SZ,DZ,PCZ,TFN,THM,VCZ,MZB,MLX; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(DZ,SZ,DMT,GYPI,OML,TFN),OK(CYP,THM,PIM),NO MIXTURE(MZB),TARGET(BMY,PCZ,VCZ).

Walker, W. W. (1984). Development of a Fate/Toxicity Screening Test. *EPA-600/s4-84-074, U.S.EPA, Gulf Breeze, FL* 30 p.

EcoReference No.: 90259

Chemical of Concern: MP,TBC,CTN,DFZ,CPY,ES,DFPM,PRT,TFN; Habitat: A; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(PRT,MP,TBC,CTN,DFZ,CPY,ES,DFPM,TFN).

Wells, D. E. and Cowan, A. A. (1982). Vertebral Dysplasia in Salmonids Caused by the Herbicide Trifluralin. *Environ.Pollut.Ser.A* 29: 249, 260 (doi: 10.1016/0143-1471(82)90066-6).

EcoReference No.: 109384

Chemical of Concern: TFN; Habitat: A; Effect Codes: ACC,GRO; Rejection Code: LITE EVAL CODED(TFN).

Wong, A. T. S., Tylka, G. L., and Hartzler, R. G. (1993). Effects of Eight Herbicides on In Vitro Hatching of Heterodera glycines. *J.Nematol.* 25: 578-584.

EcoReference No.: 72076

Chemical of Concern: CMZ,CZE,ACF,EFL,TFN,ACR,BT,ATZ,ZnS; Habitat: T; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(ATZ,ACR,TFN,ZnS,CMZ,CZE,ACF,EFL,BT).

Worth, H. M. (1970). The Toxicologic Evaluation of Benefin and Trifluralin. In: W.B.Deichmann, J.L.Radomski, and R.A.Penalver (Eds.), *Pesticides Symposia, Inter-Am.Conf.on Toxicol.and Occup.Med., Univ.of Miami Schl.of Med., Miami, FL* 263-267.

EcoReference No.: 73113

Chemical of Concern: BFL,TFN; Habitat: AT; Effect Codes: MOR,REP,GRO; Rejection Code: LITE EVAL CODED(TFN).

Wyss, G. S., Charudattan, R., Roskopf, E. N., and Littell, R. C. (2004). Effects of Selected Pesticides and Adjuvants on Germination and Vegetative Growth of *Phomopsis amaranthicola*, a Biocontrol Agent for *Amaranthus* spp. *Weed Res.* 44: 469-482 .

EcoReference No.: 96666

Chemical of Concern:

PEB,DCF,EPTC,OXF,PAQT,CLT,TFN,NPM,PDM,AMTR,PRM,NPP,MBZ,IZT,IPD,VCZ,BMY,DMT,MLN,CYR,LNR,DU,BS,GYPI,MTL,SXD,DCPA,IZP,SZ,ATZ,Maneb,MZB,CuOH,CTN,FSTL; Habitat: T; Effect Codes: MOR,REP; Rejection Code: LITE EVAL
CODED(LNR,GYPI,OXF,EPTC,CLT,DU,DCPA,ATZ,DMT,MLN,PAQT,PDM,DCF,TFN),TARGET(FSTL,CTN,CuOH,MZB,Maneb,BMY,IPD,VCZ),OK(SZ,SXD,MTL,BS,CYR).

Yu, S. M., Templeton, G. E., and Wolf, D. C. (1988). Trifluralin Concentration and the Growth of *Fusarium solani* f. sp. *cucurbitae* in Liquid Medium and Soil. *Soil Biol.Biochem.* 20: 607, 612 (doi: 10.1016/0038-0717(88)90142-3).

EcoReference No.: 109664

Chemical of Concern: TFN; Habitat: T; Effect Codes: POP,PHY; Rejection Code: LITE EVAL
CODED(TFN).

Zaidenberg, A., Marra, C., Luong, T., Gomez, P., Milani, L., Villagra, S., and Drut, R. (2007). Trifluralin Toxicity in a Chagas Disease Mouse Model. *Basic Clin.Pharmacol.Toxicol.* 101: 90-95.

EcoReference No.: 109660

Chemical of Concern: TFN; Habitat: T; Effect Codes: GRO,BCM,CEL; Rejection Code: LITE EVAL
CODED(TFN).

Acceptable for EcoTox but not OPP

Ahrens, J. F. (1974). Weed Control in Field-Grown Chrysanthemums. *Proc.Northeast.Weed Sci.Soc.* 28: 386-394.

EcoReference No.: 40639

Chemical of Concern: OYZ,DCPA,ACR,TFN; Habitat: T; Effect Codes: PHY,MOR; Rejection Code: NO ENDPOINT(OYZ,DCPA,ACR,TFN).

Aitken, J. B. (1975). Weed Control in Snap Beans with Dinitroaniline Herbicides. *Proc.South.Weed Sci.Soc.* 28: 175-178.

EcoReference No.: 41391

Chemical of Concern: TFN; Habitat: T; Effect Codes: MOR; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).

Alabaster, J. S. (1969). Survival of Fish in 164 Herbicides, Insecticides, Fungicides, Wetting Agents and Miscellaneous Substances. *Int.Pest Control* 11: 29-35 (Author Communication Used).

EcoReference No.: 542

Chemical of Concern:

24DXY,ATZ,CMPH,DBN,DZ,PQT,SZ,ACL,DZM,TFN,TBTO,PYZ,FUR,NaPCP,MCPPI,MTAS,BRA,ML H,Boron,DQTB; Habitat: A; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(ATZ),NO CONTROL(ALL CHEMS).

Andersen, R. N. (1975). Effects of Preplanting Soil-Incorporated Herbicides on Metribuzin Injury in Soybeans. *Proc.Northeast.Weed Control Conf.* 30: 62-63.

EcoReference No.: 41884

Chemical of Concern: MBZ,DMM,VNT,TFN; Habitat: T; Effect Codes: PHY,POP; Rejection Code: OK(MBZ),NO MIXTURE(VNT,TFN).

Anderson, R. L., Lyon, D. J., and Tanaka, D. L. (1996). Weed Management Strategies for Conservation-Tillage Sunflower (*Helianthus annuus*). *Weed Technol.* 10: 55-59.

EcoReference No.: 90191

Chemical of Concern: TFN,EFL,PDM; Habitat: T; Effect Codes: POP; Rejection Code: NO COC(CTN),NO CONTROL(TFN,EFL,PDM).

Anderson, W. P., Richards, A. B., and Whitworth, J. W. (1967). Trifluralin Effects on Cotton Seedlings. *Weeds* 15: 224-227.

EcoReference No.: 43377

Chemical of Concern: TFN; Habitat: T; Effect Codes: GRO; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).

Arafa, A. E. and Shahin, H. (1977). Effect of Some Herbicide Treatments on Vegetable Crops. I. Effect of Dinitramine, Trifluralin, Fluorodifen and Prometryn in Controlling Weeds in Cabbage Fields. *Agric.Res.Rev.* 55: 193-204.

EcoReference No.: 41418

Chemical of Concern: PMT,TFN; Habitat: T; Effect Codes: GRO; Rejection Code: NO ENDPOINT,NO CONTROL(PMT,TFN).

Armstrong, D. A., Buchanan, D. V., and Caldwell, R. S. (1976). A Mycosis Caused by *Lagneidium* sp. in Laboratory-Reared Larvae of the Dungeness Crab, *Cancer magister*, and Possible Chemical Treatments. *J.Invertebr.Pathol.* 28: 329-336.

EcoReference No.: 8280

Chemical of Concern: Captan, CTN, Folpet, TFN, CBD; Habitat: A; Effect Codes: BEH, MOR; Rejection Code: NO CONTROL(CTN, Captan, Folpet, CBD, TFN).

Ashton, F. M., Devilliers, O. T., Glenn, R. K., and Duke, W. B. (1977). Localization of Metabolic Sites of Action on Herbicides. *Pestic. Biochem. Physiol.* 7: 122-141.

EcoReference No.: 42644

Chemical of Concern: 24DXY, ATZ, BMC, DBN, TFN, PAQT, EPTC, PQT; Habitat: T; Effect Codes: PHY, CEL, BCM; Rejection Code: NO ENDPOINT, NO CONTROL(24DXY, ATZ, BMC, DBN, TFN, PAQT, EPTC, PQT).

Ashton, F. M., Penner, D., and Hoffman, S. (1968). Effect of Several Herbicides on Proteolytic Activity of Squash Seedlings. *Weed Sci.* 16: 169-171.

EcoReference No.: 43990

Chemical of Concern: TFN, EDT, 24DXY, ATZ, BMC, BMN, BS, DBN, DMB, BSO; Habitat: T; Effect Codes: BCM, GRO; Rejection Code: NO ENDPOINT, NO CONTROL(TFN, EDT, 24DXY, ATZ, BMC, BMN, BS, DBN, DMB, BSO).

Baldwin, F., Santelmann, P., and Greer, H. (1974). Weed Control Systems for Hophornbeam Copperleaf Control in Peanuts. *Agron. J.* 66: 789-792.

EcoReference No.: 41554

Chemical of Concern: DMM, ACR, MBZ, DMM, NFZ, TFN, PZM; Habitat: T; Effect Codes: MOR, PHY; Rejection Code: NO ENDPOINT, NO CONTROL(PZM, NFZ, ACR, TFN).

Barrentine, W. L. and Warren, G. F. (1971). Shoot Zone Activity of Trifluralin and Nitratin. *Weed Sci.* 19: 37-41.

EcoReference No.: 43446

Chemical of Concern: TFN; Habitat: T; Effect Codes: GRO; Rejection Code: NO ENDPOINT, NO CONTROL(TFN).

Begonia, G. B., Mercado, B. L., and Robles, R. P. (1971). Morphological and Physiological Responses of Crops and Weeds to Trifluralin. VII. Influence on Peroxidase Activity. *Philipp. Agric.* 55: 247-252.

EcoReference No.: 40817

Chemical of Concern: TFN; Habitat: T; Effect Codes: BCM; Rejection Code: NO ENDPOINT, NO CONTROL(TFN).

Berry, C. D. and Buchanan, G. A. (1975). Tolerance of Phalaris and Tall Fescue to Postemergence Herbicide Treatments. *Proc. South. Weed Sci. Soc.* 28: 102-110.

EcoReference No.: 41413

Chemical of Concern: TFN, ATZ, PCL, DMB, 24DXY; Habitat: T; Effect Codes: MOR, PHY, GRO, POP; Rejection Code: TARGET(ATZ, DMB), OK(PCL, 24DXY), NO ENDPOINT, NO CONTROL(TFN).

Berry, C. D. and Buchanan, G. A. (1974). Tolerance of Phalaris tuberosa L. and Festuca arundinacea Schreb. to Preemergence Herbicide Treatment. *Crop Sci.* 14: 96-99.

EcoReference No.: 41566

Chemical of Concern: TFN, CPP, ACR, FMU, ATZ, SZ, PMT, VNT, NPM, DU, BS, EFS, DMB, QJS, DCPA; Habitat: T; Effect Codes: MOR, REP, POP, PHY; Rejection Code: NO ENDPOINT, NO CONTROL(SID, ATZ, DMB, SZ, DCPA, TFN), NO COC(CBL).

Bobak, M. (1977). Electron Microscopical Study of the Influence of Trifluralin on the Ultrastructure of the Mitochondria in Meristematic Cells of the Horse Bean (*Vicia faba* L.). *Acta Fac.Rerum Nat.Univ.Comen.Physiol.Plant* 13: 9-13.

EcoReference No.: 41429

Chemical of Concern: TFN; Habitat: T; Effect Codes: POP; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).

Bobak, M. (1976). Electronmicroscopic Study of the Influence of Trifluraline on the Submicroscopic Structure of Interkinetic Nuclei, on the Process of Karyokinese and Cytokinese of Meristematic Cells in the Horse Bean (*Vicia faba* L.). *Acta Fac.Rerum Nat.Univ.Comen.Physiol.Plant.* 11: 19-25.

EcoReference No.: 41598

Chemical of Concern: TFN; Habitat: T; Effect Codes: CEL,PHY; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).

Boling, J. C. and HacsKaylo, J. (1966). Effect of the Systemic Insecticide UC 21149 and Four Pre-Emergence Herbicides on Cotton Seedlings. *J.Econ.Entomol.* 59: 1026-1027.

EcoReference No.: 40827

Chemical of Concern: DU,TFN,DCPA; Habitat: T; Effect Codes: GRO,PHY; Rejection Code: NO ENDPOINT(ALL CHEMS),NO COC(ADC).

Brathwaite, R. A. I. (1978). Effect of Herbicides on Weed Control, Yield and Quality of Eggplant (*Solanum melongena* L.) in Trinidad. *Weed Res.* 18: 243-246.

EcoReference No.: 41763

Chemical of Concern: TFN,DCPA; Habitat: T; Effect Codes: GRO; Rejection Code: NO ENDPOINT,NO CONTROL(DCPA,TFN).

Brock, J. L. (1972). The Control of Broad-Leaved Dock (*Rumex obtusifolius*) in Newly-Sown Red Clover (*Trifolium pratense*) with Trifluralin, Carbetamide and Asulam. *Weed Res.* 12: 310-315.

EcoReference No.: 40819

Chemical of Concern: ASM,TFN; Habitat: T; Effect Codes: GRO,POP; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).

Buchanan, G. A., Hauser, E. W., and Street, J. (1978). Response of Peanuts to Dinitroaniline Herbicides. *Proc.South.Weed Sci.Soc.* 31: 105-114.

EcoReference No.: 41393

Chemical of Concern: PDM,TFN; Habitat: T; Effect Codes: PHY; Rejection Code: NO ENDPOINT,NO CONTROL(PDM,TFN).

Bucholtz, D. L. and Lavy, T. L. (1978). Pesticide Interactions in Oats (*Avena sativa* L. 'Neal'). *J.Agric.Food* 26: 520-524.

EcoReference No.: 43477

Chemical of Concern: ATZ,DU,ACR,PRT,TFN; Habitat: T; Effect Codes: PHY,GRO; Rejection Code: LITE EVAL CODED(PRT),NO ENDPOINT,NO CONTROL(DU,ATZ,ACR,TFN).

Caldwell, R. S., Buchanan, D. V., Armstrong, D. A., Mallon, M. H., and Millemann, R. E. (1979). Toxicity of the Herbicides 2,4-D, DEF, Propanil and Trifluralin to the Dungeness Crab, *Cancer magister*. *Arch.Environ.Contam.Toxicol.* 8: 383-396.

EcoReference No.: 5724

Chemical of Concern: 24DXY,TFN,TBF,CMZ,PPN; Habitat: A; Effect Codes: MOR,GRO; Rejection Code: NO ENDPOINT,NO CONTROL(24DXY,TBF,PPN,TFN).

Cantliffe, D. J. and Phatak, S. C. (1974). Effect of Herbicides on Weed Control and Nitrate Accumulation in Spinach. *Hortscience* 9: 470-472.

EcoReference No.: 41689

Chemical of Concern: DCPA,PMT,ACR,TFN; Habitat: T; Effect Codes: POP; Rejection Code: NO COC(CBL),NO ENDPOINT,NO CONTROL(DCPA,PMT,ACR,TFN).

Cartwright, B., Schatzer, R. J., Morrison, W. P., and Chambers, C. (1992). Economics of Managing Lepidopterous Cabbage Pests in the Southwestern United States. In: N.S.Talekar (Ed.), *Diamondback Moth and Other Crucifer Pests, 2nd Int. Workshop, Dec.10-14, 1990, Tainan, Taiwan, Asian Veg.Res.and Dev.Ctr.(AVRDC), Shanhua, Taiwan* 351-359.

EcoReference No.: 110055

Chemical of Concern: PMR; Habitat: T; Effect Codes: POP; Rejection Code: OK(PMR),NO COC(TFN).

Chambers, A. Y., Russell, W. G., Overton, J. R., and Andrews, H. (1969). Interactions of Recommended Preemergence Herbicides, Systemic Insecticides, and Soil Fungicides on Cotton: Two Years' Results. *Proc.South.Weed Sci.Soc.* 22: 83-87.

EcoReference No.: 99408

Chemical of Concern: FMU,DU,TFN,PRT,DS; Habitat: T; Effect Codes: GRO,MOR,POP; Rejection Code: NO ENDPOINT,NO CONTROL(ALL CHEMS).

Chan, M. M. Y. and Fong, D. (1990). Inhibition of Leishmanias but not Host Macrophages by the Antitubulin Herbicide Trifluralin. *Science* 249: 924-926.

EcoReference No.: 110230

Chemical of Concern: TFN; Habitat: T; Effect Codes: POP,MOR; Rejection Code: NO ENDPOINT(TFN).

Cholaklis, J. M., McKee, M. J., Wong, L. C. K., and Gile, J. D. (1981). Acute and Subacute Toxicity of Pesticides in Microtine Rodents. In: D.W.Lamb and E.E.Kenaga (Eds), *Avian and Mammalian Wildlife Toxicology, 2nd Conference, ASTM STP 757, Philadelphia, PA* 143-154.

EcoReference No.: 36150

Chemical of Concern: SZ,PNB,DLD,PRN,PPN,24DXY,MP,TFN; Habitat: T; Effect Codes: MOR,BEH,PHY; Rejection Code: NO CONTROL(ALL CHEMS).

Cohen, R., Cuppels, D. A., Brammall, R. A., and Lazarovits, G. (1992). Induction of Resistance Towards Bacterial Pathogens of Tomato by Exposure of the Host to Dinitroaniline Herbicides. *Phytopathology* 82: 110-114.

EcoReference No.: 94610

Chemical of Concern: OYZ,TFN,ACO; Habitat: T; Effect Codes: PHY,MOR; Rejection Code: NO ENDPOINT(OYZ,TFN).

Cole, A. W. and Coats, G. E. (1973). Tall Morningglory Germination Response to Herbicides and Temperature. *Weed Sci.* 21: 443-446.

EcoReference No.: 41496

Chemical of Concern: ATZ,BMC,DU,SZ,MBZ,TRB,TFN,EPTC,NPM,DCPA,PZM; Habitat: T; Effect Codes: REP,GRO; Rejection Code: TARGET(SZ),NO ENDPOINT,NO CONTROL(EPTC,PZM,BMC,DU,ATZ,TFN).

Cole, L. K. and Metcalf, R. L. (1980). Environmental Destinies of Insecticides, Herbicides, and Fungicides in the Plants, Animals, Soil, Air, and Water of Homologous Microcosms. In: J.P.Giesy,Jr.(Ed.), *Microcosms in Ecological Research, DOE Symp.Ser.52, Tech.Inf.Ctr., U.S.Dep.Energy, Washington, DC* 971-1008.

EcoReference No.: 12253

Chemical of Concern: FNF,MP,MXC,PRT,Captan,CBZ,SZ,PCP,PNB,PRN,AND,DLD,DDT,TFN; Habitat: AT; Effect Codes: ACC,SYS; Rejection Code: NO ENDPOINT(ALL CHEMS).

Cope, O. B. (1966). Contamination of the Freshwater Ecosystem by Pesticides. *J.Appl.Ecol.* 3: 33-44 (Publ in Part As 6797).

EcoReference No.: 10337

Chemical of Concern:

DDT,HCCH,DLD,DU,MLN,24DXY,CBL,DBN,DZ,MLT,PAQT,PYN,TFN,CuS,PQT,DQTBr; Habitat: A; Effect Codes: MOR,ACC,REP; Rejection Code: NO CONTROL(ALL CHEMS),NO ENDPOINT,NO CONTROL(PQT,DQTBr).

Cope, O. B. (1965). Effects on Pesticides on Fish and Wildlife: 1864 Findings of the Fish and Wildlife Services, Washington DC. *Fish and Wildl.Serv.Cicr.226, Fish and Wildlife Service, Washington, D.C.*: 77 p. (Publ in Part As 6797).

EcoReference No.: 2871

Chemical of Concern:

CHD,CuS,PAQT,MCB,TFN,DBN,DZ,AND,PYN,HPT,EN,DLD,HCCH,EPRN,DDT,TXP,MRT,VNT,CU,A TN,DU,SZ,MLN,RTN,MXC,DDVP,DMT,FNTH,TCF,ADC,CBL,BS,DBM,FNF,24DXY,AMSV,DBAC,NS M,BYT,MVP,PPG,TMP,BSO,DDVP,Naled,FNT,BTY,PQT,DQTBr; Habitat: A; Effect Codes: MOR,BCM; Rejection Code: NO CONTROL(RTN,PPG,24DXY,Naled,BS,MLN,TMP,BSO,DZ,DU,DDVP,TCF,FNT,BTY,PQT,ADC,TFN), NO ENDPOINT(DQTBr).

Couch, J. A., Winstead, J. T., Hansen, D. J., and Goodman, L. R. (1979). Vertebral Dysplasia in Young Fish Exposed to the Herbicide Trifluralin. *J.Fish Dis.*2:35-42; *EPA-600/J-79-072, Environ.Res.Lab., U.S.EPA, Gulf Breeze, FL*:11 p.(U.S.NTIS PB80-177751).

EcoReference No.: 6425

Chemical of Concern: TFN; Habitat: A; Effect Codes: BCM,GRO; Rejection Code: NO ENDPOINT(TFN).

Danielson, L. L. and May, C. (1969). Effects of Several Herbicides on Yews and Japanese Maples. *Weed Sci.* 17: 142-144.

EcoReference No.: 43868

Chemical of Concern: SZ,DU,TFN,CPP,AMTL,DCPA; Habitat: T; Effect Codes: PHY,GRO,MOR; Rejection Code: NO ENDPOINT,NO CONTROL(DU,SZ,DCPA,TFN).

Delye, C., Menchari, Y., Michel, S., and Darmency, H. (2004). Molecular Bases for Sensitivity to Tubulin-Binding Herbicides in Green Foxtail. *Plant Physiol.* 136: 3920-3932.

EcoReference No.: 106272

Chemical of Concern: PDM,TFN,DCPA,PZM,BFL,BTL,CPP; Habitat: T; Effect Codes: CEL; Rejection Code: NO CONTROL(PDM,TFN,DCPA,PZM,BFL,BTL,CPP).

Dill, T. R. and Carter, M. C. (1973). Preemergence Weed Control in Southeastern Forest Nurseries. *Weed Sci.* 21: 363-366.

EcoReference No.: 40822

Chemical of Concern: PMT,TFN; Habitat: T; Effect Codes: GRO,POP; Rejection Code: NO
ENDPOINT,NO CONTROL(PMT,TFN).

Dowidar, A. E. and El-Nahas, A. (1978). Effect of Trifluralin on the Histology and Respiration of *Allium cepa* Root
Tips. *Biol.Plant* 20: 1-4.

EcoReference No.: 26310

Chemical of Concern: TFN; Habitat: T; Effect Codes: GRO,CEL; Rejection Code: NO ENDPOINT(TFN).

Dzantor, E. K. and Felsot, A. S. (1991). Microbial Responses to Large Concentrations of Herbicides in Soil.
Environ.Toxicol.Chem. 10: 649-656.

EcoReference No.: 73305

Chemical of Concern: MTL,ACR,TFN; Habitat: T; Effect Codes: POP; Rejection Code: NO MIXTURE,
TARGET (MTL,ACR,TFN).

Endres, C. S. and Longer, D. E. (1987). Herbicide Selectivity Among Grain and Weedy *Amaranthus* Species.
Agron.J. 79: 824-826.

EcoReference No.: 73267

Chemical of Concern: MTL,TFN,ACR,MBZ,BT; Habitat: T; Effect Codes: POP; Rejection Code: NO
ENDPOINT,TARGET(MTL,ACR),TARGET(TFN).

Erkog, F. U. and Menzer, R. E. (1985). Metabolism of Trifluralin in Rats. *J.Agric.Food Chem.* 33: 1061-1070.

EcoReference No.: 109833

Chemical of Concern: TFN; Habitat: T; Effect Codes: ACC; Rejection Code: NO ENDPOINT,NO
CONTROL(TFN).

Fabacher, D. L. and Chambers, H. (1974). Resistance to Herbicides in Insecticide-Resistant Mosquitofish, *Gambusia*
affinis. *Environ.Lett.* 7: 15-20.

EcoReference No.: 946

Chemical of Concern: 24DXY,DU,LNR,MLT,PMT,TFN,VNT,PPN,NPM,FMU; Habitat: A; Effect Codes:
MOR; Rejection Code: NO ENDPOINT(MLT),NO ENDPOINT,NO
CONTROL(LNR,24DXY,DU,PPN,PMT),NO CONTROL(TFN).

Fennell, B. J., Naughton, J. A., Dempsey, E., and Bell, A. (2006). Cellular and Molecular Actions of Dinitroaniline
and Phosphorothioamidate Herbicides on *Plasmodium falciparum*: Tubulin as a Specific Antimalarial Target.
Mol.Biochem.Parasitol. 145: 226-238.

EcoReference No.: 110228

Chemical of Concern: TFN,OYZ; Habitat: T; Effect Codes: POP; Rejection Code: NO CONTROL(TFN).

Finke, R. L., Warner, R. L., and Muzik, T. J. (1977). Effect of Herbicides on In Vivo Nitrate and Nitrite Reduction.
Weed Sci. 25: 18-22.

EcoReference No.: 42823

Chemical of Concern:
24DXY,ATZ,BMC,DU,SZ,BMN,DMB,TRB,TFN,CNR,CZE,MTZ,AMTL,CPP,IPN,MCPA,HgCl₂,PCL,PP
Z,MLH; Habitat: T; Effect Codes: BCM; Rejection Code: TARGET(LNR,SZ,DMB),NO ENDPOINT,NO
CONTROL(24DXY,AMTR,PPZ,BMC,DU,ATZ,MLH,TFN).

Finlayson, D. G., Campbell, C. J., and Roberts, H. A. (1975). Herbicides and Insecticides: Their Compatibility and
Effects on Weeds, Insects and Earthworms in the Minicauliflower Crop. *Ann.Appl.Biol.* 79: 95-108.

EcoReference No.: 25154

Chemical of Concern: PCH,CBF,TFN; Habitat: T; Effect Codes: MOR,POP,GRO; Rejection Code: NO ENDPOINT(PCH,CBF,TFN).

Frans, R., Corbin, B., Johnson, D., and McClelland, M. (1987). Herbicide Field Evaluation Trials on Field Crops, 1986. *Ark.Agric.Exp.Stn.,Res.Ser.354, Univ.of Ark, Fayetteville, AK* 92 p.

EcoReference No.: 31036

Chemical of Concern:

ACF,ACR,ATZ,BFL,BT,BMN,CRM,CLT,CZE,DMB,DU,EFL,FNP,FZF,PQT,FMU,FSF,HFP,IMQ,IZT,LC F,LNR,MTZ,MTL,NPM,NFZ,OXF,PDM,IMQ,PMT,QZF,TFN,24D,24DB,SXD; Habitat: T; Effect Codes: POP,PHY; Rejection Code: NO ENDPOINT(ALL CHEMS).

Frans, R. E., McClelland, M., and Terhune, E. (1980). Herbicide Field Trials on Field Crops, 1979. *Mimeogr.Ser.280, Ark.Agric.Exp.Stn., Univ.of Arkansas, Fayetteville, AR* 66 p.

EcoReference No.: 96750

Chemical of Concern:

ACR,ACO,MFD,NPM,BMN,PQT,PMT,DU,CZE,TFN,PDM,NFZ,OYZ,FMU,MTL,BMN,BT,ACF,MTZ,G YP,LNR,VNT,BBZ,OXF,BTY,24D,DMB,PPZ,ATZ,PCH; Habitat: T; Effect Codes: POP; Rejection Code: NO ENDPOINT(ALL CHEMS).

Frans, R. E., McClelland, M. R., Horton, D. K., Corbin, B. R. Jr., and Talbert, R. E. (1991). Crop and Herbicide Rotations for Johnsongrass (*Sorghum halepense*) Control. *Weed Sci.* 39: 660-666.

EcoReference No.: 73767

Chemical of Concern: MTL,PPZ,GYP,MBZ,MSMA,PPN,TBC,TFN,FMV,SXD; Habitat: T; Effect Codes: POP; Rejection Code: NO CONTROL(ALL CHEMS).

Gaaboub, I. A., Rawash, I. A., Tag-el-Din, A., and Hassanein, M. A. T. (1981). Joint Action of Six Herbicides with Malathion Against Mosquito Larvae of *Culex pipiens* L. *Toxicology* 20: 61-70.

EcoReference No.: 14500

Chemical of Concern: TBC,TFN,ODZ,PPN; Habitat: A; Effect Codes: MOR; Rejection Code: NO COC(MLN),OK(ODZ),NO ENDPOINT(PPN,TBC,TFN).

Gaines, T. B. and Linder, R. E. (1986). Acute Toxicity of Pesticides in Adult and Weanling Rats. *Fundam.Appl.Toxicol.* 7: 299-308.

EcoReference No.: 71303

Chemical of Concern:

DDT,PRN,PNB,TFN,TCMTB,SZ,RSM,PYZ,PPZ,PRO,ACP,MTM,MDT,CCA,DSMA,MSMA,CBF,CYC,M OM,AMTR,AMTL,ATZ,BMC, Habitat: T; Effect Codes: MOR; Rejection Code: NO CONTROL(ALL CHEMS).

Gentile, I. A. and Bovio, M. (1986). Fusarium Wilt Severity and Ethylene Evolution in Tomato Plants After Treatment with Trifluralin and Naphthylacetic Acid. *J.Plant Dis.Prot.(Z.Pflanzenkr.Pflanzenschutz)* 93: 624-631.

EcoReference No.: 109747

Chemical of Concern: TFN; Habitat: T; Effect Codes: GRO,POP,BCM; Rejection Code: NO ENDPOINT(TFN).

Gentner, W. A. (1966). Herbicidal Properties of Trifluralin Analogs (on Corn, Cotton, Soybeans, Wheat, *Digitaria Sanguinalis*, *Lolium Multiflorum*, *Amaranthus Retroflexus*, *Brassica Napu*. *Weeds* 14: 176-178.

EcoReference No.: 42382

Chemical of Concern: TFN; Habitat: T; Effect Codes: PHY; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).

George, T. K. and Liber, K. (2007). Laboratory Investigation of the Toxicity and Interaction of Pesticide Mixtures in *Daphnia magna*. *Arch.Environ.Contam.Toxicol.* 52: 64-72.

EcoReference No.: 100838

Chemical of Concern: CPY,DZ,AZ,ES,TFN; Habitat: A; Effect Codes: PHY,MOR; Rejection Code: NO CONTROL(CPY,DZ,AZ,ES,TFN).

Ghannoum, M. A., Afzal, M., Hasan, R. A. H., and Dhimi, M. S. I. (1989). Variation in Growth and Fatty Acid Contents of *Trichoderma Viride* Induced by Herbicides. *J.Environ.Sci.Health Part A* 24: 957-966.

EcoReference No.: 107576

Chemical of Concern: PQT,TFN; Habitat: T; Effect Codes: POP,GRO,BCM; Rejection Code: NO ENDPOINT(PQT,TFN).

Gile, J. D., Collins, J. C., and Gillett, J. W. (1980). Fate of Selected Herbicides in a Terrestrial Laboratory Microcosm. *Environ.Sci.Technol.* 14: 1124-1128.

EcoReference No.: 49542

Chemical of Concern: DLD,SZ,TFN,BMC; Habitat: T; Effect Codes: ACC; Rejection Code: NO ENDPOINT(SZ,TFN,BMC).

Gilreath, J. P., Santos, B. M., Busacca, J. D., Eger, J. E. Jr., Mirusso, J. M., and Gilreath, P. R. (2006). Validating Broadcast Application of Telone C-35 Complemented with Chloropicrin and Herbicides in Commercial Tomato Farms. *Crop Prot.* 25: 79-82.

EcoReference No.: 88888

Chemical of Concern: CLP,CLPM,MB,PEB,TFN,13DPE,DPDP; Habitat: T; Effect Codes: POP,GRO; Rejection Code: NO MIXTURE(MB,PEB,TFN),NO CONTROL(13DPE,CLP,CLPM).

Glaze, N. C. (1970). Evaluation of Several Herbicides in Turnip Green Plantings. *Proc.South.Weed Sci.Soc.* 23: 197-201.

EcoReference No.: 41908

Chemical of Concern: PAQT,ACR,TFN,DCPA; Habitat: T; Effect Codes: POP,PHY; Rejection Code: NO MIXTURE(PAQT),NO ENDPOINT,CONTROL(DCPA,ACR,TFN).

Grover, R. (1965). Effect of Several Herbicides on Germination, Survival and Early Growth of Caragana and on Weeds. *Can.J.Plant Sci.* 45: 477-486.

EcoReference No.: 42310

Chemical of Concern: DBN,LNR,TFN,DU,DCPA; Habitat: T; Effect Codes: GRO,POP,REP; Rejection Code: NO ENDPOINT,NO CONTROL(LNR,DU,DCPA,TFN).

Guerrero, N. R. V., Taylor, M. G., Davies, N. A., Lawrence, M. A. M., Edwards, P. A., Simkiss, K., and Wider, E. A. (2002). Evidence of Differences in the Biotransformation of Organic Contaminants in Three Species of Freshwater Invertebrates. *Environ.Pollut.* 117: 523-530.

EcoReference No.: 109834

Chemical of Concern: PYR,PCP,24DC,TFN; Habitat: T; Effect Codes: ACC; Rejection Code: NO ENDPOINT(PYR,PCP,TFN).

Hammerton, J. L. (1974). Weed Control Work in Progress at the University of the West Indies Part 4. *PANS (Pest.Artic.News Summ.)* 20: 429-436.

EcoReference No.: 40607

Chemical of Concern: ATZ,ACR,BT,PDM,CP,PTY,ODZ,CNR,PMT,TFN,SZ; Habitat: T; Effect Codes: PHY,POP; Rejection Code: NO ENDPOINT,NO CONTROL(ATZ,PDM,ACR,TFN).

Hang, M., Zhongyun, C., Yuhua, Z., and Meichi, C. (2001). Effects of Trifluralin on Soil Microbial Populations and the Nitrogen Fixation Activities. *J.Environ.Sci.Health Part B* 36: 569-579.

EcoReference No.: 100709

Chemical of Concern: TFN; Habitat: T; Effect Codes: POP,PRS; Rejection Code: NO ENDPOINT(TFN).

Hartnett, J. P. (1975). Weed Control in Soybeans with RH-2512 and RH-2915. *Proc.Northeast.Weed Sci.Soc.* 29: 4-8.

EcoReference No.: 40632

Chemical of Concern: OXF,DMM,ACR,LNR,MBZ,TFN,DU; Habitat: T; Effect Codes: MOR,PHY,GRO; Rejection Code: NO ENDPOINT,NO CONTROL(OLF,LNR,DU,ACR,TFN).

Hashimoto, Y. and Nishiuchi, Y. (1981). Establishment of Bioassay Methods for the Evaluation of Acute Toxicity of Pesticides to Aquatic Organisms. *J.Pestic.Sci.* 6: 257-264 (JPN) (ENG ABS).

EcoReference No.: 5761

Chemical of Concern:

DDT,TPN,FNTH,24DXY,PRN,PAQT,CBL,PYN,Zineb,CZE,FBM,PPX,MOM,ES,TBC,MLN,FE,SZ,NaPCP ,Captan,AND,DZ,ETN,FLAC,PPN,FNT,RTN,EN,PQT,TFN,PPX,TDC; Habitat: A; Effect Codes: MOR; Rejection Code: NO CONTROL(ALL CHEMS).

Haunerland, N. H. and Bowers, W. S. (1986). Binding of Insecticides to Lipophorin and Arylphorin, Two Hemolymph Proteins of *Heliothis zea*. *Arch.Insect Biochem.Physiol.* 3: 87-96.

EcoReference No.: 109943

Chemical of Concern: CBL,MLN,TFN,DLD,PMR,DDT; Habitat: T; Effect Codes: BCM; Rejection Code: NO ENDPOINT,NO CONTROL(CBL,MLN,TFN,PMR).

Hawton, D. and Johnson, I. D. G. (1981). Weed Control in Peanuts in North Queensland. *Aust.J.Exp.Agric.Anim.Husb.* 21: 218-222.

EcoReference No.: 75856

Chemical of Concern: MCPB,BT,VNT,24DB,TFN,CTN; Habitat: T; Effect Codes: POP; Rejection Code: OK(BT,24DB),NO MIXTURE(VNT,TFN,CTN),TARGET(MCPB).

Hawton, D., Johnson, I. D. G., Loch, D. S., Harvey, G. L., Marley, J. M. T., Hazard, W. H. L., Bibo, J., and Walker, S. R. (1990). A Guide to the Susceptibility of Some Tropical Crop and Pasture Weeds and the Tolerance of Some Crop Legumes to Several Herbicides. *Trop.Pest Manag.* 36: 147-150.

EcoReference No.: 73776

Chemical of Concern:

ACR,ATZ,BT,DMB,DU,MTL,MBZ,DMM,PDM,ACF,BFL,24DXY,EPTC,FZFB,PCL,SXD,TFN,VNT; Habitat: T; Effect Codes: POP; Rejection Code: NO ENDPOINT(ALL CHEMS).

Hayton, W. L. and Archer, B. G. (1981). Kinetics of Accumulation of Trifluralin by Fish. *Proc.West Pharmacol.Soc.* 24: 147-149.

EcoReference No.: 16104

Chemical of Concern: TFN; Habitat: A; Effect Codes: ACC; Rejection Code: NO CONTROL(TFN).

Heck, H. A., Dyer, R. L., Scott, A. C., and Anbar, M. (1977). Determination and Disposition of Trifluralin in the Rat.

Separation by Sequential High-Pressure Liquid Chromatography and Quantitation by Field Ionization Mass Spectrometry. *J.Agric.Food Chem.* 25: 901-908.

EcoReference No.: 109752

Chemical of Concern: TFN; Habitat: T; Effect Codes: ACC; Rejection Code: NO ENDPOINT(TFN).

Henne, R. C. (1977). new Compounds with Potential for Weed Control in Tomatoes. *Proc.Northeast.Weed Sci.Soc.* 31: 207-214.

EcoReference No.: 40630

Chemical of Concern: MTL,TFN,ODZ; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(MTL),NO ENDPOINT(TFN).

Hensley, J. R. and Norton, J. A. (1976). Effect of Profluralin, Environmental Conditions and Soil Applied Insecticides on Cotton Tolerance. *Proc.South.Weed Sci.Soc.* 29: 115-124.

EcoReference No.: 99394

Chemical of Concern: TFN,DS,ADC,PCNB; Habitat: T; Effect Codes: GRO; Rejection Code: NO ENDPOINT,NO CONTROL(DS,ADC),TARGET(TFN).

Hess, F. D. (1980). A Chlamydomonas Algal Bioassay for Detecting Growth Inhibitor Herbicides. *Weed Sci.* 28: 515-520.

EcoReference No.: 6513

Chemical of Concern:

ACR,ATZ,BMN,BS,DBN,GYP,MLT,TFN,BTY,CP,AMTL,EPTC,PAQT,FDE,BSO,DCPA,PQT; Habitat: A; Effect Codes: POP; Rejection Code: LITE EVAL CODED(ATZ,MLT),NO ENDPOINT,NO CONTROL(BS,EPTC,GYP,BSO,DCPA,BTY,ACR,PQT,FDE,TFN).

Hess, F. D. (1979). The Influence of the Herbicide Trifluralin on Flagellar Regeneration in Chlamydomonas. *Exp.Cell Res.* 119: 99-109.

EcoReference No.: 6872

Chemical of Concern: TFN; Habitat: A; Effect Codes: GRO,POP; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).

Hirose, S., Kawahigashi, H., Ozawa, K., Shiota, N., Inui, H., Ohkawa, H., and Ohkawa, Y. (2005). Transgenic Rice Containing Human CYP2B6 Detoxifies Various Classes of Herbicides. *J.Agric.Food Chem.* 53: 3461-3467.

EcoReference No.: 101739

Chemical of Concern: NFZ,TFN; Habitat: T; Effect Codes: BCM,GRO,PHY; Rejection Code: NO ENDPOINT(NFZ,TFN).

Hirose, S., Kawahigashi, H., Tagiri, A., and Ohkawa, Y. (2008). Herbicide-Induced Anthocyanin Accumulation in Transgenic Rice by Expression of Rice OSB2 Under the Control of Rice CYP7A21 Promoter. *J.Agric.Food Chem.* 56: 1259-1263.

EcoReference No.: 107267

Chemical of Concern: MCPA,ACO,MTL,TFN,24D,ACR; Habitat: A; Effect Codes: CEL; Rejection Code: NO ENDPOINT(MTL,TFN,24D,ACR).

Holst, R. W., Yopp, J. H., and Kapusta, G. (1982). Effect of Several Pesticides on the Growth and Nitrogen Assimilation of the Azolla-anabaena Symbiosis. *Weed Sci.* 30: 54-58.

EcoReference No.: 70299

Chemical of Concern: SZ,ATZ,LNR,MBZ,24DXY,DMB,DU,BMY,ACR,PQT,TFN,DQTB; Habitat: A;

Effect Codes: POP,PHY,BCM; Rejection Code: LITE EVAL CODED(ATZ,SZ,DMB),NO ENDPOINT(LNR,24DXY,DU,BMY,ACR,PQT,TFN,DQTBBr).

Horowitz, M., Blumenfeld, T., Herzlinger, G., and Hulin, N. (1974). Effects of Repeated Applications of Ten Soil-Active Herbicides on Weed Population, Residue Accumulation and Nitrification. *Weed Res.* 14: 97-109.

EcoReference No.: 40823

Chemical of Concern: BMC,DU,SZ,PMT,TFN,DCPA,FMU,PYZ; Habitat: T; Effect Codes: GRO,POP; Rejection Code: TARGET(SZ,PYZ),NO ENDPOINT,NO CONTROL(BMC,DU,PMT,TFN).

Huckaba, R. M., Coble, H. D., and Van Duyn, J. W. (1988). Joint Effects of Acifluorfen Applications and Soybean Thrips (*Sericothrips variabilis*) Feeding on Soybean (*Glycine max*). *Weed Sci.* 36: 667-670.

EcoReference No.: 109661

Chemical of Concern: TFN,ACF,CBL; Habitat: T; Effect Codes: GRO,POP,REP,PHY; Rejection Code: NO EFFECT(TFN),OK(ACF,CBL).

Huckins, J. N., Petty, J. D., and England, D. C. (1986). Distribution and Impact of Trifluralin, Atrazine, and Fonofos Residues in Microcosms Simulating a Northern Prairie Wetland. *Chemosphere* 15: 563-588.

EcoReference No.: 11891

Chemical of Concern: ATZ,TFN; Habitat: A; Effect Codes: MOR,ACC; Rejection Code: LITE EVAL CODED(ATZ),NO ENDPOINT(TFN).

Isakeit, T. and Lockwood, J. L. (1990). Increased Exudation of Carbon Compounds from 14C-Labelled Ungerminated *Cochliobolus sativus* Conidia in Response to Several Herbicides. *Mycol.Res.* 94: 857-861.

EcoReference No.: 95636

Chemical of Concern: ATZ,LNR,TFN,MCPA,PAQT; Habitat: T; Effect Codes: BCM,REP; Rejection Code: NO ENDPOINT(ALL CHEMS).

Isakeit, T. S. (1988). Deleterious Effect of Atrazine on Ungerminated Conida of *Cochliobolus sativus* in Soil. *Ph.D.Thesis, Michigan State Univ.,MI* 140 p.

EcoReference No.: 95972

Chemical of Concern: PPZ,PMT,SZ,AMTR,ATZ,LNR,TFN,MCPA,PAQT,CZE,PRO; Habitat: T; Effect Codes: REP,POP,ACC; Rejection Code: NO ENDPOINT(ALL CHEMS).

Isensee, A. R., Kearney, P. C., and Jones, G. E. (1979). Modeling Aquatic Ecosystems for Metabolic Studies. *ACS Symp.Ser.99* 195-216.

EcoReference No.: 110143

Chemical of Concern: TFN; Habitat: A; Effect Codes: ACC; Rejection Code: NO ENDPOINT(TFN).

Isensee, A. R. and Yockim, R. S. (1980). Freshwater Micro-ecosystem Development and Testing of Substitute Chemicals. *EPA 600/3-80/008, U.S.EPA, Duluth, MN* 36 p.

EcoReference No.: 50508

Chemical of Concern: PNB,SZ,TFN; Habitat: A; Effect Codes: ACC; Rejection Code: NO CONTROL,NO ENDPOINT(SZ,FTN,PNB,TFN).

Ito, N., Hasegawa, R., Imaida, K., Takahashi, S., and Shirai, T. (1994). Medium-Term Rat Liver Bioassay for Rapid Detection of Carcinogens and Modifiers of Hepatocarcinogenesis. *Drug Metab.Rev.* 26: 431-442.

EcoReference No.: 109942

Chemical of Concern: PCZ,TDF,TFN,ACR,LIM,ATZ,DMZ,DLD,DES; Habitat: T; Effect Codes: CEL;

Rejection Code: NO ENDPOINT,NO CONTROL(PCZ,TDF,TFN,ACR,LIM,ATZ,DMZ).

Izawa, S., Winget, D. G., and Good, N. E. (1966). Phlorozin, A Specific Inhibitor of Photophosphorylation and Phosphorylation-Coupled Electron Transport in Chloroplasts. *Bioc Biop R* 22: 223-226.

EcoReference No.: 41249

Chemical of Concern: TFN; Habitat: T; Effect Codes: GRO; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).

Jacques, G. L. and Harvey, R. G. (1979). Dinitroaniline Herbicide Phytotoxicity As Influenced by Soil Moisture and Herbicide Vaporization. *Weed Sci.* 27: 536-539.

EcoReference No.: 41463

Chemical of Concern: OYZ,TFN; Habitat: T; Effect Codes: GRO; Rejection Code: NO ENDPOINT,NO CONTROL(OYZ,TFN).

Jennings, E. A. and Drennan, D. S. H. (1979). Pre-Sowing Herbicides in Irrigated Cotton (*Gossypium barbadense* L.) and Groundnut (*Arachis hypogaea* L.) in the Sudani I. Weed Control and Crop Yields Achieved W . *Weed Res.* 19: 75-80.

EcoReference No.: 42834

Chemical of Concern: TFN; Habitat: T; Effect Codes: GRO,REP; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).

Jennings, K. M., York, A. C., Batts, R. B., and Culpepper, A. S. (1997). Sicklepod (*Senna obtusifolia*) and Entireleaf Morningglory (*Ipomoea hederacea* var. *integriuscula*) Management in Soybean (*Glycine max*) with Flumetsulam. *Weed Technol.* 11: 227-234.

EcoReference No.: 73938

Chemical of Concern: MTL,FTS,MBZ,TFN,CRM,IMQ; Habitat: T; Effect Codes: POP; Rejection Code: NO CONTROL,TARGET(MTL),TARGET(FTS,TFN).

Johnson, A. W., Burton, G. W., Sumner, D. R., and Handoo, Z. (1997). Coastal Bermudagrass Rotation and Fallow for Management of Nematodes and Soilborne Fungi on Vegetable Crops. *J.Nematol.* 29: 710-716.

EcoReference No.: 101870

Chemical of Concern: FMP; Habitat: T; Effect Codes: POP; Rejection Code: EFFICACY(FMP),NO COC(TFN,MTL).

Johnson, B. J. (1972). Effects of Herbicides Applied Preplant or Preemergence on Weeds and Sunflowers. *Crop Sci.* 12: 650-653.

EcoReference No.: 41645

Chemical of Concern: TFN,EPTC; Habitat: T; Effect Codes: MOR; Rejection Code: NO ENDPOINT,NO CONTROL(EPTC,TFN).

Johnson, D. H., Beaty, J. D., Horton, D. K., Talbert, R. E., Guy, C. B., Mattice, J. D., Lavy, T. L., and Smith, R. J. Jr. (1995). Effects of Rotational Crop Herbicides on Rice (*Oryza sativa*). *Weed Sci.* 43: 648-654.

EcoReference No.: 73739

Chemical of Concern: MTL,ACR,ATZ,NFZ,CMZ,FMU,IMQ,IZT,TFN; Habitat: T; Effect Codes: GRO,ACC; Rejection Code: NO ENDPOINT,TARGET(ATZ,CMZ,MTL,NFZ,ACR,TFN).

Jones, K. H., Sanderson, D. M., and Noakes, D. N. (1968). Acute Toxicity Data for Pesticides (1968). *World Rev.Pest Control* 7: 135-143.

EcoReference No.: 70074

Chemical of Concern:

24DXY,ACL,ADC,AMTL,AMTR,AND,ASM,ATN,ATZ,AZ,BFL,BMC,BMN,BS,BTY,Captan,CBL,CCA,CHD,CMPH,CPP,CPY,CQTC,Cu,CuFRA,DBN,DCB,DCNA,DCPA,DDD,DDT,DDVP,DEM,DINO,DLD,DMB,DMT,DOD,DPP1,DQTBr,DS,DU,DZ,DZM,EDT,EN,EP,EPTC,ES,ETN,FLAC,FMU,FNF,FNT,FNTH,Folpet,HCCH,HPT,LNR,Maneb,MCB,MCPA,MCPB,MCP1MDT,MLH,MLN,MLT,MRX,MTM,MVP,MXC,Naled,NPM,PB,PCH,PCL,PCP,PEB,PHMD,PHSL,PMT,PPHD,PPN,PPX,PPZ,PQT,PRN,PRO,PRT,PYN,PYZ,RTN,SFT,SID,SZ,TCF,TFN,THM,TMP,TRB,TRL,TXP,VNT,Zineb; Habitat: T; Effect Codes: MOR; Rejection Code: NO PUBL
AS(24DXY,ACL,AMTL,AMTR,ASM,ATN,AZ,BFL,BMC,BMN,BS,BTY,CCA,CMPH,CPP,CPY,CQTC,CTHM,DBN,DCB,DCNA,DDT,DINO,DOD,DPP1,DQTBr,DU,DZM,EP,EPTC,ES,FMU,FNF,FNT,Folpet,HCCH,HPT,LNR,MCB.

Jonsson, C. M., Maia, A. H. N., Ferreira, C. J. A., and Ribeiro, E. O. (1998). Risk Assessment of the Herbicide Clomazone to Aquatic Life. *Verh.Internat.Verein.Limnol.* 26: 1724-1726.

EcoReference No.: 99777

Chemical of Concern: TPR,MSMA,TFN,ACR,SZ,24D,GYP,CMZ; Habitat: A; Effect Codes: POP,MOR; Rejection Code: OK(CMZ),NO REVIEW(TPR,MSMA,TFN,ACR,SZ,24D,GYP).

Kanazawa, J. (1981). Bioconcentration Potential of Pesticides by Aquatic Organisms. *Jpn.Pestic.Inf.* 39: 12-16.

EcoReference No.: 12534

Chemical of Concern: HCCH,CBL,TFN,FNT,TBC,MLT,PNB,DZ,DLD; Habitat: A; Effect Codes: ACC,GRO; Rejection Code: NO CONTROL(HCCH,CBL,TFN,FNT,TBC,MLT,PNB,DLD),NO ENDPOINT,NO CONTROL(DZ).

Kanazawa, J. (1981). Measurement of the Bioconcentration Factors of Pesticides by Freshwater Fish and Their Correlation with Physicochemical Properties or Acute Toxicities. *Pestic.Sci.* 12: 417-424.

EcoReference No.: 15599

Chemical of Concern: DLD,DZ,MLT,FNT,CBL,TBC,PNB,HCCH,TFN; Habitat: A; Effect Codes: MOR,ACC; Rejection Code: NO CONTROL(DLD,DZ,MLT,FNT,CBL,TBC,PNB,HCCH,TFN).

Kanazawa, J. (1983). A Method of Predicting the Bioconcentration Potential of Pesticides by Using Fish. *Jpn.Agric.Res.Q.* 17: 173-179.

EcoReference No.: 10750

Chemical of Concern: HCCH,MLT,TFN,CBL,DLD,DZ,FNT,TBC,PNB; Habitat: A; Effect Codes: ACC,BCM,GRO; Rejection Code: NO CONTROL(HCCH,MLN,TFN,CBL,DLD,DZ,FNT,TBC,PNB).

Kanazawa, J. (1980). Prediction of Biological Concentration Potential of Pesticides in Aquatic Organisms. *Rev.Plant Prot.Res.* 13 : 27-36.

EcoReference No.: 59925

Chemical of Concern: PNB,DZ,MLT,TBC,HCCH,TFN,FNT,CBL,DLD; Habitat: A; Effect Codes: ACC,MOR; Rejection Code: NO CONTROL(PNB,DZ,MLT,TBC,HCCH,TFN,FNT,CBL,DLD).

Kapusta, G. and Rouwenhorst, D. L. (1973). Interaction of Selected Pesticides and Rhizobium japonicum in Pure Culture and Under Field Conditions. *Agron.J.* 65: 112-115.

EcoReference No.: 50827

Chemical of Concern:

MXC,MLN,HCCH,DS,DLD,DZ,CBL,AZ,AND,ATZ,ACR,DCPA,DMB,LNR,NPM,PCH,TFN,VNT; Habitat: T; Effect Codes: PHY,POP,GRO; Rejection Code: LITE EVAL CODED(DS),OK(CBL),NO ENDPOINT(MXC,MLN,HCCH,DLD,DZ,AZ,AND,ATZ,ACR,DCPA,DMB,LNR,NPM,

PCH,TFN,VNT,ACR).

Kawahigashi, H., Hirose, S., Ohkawa, H., and Ohkawa, Y. (2006). Broad Range of Herbicide Tolerance of Glutinous Upland Rice Variety 'Yumenohatamochi' Carrying Human Cytochrome P450 Genes. *Plant Biotechnol.* 23: 227-231.

EcoReference No.: 109941

Chemical of Concern: DU,NFZ,PDM,TFN,ACR,MTL; Habitat: AT; Effect Codes: CEL,POP; Rejection Code: NO ENDPOINT(DU,NFZ,PDM,TFN,ACR,MTL).

Kawahigashi, H., Hirose, S., Ohkawa, H., and Ohkawa, Y. (2005). Evaluation of Herbicide Metabolism in Transgenic Rice Plants Expressing CYP1A1 and CYP2B6. *ACS Symp.Ser.* 892: 18-27.

EcoReference No.: 101418

Chemical of Concern: TFN,PDM,ACO,QZFE,CPP,DU,NFZ,ACR,MTL; Habitat: T; Effect Codes: ACC; Rejection Code: NO ENDPOINT(MTL),NO DURATION(TFN,PDM,ACO,QZFE,CPP,DU,NFZ,ACR).

Kawahigashi, H., Hirose, S., Ozawa, K., Ido, Y., Kojima, M., Ohkawa, H., and Ohkawa, Y. (2005). Analysis of Substrate Specificity of Pig CYP2B22 and CYP2C49 Towards Herbicides by Transgenic Rice Plants. *Transgenic Res.* 14: 907-917.

EcoReference No.: 100194

Chemical of Concern: NFZ,MTL,DU,PDM,TFN,ACO,ACR; Habitat: T; Effect Codes: GRO; Rejection Code: NO COC(PMR,IXB),NO ENDPOINT,NO CONTROL(NFZ,MTL,DU,ACR,PDM,TFN).

Kearney, P. C., Isensee, A. R., and Kontson, A. (1977). Distribution and Degradation of Dinitroaniline Herbicides in an Aquatic Ecosystem. *Pestic.Biochem.Physiol.* 7: 242-248.

EcoReference No.: 7524

Chemical of Concern: TFN; Habitat: A; Effect Codes: ACC; Rejection Code: NO CONTROL(TFN).

Kosinski, R. J. and Merkle, M. G. (1984). The Effect of Four Terrestrial Herbicides on the Productivity of Artificial Stream Algal Communities. *J.Environ.Qual.* 13: 75-82.

EcoReference No.: 11864

Chemical of Concern: ATZ,TFN,PAQT,PQT; Habitat: A; Effect Codes: PHY; Rejection Code: LITE EVAL CODED(ATZ),OK(PAQT),NO ENDPOINT,NO CONTROL(PQT,TFN).

Koyama, J. (1996). Vertebral Deformity Susceptibilities of Marine Fishes Exposed to Herbicide. *Bull.Environ.Contam.Toxicol.* 56 : 655-662.

EcoReference No.: 17085

Chemical of Concern: TFN; Habitat: A; Effect Codes: GRO,MOR; Rejection Code: NO CONTROL(TFN).

Kratky, B. A. and Warren, G. F. (1971). The Use of Three Simple, Rapid Bioassays on Forty-Two Herbicides. *Weed Res.* 11: 257-262.

EcoReference No.: 40616

Chemical of Concern:

EDT,SZ,24DC,ATZ,24DXY,ACR,BMC,BMN,BS,DBN,DCPA,DMB,LNR,PQT,TRB,TFN,PYZ,NaN3,PRO ,EPTC,BSO,PPN,MLH; Habitat: AT; Effect Codes: POP,GRO; Rejection Code: LITE EVAL CODED(LNR,BMC,PRO,ATZ,SZ,PYZ,NaN3,PPN),NO ENDPOINT(BMC,BS,SZ,DMB,BSO,ACR,PQT,TFN),NO ENDPOINT,NO CONTROL(EPTC,24DXY,DCPA,MLH).

Kubota, S. S. and Ochiai, T. (1979). Studies on Toxic Effects of Pesticides on Fish - III. Effect of Benthocarb on the Toxicity of the Other Pesticides. *Bull.Fac.Fish.Mie Univ.* 6: 119-128 (JPN) (ENG ABS).

EcoReference No.: 6912

Chemical of Concern: MLT,TBC,TFN,FNTH; Habitat: A; Effect Codes: MOR; Rejection Code: NO ENDPOINT(TBC),NO ENDPOINT,NO CONTROL(TFN).

Lavalleye, M. P., Boyd, V. F., Keefer, C. G., Hist, L. F., and McDonald, W. (1973). SAN 9789, a Pyridazinone Herbicide Selective for Cotton and Other Crops. *Proc.South Weed Sci.Soc.* 26: 124-130.

EcoReference No.: 41242

Chemical of Concern: NFZ,FMU,DU,TFN; Habitat: T; Rejection Code: NO ENDPOINT,NO CONTROL(NFZ,FMU,DU,TFN).

Lider, L. A. and Leonard, O. A. (1968). Morning Glory Control in Vineyards...with Two New Soil-Residual Herbicides: Dichlobenil and Chlorthiamid. *Calif.Agric.* 22: 8-10.

EcoReference No.: 40708

Chemical of Concern: DBN,TFN,BS; Habitat: T; Effect Codes: POP; Rejection Code: NO ENDPOINT(TFN,BS).

Lignowski, E. M. and Scott, E. G. (1972). Effect of Trifluralin on Mitosis. *Weed Sci.* 20: 267-270.

EcoReference No.: 43287

Chemical of Concern: TFN; Habitat: T; Effect Codes: CEL; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).

Lignowski, E. M. and Scott, E. G. (1971). Trifluralin and Root Growth. *Plant Cell Physiol.* 12: 701-708.

EcoReference No.: 41613

Chemical of Concern: TFN; Habitat: T; Effect Codes: BCM,GRO,PHY; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).

Lio-Po, G. D., Sanvictores, M. E. G., Baticados, M. C. L., and Lavilla, C. R. (1982). In Vitro Effect of Fungicides on Hyphal Growth and Sporogenesis of *Lagenidium* spp. Isolated from *Penaeus monodon* Larvae and *Scylla serrata* Eggs. *J.Fish Dis.* 5: 97-112.

EcoReference No.: 65464

Chemical of Concern:

ACAC,BMY,DBAC,BRA,CaOCl,CuS,24DXY,CTN,ETHN,FML,HOX,IODN,PL,KPM,TFN; Habitat: A; Effect Codes: POP,GRO; Rejection Code: NO ENDPOINT(ALL CHEMS).

Lutman, P. J. W. (1977). Studies on the Control of Groundkeeper Potatoes with the Soil-Applied Herbicides Chloropham, Propyzamide and Trifluralin. *Pestic.Sci.* 8: 637-646.

EcoReference No.: 41409

Chemical of Concern: TFN,PZM; Habitat: T; Effect Codes: POP; Rejection Code: NO ENDPOINT,NO CONTROL(PZM,TFN).

Macek, K. J., Hutchinson, C., and Cope, O. B. (1969). The Effects of Temperature on the Susceptibility of Bluegills and Rainbow Trout to Selected Pesticides. *Bull.EnvIRON.Contam.Toxicol.* 4: 174-183.

EcoReference No.: 2085

Chemical of Concern: AND,CHD,Naled,DLD,DU,EN,HPT,HCCH,MLN,MXC,ES,TXP,TFN,CPY; Habitat: A; Effect Codes: MOR; Rejection Code: NO CONTROL(Naled,MLN,DU,TFN).

Macri, A., Ricciardi, C., Stazi, A. V., Mantovani, A., Macri, C. V., Piccioni, A., Badellino, E., Bianchi, M. P., Pepe, M., and Ceccanti, M. (1987). Subchronic Oral Toxicity of 4-Chloro-alpha,alpha,alpha-Trifluorotoluene in Sprague-Dawley Rats. *Food Chem.Toxicol.* 25: 781-786.

EcoReference No.: 110150; Habitat: T; Effect Codes: GRO,MOR,BCM; Rejection Code: NO COC(TFN).

Maiteki, G. A. and Lamb, R. J. (1985). Spray Timing and Economic Threshold for the Pea Aphid, *Acyrtosiphon pisum* (Homoptera: Aphididae), on Field Peas in Manitoba. *J.Econ.Entomol.* 78: 1449-1454.

EcoReference No.: 89287

Chemical of Concern: MLN; Habitat: T; Effect Codes: POP; Rejection Code: OK(MLN),NO COC(TFN).

Makioka, A., Kumagai, M., Ohtomo, H., Kobayashi, S., and Takeuchi, T. (2000). Effect of Dinitroaniline Herbicides on the Growth of *Entamoeba histolytica*. *J.Parasitol.* 86: 607-610.

EcoReference No.: 66748

Chemical of Concern: OYZ,TFN; Habitat: A; Effect Codes: GRO; Rejection Code: NO ENDPOINT(OYZ,TFN).

Mann, J. D. and Pu, M. (1968). Inhibition of Lipid Synthesis by Certain Herbicides. *Weed Sci.* 1: 197-198.

EcoReference No.: 43988

Chemical of Concern: EDT,SZ,24DXY,ATZ,DBN,TFN,PCP,PCL,EPTC,PPN,PQT,MLH; Habitat: T; Effect Codes: BCM; Rejection Code: NO ENDPOINT,NO CONTROL(EPTC,EDT,SZ,24DXY,ATZ,DBN,TFN,PCP,PCL,PPN,PQT,MLH).

Mayer, F. L. Jr. (1974). Pesticides as Pollutants. In: B.G.Liptak (Ed.), *Environmental Engineer's Handbook*, Chilton Book Co., Radnor, PA 405-418 (Publ in Part As 6797).

EcoReference No.: 70421

Chemical of Concern:

AND,CHD,DDT,DLD,ES,EN,HPT,TXP,DZ,CPY,PRN,CBL,ACL,ATZ,Cu,EDT,SZ,As,MLN,Captan,Naled,24DXY,PPG,TBT,TMP,DU,TCF,DCF,PQT,MLH,TFN,DQTB; Habitat: A; Effect Codes: MOR; Rejection Code: NO CONTROL(TBT,PPG,AND,CHD,DDT,DLD,ES,EN,HPT,TXP,DZ,CPY,PRN,CBL,ACL,ATZ,Cu,EDT,SZ,As,MLN,Captan,Naled,TMP,DU,TCF,DCF,PQT,MLH,TFN,DQTB),NO ENDPOINT,NO CONTROL(24DXY).

Mayer, F. L. Jr. and Eilersieck, M. R. (1986). Manual of Acute Toxicity: Interpretation and Data Base for 410 Chemicals and 66 Species of Freshwater Animals. *Resour.Publ.No.160, U.S.Dep.Interior, Fish Wildl.Serv., Washington, DC* 505 p. (USGS Data File).

EcoReference No.: 6797

Chemical of Concern:

EDT,RSM,SZ,24DXY,ACP,ACR,ADC,ATM,ATN,ATZ,AZ,BS,CaPS,Captan,CBF,CBL,CMPH,CQTC,CPY,CuS,DBN,DCPA,DCTP,DDVP,DFZ,DMB,DMT,DOD,DPDP,DS,DU,DZ,FO,GYP,HCCH,HXZ,IGS,LNR,MBZ,MCPB,MDT,MLN,MLT,MOM,MP,MTL,NaN3,Naled,OML,OYZ,PCP,PEB,PAQT,PRT,PSM,Folpet,PYN,CYT,DMM,EFS,NAA,NTP,PMR,PPB,TFN,WFN,RSM,RTN,ALSV,Se,DBAC,Zn,As,MTPN,DCB,MTAS,OXD,PEPPG,TBF,CPYM,FLU,PPG,EPTC,TBO,PFF,TMP,TVPM,BSO,ZnS,ES,TCF,FNT,BMY,PPN,DCF,BTY,FDE,FBOX,EFV,PPX,MBTZ,DQTB; Habitat: A; Effect Codes: MOR,PHY; Rejection Code: LITE EVAL CODED(MTAS,MTPN,DCB,DZ,IGS,ATZ,MTL,MLT,CBF,ADC,MOM,PPB,SZ,DMT,WFN,RTN,CuS,DOD,NaN3,DMB,RSM,CaPS,MCPB,NaPCP,PCP,AMSV,ALSV,PRT,ATM,CQTC,ATN,DBAC),NO CONTROL(PMR,EPTC,PPG,GYP,LNR,PSM,DS,FLU,OYZ,24DXY,DPDP,CPYM,CPY,PEPPG,MP,Naled,BS,OXD,Captan,MLN,HXZ,TBF,TBO,CMPH,PFF,TMP,TVPM,BSO,DCTP,DU,ZnS,DCPA,OML,ACP,DDVP,ES,TCF,FNT,BMY,PPN,DCF,BTY,ACR,PQT,FDE,FBOX,EFV,TFN,PPX,MBTZ,DQTB,DFZ).

McCorkle, F. M., Chambers, J. E., and Yarbrough, J. D. (1977). Acute Toxicities of Selected Herbicides to Fingerling Channel Catfish, *Ictalurus punctatus*. *Bull.Environ.Contam.Toxicol.* 18: 267-270.

EcoReference No.: 858

Chemical of Concern: 24DXY,BS,DU,MBZ,DMM,TFN,EPTC,BSO,PPN; Habitat: A; Effect Codes: MOR; Rejection Code: NO CONTROL(BS,BSO,PPN,TFN),NO ENDPOINT,NO CONTROL(EPTC,24DXY,DU).

McNevin, G. R. and Harvey, R. G. (1982). Wild Proso Millet (*Panicum miliaceum*) Control in Processing Peas (*Pisum sativum*) and Soybeans (*Glycine max*). *Weed Sci.* 30: 365-368.

EcoReference No.: 41283

Chemical of Concern: OYZ,ACR,MTL,DFP,EFL,LNR,MCPB,MBZ,DMM,PDM,TFN,PCH ; Habitat: T; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(MTL),TARGET(LNR,MCPB),NO ENDPOINT(OYZ,PDM,ACR,TFN).

Mead, J. R., Benbow, J. W., Garmon, D., and Stewart, J. (1999). Improved Efficacy of Dinitroaniline Analogs for Use as Anti-Cryptosporidial Drugs. *J.Eukaryot.Microbiol.* 46: 62s-63s.

EcoReference No.: 110142

Chemical of Concern: TFN; Habitat: T; Effect Codes: PHY; Rejection Code: NO ENDPOINT(TFN).

Medina, H. S. G., Lopata, M. E., and Bacila, M. (1994). The Response of Sea Urchin Egg Embryogenesis Towards the Effect of Some Pesticides. *Arq.Biol.Tecnol.(Curitiba)* 37: 895-906.

EcoReference No.: 18579

Chemical of Concern: GYP,MP,OXF,DM,TFN; Habitat: A; Effect Codes: GRO; Rejection Code: NO ENDPOINT(MP),NO ENDPOINT,NO CONTROL(OXF,GYP,DM,TFN).

Mehta, R. S. and Hawxby, K. W. (1983). Physiological Response of *Anacystis nidulans* (Cyanophyceae) to Various Herbicides. *J.Phycol.* 19: 15.

EcoReference No.: 11817

Chemical of Concern: SZ,FMU,PMT,TFN; Habitat: A; Rejection Code: NO ABSTRACT(SZ,FMU),NO ENDPOINT,NO CONTROL(PMT,TFN),NO COC(CBL).

Meissner, R. (1977). Herbicidal Weed Control in Sweet Potatoes. *Agroplantae* 9: 31.

EcoReference No.: 94454

Chemical of Concern: DCPA,BS,DBN,LNR,NPM,TFN; Habitat: T; Effect Codes: POP; Rejection Code: NO ENDPOINT,NO CONTROL(DCPA,BS,LNR,TFN),NO COC(QOC,TFR).

Mele, P. M. and Carter, M. R. (1999). Impact of Crop Management Factors in Conservation Tillage Farming on Earthworm Density, Age Structure and Species Abundance in South-Eastern Australia. *Soil Tillage Res.* 50: 1-10.

EcoReference No.: 52153

Chemical of Concern: SFR,LIME,TFN,GYP,CSF; Habitat: T; Effect Codes: POP; Rejection Code: NO EFFECT(TFN),OK(SFR,GYP).

Metcalf, R. L., Cole, L. K., Wood, S. G., Mandel, D. J., and Milbrath, M. L. (1979). Design and Evaluation of a Terrestrial Model Ecosystem for Evaluation of Substitute Pesticide Chemicals. *EPA 600/3-79-004, U.S.EPA, Corvallis, OR* 306 p.

EcoReference No.: 52194

Chemical of Concern: DDT,PCP,MXC,AND,DLD,PRT,HCCH,Captan,SZ,TFN,MP,PRN; Habitat: AT;

Effect Codes : GRO,ACC; Rejection Code: NO ENDPOINT(ALL CHEMS).

Metcalf, R. L., Reinbold, K. A., Sanborn, J. R., Childers, W. F., Bruce, W. N., and Coats, J. (1974). Comparative Biochemistry, Biodegradability and Toxicity of DDT and Carbofuran Analogues. *Water Resour.Ctr., Univ.of Illinois, Urbana, IL* 51 p.

EcoReference No.: 52192

Chemical of Concern: CBF,DDT,PPB,TFN,MXC,AND; Habitat: A; Effect Codes: ACC,MOR; Rejection Code: NO ENDPOINT(ALL CHEMS),MIXTURE(PPB).

Metcalf, R. L. and Sanborn, J. R. (1975). Pesticides and Environmental Quality in Illinois. *Il.Nat.Hist.Surv.Bull.* 31: 381-436.

EcoReference No.: 37948

Chemical of Concern:

ACP,PRN,CBL,PPX,EN,HCCH,MRX,PCP,MLN,FNF,FNT,TMP,DFZ,MTPN,FTT,ADC,CPYM,CPY,PCH,24DXY,PHMD,MXC,DMB,ACR,ATZ,TBO,GYP,OYZ,BT,MBZ,TFN,CBF,Maneb,Zineb,AND,DLDDDT,HPT,TXP,CHD,PPN,Captan; Habitat: AT; Effect Codes: ACC; Rejection Code: NO CONTROL,NO ENDPOINT(ALL CHEMS).

Minton, E. B. (1972). Effects of Seed Treatment with Fungicides and Systemic Insecticides on Stand of Cotton. *Crop Sci.* 12: 93-94.

EcoReference No.: 106342

Chemical of Concern: DS,TFN,Captan,CLNB,CTN,PRT; Habitat: T; Effect Codes: POP; Rejection Code: OK(DS,PRT),NO MIXTURE(Captan,CLNB,CTN,TFN).

Moreland, D. E., Farmer, F. S., and Hussey, G. G. (1971). Inhibition of Photosynthesis and Respiration by Substituted 2,6-Dinitroaniline Herbicides. *Pest Bioc* 1: 342-353.

EcoReference No.: 40799

Chemical of Concern: OYZ,TFN; Habitat: T; Effect Codes: BCM,PHY; Rejection Code: NO ENDPOINT,NO CONTROL(OYZ,TFN).

Moreland, D. E., Malhotra, S. S., Gruenhagen, R. D., and Shokraii, E. H. (1969). Effects of Herbicides on RNA and Protein Synthesis. *Weed Sci.* 17: 556-563.

EcoReference No.: 42656

Chemical of Concern: AMTL,PCL,EPTC,PCH,PPN,TFN,DMB,DBN,DU,ATZ; Habitat: T; Effect Codes: BCM; Rejection Code: TARGET(DMB),NO ENDPOINT,NO CONTROL(EPTC,DU,ATZ,PPN,TFN).

Mueller-Warrant, G. W., Young III, W. C., and Mellbye, M. E. (1994). Influence of Residue Removal Method and Herbicides on Perennial Ryegrass Seed Production: II. Crop Tolerance. *Agron.J.* 86: 684-690.

EcoReference No.: 73260

Chemical of Concern: MTL,TFN,OXF,PDM,DU; Habitat: T; Effect Codes: POP; Rejection Code: NO ENDPOINT,TARGET(MTL),TARGET(OXF,DU,PDM,TFN).

Murphy, H. J. and Gajewski, T. (1977). Effect of Several Herbicides Applied Preemergence, at Drag-Off and Layby on Weed Control in White Potatoes. *Proc.Northeast.Weed Sci.Soc.* 31: 176-179.

EcoReference No.: 41806

Chemical of Concern: ACR,LNR,MTL,PDM,MBZ,DMM,EPTC,TFN; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(MTL),NO ENDPOINT(LNR,DU,ACR,TFN).

Naqvi, S. M., Hawkins, R., and Naqvi, N. H. (1987). Mortality Response and LC50 Values for Juvenile and Adult Crayfish, *Procambarus clarkii* Exposed to Thiocarbonyl (Insecticide), Treflan, Msma, Oust. *Environ.Pollut.* 48: 275-283.

EcoReference No.: 12802

Chemical of Concern: SMM,TFN,ES; Habitat: A; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(ES),NO CONTROL(SMM,TFN).

Nath, J., Okoye, V., and Schneider, I. (1994). Anti-Malarial Effects of the Anti-Tubulin Herbicide Trifluralin: Studies with *Plasmodium falciparum*. *Walter Reed Army Inst.of Research, Washington, DC* 9 p. (NTIS/02997342_a).

EcoReference No.: 110080

Chemical of Concern: TFN; Habitat: T; Effect Codes: CEL,POP; Rejection Code: NO ENDPOINT(TFN).

Naughton, J. A., Hughes, R., Bray, P., and Bell, A. (2008). Accumulation of the Antimalarial Microtubule Inhibitors Trifluralin and Vinblastine by *Plasmodium falciparum*. *Biochem.Pharmacol.* 75: 1580-1587.

EcoReference No.: 109753

Chemical of Concern: TFN; Habitat: T; Effect Codes: ACC; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).

Neel, P. L. (1973). Weed Control in Containers with Herbicide-Impregnated Mulch Materials. *P.Fla.Hor.S.* 85: 409-413.

EcoReference No.: 25028

Chemical of Concern: DCPA,SZ,TFN,ACR; Habitat: T; Effect Codes: GRO,PHY,POP,REP; Rejection Code: NO ENDPOINT(ALL CHEMS).

Negi, N. S., Funderburk, H. H. Jr., Schultz, D. P., and Davis, D. E. (1968). Effect of Trifluralin and Nitratin on Mitochondrial Activities. *Weed Sci.* 16: 83-85.

EcoReference No.: 43615

Chemical of Concern: TFN; Habitat: T; Effect Codes: BCM,PHY; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).

Nishiuchi, Y. (1974). Control Effect of Pesticide to Duckweed. *Bull.Agric.Chem.Insp.Stn.(Noyaku Kensasho Hokoku)* 14: 69-72 (JPN) (ENG ABS).

EcoReference No.: 15281

Chemical of Concern:

24DXY,ACR,BMC,BS,DBN,DCPA,DU,LNR,MLT,PEB,PMT,PQT,SZ,TBC,PHMD,PYZ,CuS,PCP,PPZ,QOC,EPTC,CYA,BSO,PPN,TFN,DQTB; Habitat: A; Effect Codes: MOR; Rejection Code: NO ENDPOINT,NO CONTROL(QOC,BS,CYA,EPTC,LNR,24DXY,BSO,DU,DCPA,PPN,PMT,ACR,PQT,TBC,TFN,DQTB).

Nishiuchi, Y. (1972). Toxicity of Pesticides to Some Water Organisms. *Bull.Agric.Chem.Insp.Stn.(Noyaku Kensasho Hokoku)* 12: 122-128 (JPN) (ENG TRANSL).

EcoReference No.: 10258

Chemical of Concern:

3CE,AC,AMTL,AMTR,AND,As,ATZ,BMC,BS,Captan,CBL,CPA,CPY,CTN,Cu,DBN,DCPA,DDT,DDVP,DLD,DMB,DMT,DPA,DSMA,DU,DZ,EDB,EDC,EN,EPTC,ES,ETN,Fe,FLAC,FML,FNT,FNTH,HCCH,Hg,HPT,LNR,MCA,MCPB,MCP1,MDT,MLN,MOM,MP,MTAS,NALED,Ni,NTCN,OPHP,Pb,PCB,PCP,PCZ,PEB,PHMD,PHSL,PHTH,PMT,PNB,PPX,PPZ,PRN,PSM,PYN,SFL,SID,STREP,SZ,TBC,TFN,THM,TPE,TPH,TPM,TRN,Zn; Habitat: A; Effect Codes: MOR; Rejection Code: NO CONTROL (ALL CHEMS)/NO RESIDUE (PCBRES).

Nishiuchi, Y. and Asano, K. (1979). Toxicity of Agricultural Chemicals to Some Freshwater Organisms - LIX. *The Aquiculture (Suisan Zoshoku)* 27: 48-55 (JPN) (ENG TRANSL).

EcoReference No.: 6954

Chemical of Concern:

ACP,ACR,ATZ,BMC,BT,Captan,CPY,CTN,Cu,CuOH,CuS,DDVP,DMT,DU,DZ,Folpet,HCCH,LNR,MAL,MDT,MLN,MOM,PCP,PEB,PHMD,PMT,PNB,PPG,PQT,PSM,QOC,TBC,TFN,RTN,CuCl,PPZ,Zn,Ni,As,DCB,CPYM,EPTC,Ziram,TVPM,STRP,SFR,TCF,BMY,PPN,DCF,PPX,DQTBr,TDC; Habitat: A; Effect Codes: MOR; Rejection Code: NO
CONTROL(RTN,Ziram,EPTC,PPG,LNR,PSM,CPYM,CPY,DMT,MLN,BMC,CTN,QOC,Captan,Folpet,ATZ,TVPM,DZ,DU,STRP,SFR,ACP,DDVP,TCF,BMY,PPN,DCF,PMT,ACR,PQT,TBC,TFN,PPX,DQTBr,TD C).

Nishiuchi, Y. and Yoshida, K. (1972). Toxicities of Pesticides to Some Fresh Water Snails. *Bull.Agric.Chem.Insp.Stn.* 12: 86-92 (JPN) (ENG ABS) (ENG TRANSL) (Author Communication Used).

EcoReference No.: 9158

Chemical of Concern:

ACR,AMTR,AND,Captan,CBL,CTN,CuOH,CuS,CZE,DCF,DDT,DDVP,DEM,DINO,DMT,DOD,DZ,EN,ES,ETN,FNT,Folpet,HCCH,MDT,MOM,MP,NPH,PAQT,PCP,PEB,PHMD,PHSL,PPN,PQT,PRN,PYN,QOC,RTN,TBC,TBT,TCF,TDC,TDE,TFN,Zineb,Ziram,Zn; Habitat: A; Effect Codes: PHY,GRO; Rejection Code: NO
CONTROL(ACR,AMTR,AND,Captan,CBL,CTN,CuOH,CuS,CZE,DCF,DDT,DDVP,DEM,DINO,DMT,DOD,DZ,EN,ES,ETN,FNT,Folpet,HCCH,MDT,MOM,MP,NPH,PAQT,PCP,PEB,PHMD,PHSL,PPN,PQT,PRN,PYN,QOC,RTN,TBC,TBT,TCF,TDC,TDE,TFN,Zineb,Ziram,Zn).

Okayama, K., Nakano, T., Matsutani, S., and Sugimura, T. (1995). A Simple and Reliable Method for Evaluating the Effectiveness of Fungicides for Control of Powdery Mildew (*Sphaerotheca macularis*) on Strawberry. *Ann.Phytopathol.Soc.Jpn.* 61: 536-540 .

EcoReference No.: 99772

Chemical of Concern: MYC,FRM,BTN,TFZ; Habitat: T; Effect Codes: POP; Rejection Code: TARGET(FRM,MYC,TFZ),NO COC(TFN).

Pakdaman, B. S. and Mohammadi Goltapeh, E. (2007). In Vitro Studies on the Integrated Control of Rapeseed White Stem Rot Disease Through the Application of Herbicides and Trichoderma Species. *Pak.J.Biol.Sci.* 10: 7-12.

EcoReference No.: 109936

Chemical of Concern: TFN,SXD; Habitat: T; Effect Codes: GRO; Rejection Code: LITE EVAL CODED(SXD),NO ENDPOINT(TFN).

Palmer, J. S. (1972). Toxicity of 45 Organic Herbicides to Cattle, Sheep and Chickens. *Prod.Res.Rep.No.137, Agric.Res.Serv., U.S.Dep.of Agric., Washington, DC.*

EcoReference No.: 80557

Chemical of Concern:

24DXYEE,MCPB,MCPA,PEB,VNT,EPTC,MSMA,CCA,TFN,PAQT,DQTBr,NPM,PYZ,DCPA,AMTL,DM DP,24D; Habitat: T; Effect Codes: GRO,MOR,BEH; Rejection Code: NO ENDPOINT(ALL CHEMS).

Parka, S. J. and Worth, H. M. (1965). The Effects of Trifluralin to Fish. *Proc.18th Annu.Meeting Southern Weed Conf.* 18: 469-473.

EcoReference No.: 14178

Chemical of Concern: DDT,TFN; Habitat: A; Effect Codes: MOR; Rejection Code: NO CONTROL(TFN).

Pool, R. A. F. (1977). A Rapid Bioassay for Pesticide Phytotoxicity. *J.Agric.Food Chem.* 25: 1216-1218.

EcoReference No.: 43504

Chemical of Concern: SZ,BMC,CBL,DU,Captan,MLN,TFN,GYP,DCPA,BMY,Maneb; Habitat: T; Effect Codes: BCM; Rejection Code: NO ENDPOINT,NO CONTROL(SZ,BMC,CBL,DU,Captan,MLN,TFN,GYP,DCPA,BMY,Maneb).

Powell, R. L., Moser, E. M., Kimerle, R. A., McKenzie, D. E., and McKee, M. (1996). Use of a Miniaturized Test System for Determining Acute Toxicity of Toxicity Identification Evaluation Fractions. *Ecotoxicol.Environ.Saf.* 35: 1-6.

EcoReference No.: 109574

Chemical of Concern: PCP,ACE,Captan,MBTZ,TFN,ABSA,NaLS; Habitat: A; Effect Codes: MOR; Rejection Code: OK(PCP),NO MIXTURE(ACE,Captan,MBTZ,TFN).

Putnam, A. R. and Davidson, H. (1970). Chemical Control of Weeds in Transplanted Ground Covers. *J.Am.Soc.Hortic.Sci.* 95: 687-689.

EcoReference No.: 43457

Chemical of Concern: SZ,BS,DBN,TFN,EPTC,BSO,DCPA; Habitat: T; Effect Codes: PHY,POP; Rejection Code: NO ENDPOINT,NO CONTROL(EPTC,BS,BSO,SZ,DCPA,TFN).

Quader, H. and Filner, P. (1980). The Action of Antimitotic Herbicides on Flagellar Regeneration in *Chlamydomonas reinhardtii*: A Comparison with the Action of Colchicine. *Eur.J.Cell Biol.* 21: 301-304.

EcoReference No.: 6608

Chemical of Concern: TFN,OYZ; Habitat: A; Effect Codes: PHY,GRO; Rejection Code: NO ENDPOINT(OYZ,TFN).

Reeves, S. A. Jr. (1977). Evaluations of Selected Pre- and Postemergence Chemicals on Weed Control and Phytotoxicity to Eight Sugarcane Varieties. *Proc.South.Weed Sci.Soc.* 30: 130-132.

EcoReference No.: 41315

Chemical of Concern: ATZ,HXZ,DMM,DMB,MBZ,TET,TRB,TFN; Habitat: T; Effect Codes: POP,PHY; Rejection Code: TARGET(DMB),NO ENDPOINT,NO CONTROL(HXZ,ATZ,TET,TFN).

Reinbold, K. A. and Metcalf, R. L. (1976). Effects of the Synergist Piperonyl Butoxide on Metabolism of Pesticides in Green Sunfish. *Pestic.Biochem.Physiol.* 6: 401-412 (Used 698 for Ref).

EcoReference No.: 2917

Chemical of Concern: PPB,TFN,AND,MXC; Habitat: A; Effect Codes: ACC; Rejection Code: NO MIXTURE(PPB),NO ENDPOINT(TFN,AND,MXC).

Richardson, W. G. and West, T. M. (1985). The Response of *Viola arvensis* and Winter Wheat to Various Herbicides, Pre-emergence. *Tests Agrochem.Cultiv.* 6: 150-151.

EcoReference No.: 31239

Chemical of Concern: SZ,TRL,DMB,CPR,TFN,PHMD,LNR,MTSM,CSF,CZE; Habitat: T; Effect Codes: GRO; Rejection Code: NO ENDPOINT(ALL CHEMS) .

Riggs, R. D., Hamblen, M. L., and Rakes, L. (1989). Effects of Fertilizer and Pesticides on Soybean Growing in *Heterodera glycines*-Infested Soil. *J.Nematol.* 21: 635-639 .

EcoReference No.: 90787

Chemical of Concern: BMY,Maneb,LNR,TFN; Habitat: T; Effect Codes: POP; Rejection Code: NO MIXTURE(BMY,Maneb,LNR,TFN).

- Robinson, D. G. and Herzog, W. (1977). Structure, Synthesis and Orientation of Microfibrils. III. A Survey of the Action of Microtubule Inhibitors on Microtubules and Microfibril Orientation in *Oocystis solitaria*. *Cytobiologie* 15: 463-474 .
- EcoReference No.: 92137
Chemical of Concern: PZM,DCPA,OYZ,TFN; Habitat: A; Effect Codes: CEL,BCM; Rejection Code: NO ENDPOINT(ALL CHEMS).
- Robinson, S. J., Yocum, C. F., Ikuma, H., and Hayashi, F. (1977). Inhibition of Chloroplast Electron Transport Reactions by Trifluralin and Diallate. *Plant Physl* 60: 840-844.
- EcoReference No.: 41445
Chemical of Concern: TFN; Habitat: T; Effect Codes: BCM,PHY; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).
- Rovesti, L. and Deseo, K. V. (1990). Compatibility of Chemical Pesticides with the Entomopathogenic Nematodes, *Steinernema carpocapsae* Weiser and *S.feltiae* Filipjev (Nematoda: Steinernematidae). *Nematologica* 36: 237-245.
- EcoReference No.: 70083
Chemical of Concern:
DM,FMP,PPG,AMZ,AND,MOM,PRT,MTAS,DZ,PRN,PPHD,ES,PAQT,ACR,DOD,CYX,TFN,OXF,PHM D,LNR,PNB; Habitat: T; Effect Codes: BEH,PHY; Rejection Code: NO ENDPOINT(DM,FMP,PPG,AMZ,MOM,PRT,MTAS,DZ,ES,PAQT,ACR,TFN,OXF,PHMD,LNR,DM),NO COC(TLM,CTN).
- Rovesti, L. and Deseo, K. V. (1991). Compatibility of Pesticides with the Entomopathogenic Nematode, *Heterorhabditis heliothidis*. *Nematologica* 37: 113-116.
- EcoReference No.: 102311
Chemical of Concern: TFN,GYP,LNR,PQT,PPHD,DZ,TBO,ACP,CBF,MOM; Habitat: T; Effect Codes: PHY,POP; Rejection Code: NO ENDPOINT(ALL CHEMS).
- Ruppel, E. G., Gilbertson, R. L., and Schweizer, E. E. (1988). Population Densities of Selected Soil-Borne Fungi and Disease Incidence in a Crop Rotation Under Varied Weed-Management Systems. *Agric.Ecosyst.Environ.* 21: 163-169.
- EcoReference No.: 98842
Chemical of Concern: DMB,PHMD,24DXY,CZE,TFN,ACR,EPTC; Habitat: T; Effect Codes: POP; Rejection Code: NO ENDPOINT(ALL CHEMS).
- Sanborn, J. R. (1974). The Fate of Select Pesticides in the Aquatic Environment. *EPA-660/3-74-025, U.S.EPA, Corvallis, OR* 83 p. (Publ in Part As 15007).
- EcoReference No.: 2318
Chemical of Concern: TFN,DLD,PRN,BT,PYZ,PCB; Habitat: A; Effect Codes: ACC; Rejection Code: NO CONTROL(TFN).
- Sanders, H. O. (1970). Toxicities of Some Herbicides to Six Species of Freshwater Crustaceans. *J.Water Pollut.Control Fed.* 24: 1544-1550 (Publ in Part As 6797).
- EcoReference No.: 886
Chemical of Concern: SZ,EDT,24DXY,BS,DBN,DMB,DU,MLT,PEB,TFN,EPTC,BSO,BTY,MTAS,PPN; Habitat: A; Effect Codes: MOR,PHY; Rejection Code: LITE EVAL CODED(MLT,SZ,DMB),NO CONTROL(EPTC,24DXY,BS,BSO,DU,PPN,BTY,TFN).

Sanders, H. O. (1969). Toxicity of Pesticides to the Crustacean *Gammarus lacustris*. *Tech.Pap.No.25, U.S.D.I., Bur.Sports Fish.Wildl., Fish Wildl.Serv., Washington, DC* 18 p. (Author Communication Used) (Used with Reference 732) (Publ in Part As 6797).

EcoReference No.: 885

Chemical of Concern:

SZ,EDT,24DXY,AZ,CBL,CMPH,CPY,DBN,DDVP,DMB,DMT,DS,DU,DZ,HCCH,MLN,MLT,Naled,PAQ
T,PRT,TFN,RTN,NaN3,ATN,OXD,Captan,TBF,PPG,TMP,DCTP,ES,TCF,PQT,PPX; Habitat: A; Effect
Codes: MOR; Rejection Code: LITE EVAL
CODED(CBL,AZ,DZ,MLT,SZ,DMT,RTN,NaN3,DMB,PRT,ATN),NO
CONTROL(PPG,DS,24DXY,CPY,MLN,Naled,OXD,Captan,TBF,CMPH,TMP,DCTP,DU,DDVP,ES,TCF,P
QT,TFN,PPX).

Sanders, H. O. and Cope, O. B. (1968). The Relative Toxicities of Several Pesticides to Naiads of Three Species of Stoneflies. *Limnol.Oceanogr.* 13: 112-117 (Author Communication Used) (Publ in Part As 6797).

EcoReference No.: 889

Chemical of Concern:

24DXY,AZ,CBL,CPY,DBN,DDVP,DMT,DS,DU,DZ,HCCH,MLN,MLT,Naled,PYN,TFN,RTN,As,NaN3,A
TN,OXD,Captan,TBF,TMP,DCTP,ES,TCF,FNT,PQT,PPX; Habitat: A; Effect Codes: MOR; Rejection
Code: LITE EVAL CODED(CBL,DZ,MLT,DMT,RTN,NaN3,ATN),NO
CONTROL(DS,24DXY,CPY,TBF,Naled,OXD,Captan,MLN,TMP,DCTP,DU,DDVP,ES,TCF,FNT,TFN,PP
X),NO ENDPOINT(PQT).

Sanders, H. O. and Cope, O. B. (1966). Toxicities of Several Pesticides to Two Species of Cladocerans. *Trans.Am.Fish.Soc.* 95: 165-169 (Author Communication Used) (Publ in Part As 6797).

EcoReference No.: 888

Chemical of Concern:

24DXY,As,AND,BNZ,CBL,CHD,CYT,DBN,DBN,DDT,DLD,DU,DZ,EN,FNTH,HCCH,HPT,MLN,MVP,
MXC,Naled,PAQT,PRN,PYN,RTN,TFN,TXP,PQT; Habitat: A; Effect Codes: PHY; Rejection Code: NO
CONTROL(24DXY,CBL,DBN,DU,DZ,HCCH,MLN,Naled,CYT,PYN,TFN,RTN,As,PQT).

Sandhu, S. S., Waters, M. D., Simmon, V. F., Mortelmans, K. E., Mitchell, A. D., Jorgenson, T., Jones, D. C. L., Valencia, R., and Stack, F. (1985). Evaluation of the Genotoxic Potential of Certain Pesticides Used in Pakistan. *Basic Life Sci.* 34: 185-219.

EcoReference No.: 89882

Chemical of Concern:

PPN,DMB,24DXY,MZB,Zineb,Maneb,Captan,BMY,TCF,ACP,AZ,CBF,CPY,DZ,EN,MLN,MOM,MP,DS,F
NTH,PMR,PRT,TFN,ETN; Habitat: T; Effect Codes: REP,CEL,PHY; Rejection Code: NO
ENDPOINT(ALL CHEMS),NO BACTERIA(DZ,EN,PMR,MZB,Maneb,Zineb,24DXY,PPN,TFN,ETN).

Sanok, W. J. (1974). Evaluation of Herbicides for Control of Weeds in Long Island Potatoes-1973. *Proc.Northeast.Weed Sci.Soc.* 28 : 282-286.

EcoReference No.: 40636

Chemical of Concern: DMM,ACR,LNR,MBZ,TFN,DU; Habitat: T; Effect Codes: GRO,MOR; Rejection
Code: NO ENDPOINT,NO CONTROL(LNR,DU,ACR,TFN).

Santelmann, P. W., Matlock, R. S., and Six, L. (1967). Phytotoxicity of Herbicides to Spanish Peanuts (*Arachis Hypogaea* L.) As Influenced by Planting Depth and Simulated Rainfall. *Crop Sci.* 7: 365-367.

EcoReference No.: 40873

Chemical of Concern: TFN,BS,BSO; Habitat: T; Effect Codes: GRO; Rejection Code: NO
ENDPOINT,NO CONTROL(BS,BSO,TFN).

- Sauls, B. T. (1999). Pesticide Risk Mitigation of Avian Wildlife in Iowa Agroecosystems. *Ph.D.Thesis, Texas Tech Univ., Lubbock, TX* 104 p.
- EcoReference No.: 93607
Chemical of Concern: LCYT,TFN,LCF,GYP,IZT,24D,QZF,CRM,TBO,MTL,CZE,PDM ; Habitat: T; Effect Codes: MOR,REP,POP; Rejection Code: NO MIXTURE(GYP,24D,LCF,MTL,TBO,LCYT,PDM,CZE,TFN,IZT,QZF,CRM),NO COC(ATZ).
- Schibler, M. J. and Huang, B. (1991). The ColR4 and ColR15 Beta-Tubulin Mutations in Chlamydomonas reinhardtii Confer Altered Sensitivities to Microtubule Inhibitors and Herbicides by Enhancing Microtubule Stability. *J.Cell Biol.* 113: 605-614.
- EcoReference No.: 91769
Chemical of Concern: OYZ,TFN,BFL,PZM; Habitat: A; Effect Codes: POP,BCM,CEL; Rejection Code: NO CONTROL,ENDPOINT(OYZ,PZM,TFN).
- Schultz, D. P., Funderburk, H. H. Jr., and Neg, N. S. (1968). Effect of Trifluralin on Growth, Morphology and Nucleic Acid Synthesis. *Plant Physiol.* 43: 265-273 .
- EcoReference No.: 43997
Chemical of Concern: TFN; Habitat: T; Effect Codes: CEL,GRO,PHY; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).
- Schultz, I. R. and Hayton, W. L. (1994). Body Size and the Toxicokinetics of Trifluralin in Rainbow Trout. *Toxicol.Appl.Pharmacol.* 129: 138-145.
- EcoReference No.: 109835
Chemical of Concern: TFN; Habitat: A; Effect Codes: ACC; Rejection Code: NO CONTROL(TFN).
- Schultz, I. R. and Hayton, W. L. (1997). Influence of Body Fat on Trifluralin Toxicokinetics in Rainbow Trout (Oncorhynchus mykiss). *Environ.Toxicol.Chem.* 16: 997-1001.
- EcoReference No.: 17857
Chemical of Concern: TFN; Habitat: A; Effect Codes: ACC; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).
- Schultz, I. R. and Hayton, W. L. (1999). Interspecies' Scaling of the Bioaccumulation of Lipophilic Xenobiotics in Fish: An Example Using Trifluralin. *Environ.Toxicol.Chem.* 18: 1440-1449.
- EcoReference No.: 54001
Chemical of Concern: TFN; Habitat: A; Effect Codes: ACC,PHY,BCM; Rejection Code: NO CONTROL(TFN).
- Schultz, I. R. and Hayton, W. L. (1993). Toxicokinetics of Trifluralin in Rainbow Trout. *Aquat.Toxicol.* 26: 287-306.
- EcoReference No.: 8239
Chemical of Concern: TFN; Habitat: A; Effect Codes: ACC; Rejection Code: NO ENDPOINT,NO CONTROL(TFN).
- Scott, A. W. Jr. and Reeves, S. A. Jr. (1977). Evaluation of Selected Pre and Postemergence Weed Control Treatments in Sugarcane. *Proc.South.Weed Sci.Soc.* 30: 125-129 .
- EcoReference No.: 40807
Chemical of Concern: ATZ,HXZ,DMM,DMB,PDM,TET,TFN; Habitat: T; Effect Codes: POP; Rejection Code: NO ENDPOINT(ATZ,DMM,DMB),NO ENDPOINT,NO CONTROL(HXZ,PDM,TET,TFN).

Sheehan, P. J., Axler, R. P., and Newhook, R. C. (1986). Evaluation of Simple Generic Aquatic Ecosystem Tests to Screen the Ecological Impacts of Pesticides. In: J.Cairns,Jr.(Ed.), *Community Toxicity Testing, ASTM STP 920, Philadelphia, PA* 158-179.

EcoReference No.: 17164

Chemical of Concern: Cu,Hg,DM,FNT,FNV,MXC,ATZ,24DXY,TRL,TFN; Habitat: A; Effect Codes: POP,SYS; Rejection Code: NO ENDPOINT(ALL CHEMS).

Simmon, V. F., Mitchell, A. D., and Jorgenson, T. A. (1977). Evaluation of Selected Pesticides as Chemical Mutagens: In Vitro and In Vivo Studies. *EPA-600/1-77-028, U.S.EPA, Res.Triangle Park, NC* 238 p. (NTIS/PB-268647).

EcoReference No.: 71394

Chemical of Concern:

MSMA,SZ,PRT,PRN,Folpet,BMC,CCA,Captan,CPY,DSMA,FNTH,AZ,MLN,MOM,MP,PNB,TFN;

Habitat: T; Effect Codes: REP,MOR; Rejection Code: LITE EVAL

CODED(PRT,MLN,Captan,Folpet,MP,BMC,AZ),OK(MOM),NO IN VITRO(TFN,CPY),NO ENDPOINT(SZ),NO COC(TDC).

Simms, J. W., Collier, C. W. Jr., and Schubert, O. E. (1972). Chemical Weed Control in Liriope (Liliaceae). *Proc.W.Va.Acad.Sci.* 44: 78-84.

EcoReference No.: 40614

Chemical of Concern: VNT,PCH,SZ,AMTL,CPP,DCPA,DBN,TRB,TFN,FS,CNR,PEB,LNR,DU,ACR;

Habitat: T; Effect Codes: MOR,PHY; Rejection Code: TARGET(SZ),NO ENDPOINT,NO CONTROL(LNR,DU,ACR,TFN).

Smart, J. R. and Coleman, R. J. (1998). Kenaf Response to Herbicides in the Rio Grande Valley. *Subtrop.Plant Sci.* 50: 49-53.

EcoReference No.: 73927

Chemical of Concern: MTL,TFN,PDM,MSMA,FZFP; Habitat: T; Effect Codes: POP; Rejection Code: NO ENDPOINT(MTL,TARGET-PDM),TARGET(TFN).

Smith, D. and Buchholtz, K. P. (1964). Modification of Plant Transpiration Rate with Chemicals. *Plant Physiol.* 39: 572-578.

EcoReference No.: 42221

Chemical of Concern: ATZ,SZ,24DXY,LNR,TFN,PPZ,AMTR,AMTL,DU,EPTC,DCPA,PPN,DQTBr;

Habitat: T; Effect Codes: PHY; Rejection Code: NO ENDPOINT(ATZ,SZ,PPZ,AMTR,AMTL),NO ENDPOINT,NO CONTROL(EPTC,LNR,24DXY,DU,DCPA,PPN,TFN,DQTBr).

Smith, M. T. and Hardee, D. D. (1996). Influence of Fungicides on Development of an Entomopathogenic Fungus (Zygomycetes: Neozygitaaceae) in the Cotton Aphid (Homoptera: Aphididae). *Environ.Entomol.* 25: 677-687.

EcoReference No.: 70198

Chemical of Concern: PNB,MLX; Habitat: T; Effect Codes: POP,PHY; Rejection Code: LITE EVAL CODED(MLX),OK(CPY),NO ENDPOINT(TFN,FMU,CZE,ADC).

Snel, M., Gramlich, J. V., Washbrooke, P. F., Brandes, H., Doehler, R., Muggenberger, F., and Jacob, L. (1974). Oryzalin, A new Pre-Emergence Herbicide for Rapeseed, Soybeans, and Some Other Crops. *Med Rijk Lg* 39: 523-536.

EcoReference No.: 43415

Chemical of Concern: OYZ,ACR,TFN; Habitat: T; Effect Codes: MOR; Rejection Code: NO

ENDPOINT,NO CONTROL(OYZ,ACR,TFN).

Spacie, A. and Hamelink, J. L. (1979). Dynamics of Trifluralin Accumulation in River Fishes. *Environ.Sci.Technol.* 13: 817-822.

EcoReference No.: 7267

Chemical of Concern: TFN; Habitat: A; Effect Codes: ACC; Rejection Code: NO CONTROL(TFN).

St.John, J. B. and Hilton, J. L. (1973). Lipid Metabolism As A Site of Herbicide Action. *Weed Sci.* 21: 477-480.

EcoReference No.: 25360

Chemical of Concern: OYZ,TFN,AMTL,PCL; Habitat: T; Effect Codes: PHY,BCM,GRO; Rejection Code: NO ENDPOINT(ALL CHEMS).

Stojanovic, B. J., Kennedy, M. V., and Shuman, F. L. Jr. (1972). Edaphic Aspects of the Disposal of Unused Pesticides, Pesticide Wastes, and Pesticide Containers. *J.Environ.Qual.* 1: 54-62.

EcoReference No.: 90589

Chemical of Concern: ATZ,BMC,CBL,24DXY,DDT,DMB,DLD,DU,MLN,PAQT,PCL,TFN,VNT,Zineb; Habitat: T; Effect Codes: POP; Rejection Code: NO ENDPOINT(ALL CHEMS).

Stokkermans, T. J. W., Schwartzman, J. D., Keenan, K., Morrisette, N. S., Tilney, L. G., and Roos, D. S. (1996). Inhibition of *Toxoplasma gondii* Replication by Dinitroaniline Herbicides. *Exp.Parasitol.* 84: 355-370.

EcoReference No.: 94281

Chemical of Concern: OYZ,EFL,TFN; Habitat: A; Effect Codes: POP,CEL,BCM; Rejection Code: NO ENDPOINT(OYZ,TFN).

Svobodova, Z. and Vykusova, B. (1988). Comparing the Sensitivity of Rainbow Trout and Rasbora heteromorpha to Various Toxic Substances (Porovnaní Citlivosti Pstruha Duhoveho a Razbory Klinoskvrnné k Různým Cizorodým Latkam). *Bul.VURH Vodnany* 24: 14-19 (CZE) (ENG ABS).

EcoReference No.: 315

Chemical of Concern: ATZ,MTL,TFN; Habitat: A; Effect Codes: MOR; Rejection Code: NO FOREIGN(MTL),NO CONTROL(ATZ,TFN).

Sweat, J. K., Horak, M. J., Peterson, D. E., Lloyd, R. W., and Boyer, J. E. (1998). Herbicide Efficacy on Four Amaranthus Species in Soybean (Glycine max). *Weed Technol.* 12: 315-321.

EcoReference No.: 108601

Chemical of Concern:

ACO,ACR,MTC,MBZ,PDM,TFN,IMQ,SFZ,LNR,IZX,IZT,THF,ACF,FSF,LCF,PDM,TFN,FMC; Habitat: T; Effect Codes: POP; Rejection Code: NO CONTROL(ACO,ACR,MTC,MBZ,PDM,TFN,IMQ,SFZ,LNR,IZX,IZT,THF,ACF,FSF,LCF,PDM,TFN,FMC).

Takeuchi, S., Matsuda, T., Kobayashi, S., Takahashi, T., and Kojima, H. (2006). In Vitro Screening of 200 Pesticides for Agonistic Activity via Mouse Peroxisome Proliferator-Activated Receptor (PPAR)alpha and PPARgamma and Quantitative Analysis of In Vivo Induction Pathway. *Toxicol.Appl.Pharmacol.* 217: 235-244.

EcoReference No.: 89206

Chemical of Concern:

AND,HCCH,Captan,CHD,CTN,DDT,DBN,DCF,DLD,ES,EN,Folpet,HPT,MXC,PCP,ACF,ACFM,DFPM,FZFB,OXF,ACP,ANL,CPY,CPYM,DZ,DDVP,DMT,DS,ETN,FMP,FNT,FNTH,GYP,IFP,MLN,MTM,MDT,MP,PRN,PRT,PHSL,PSM,PIRM,PFF,TBO,TVP,TCM,TCF,CYF,CYH,CYP,DM,EFX,FNV,FYT,FVL,PMR,

PYN,TFT,TLM,BDC,BMY,CBL,CBD,CBF,CPP,MCB,MOM,MLT,OML,PHMD,PIM,TBC,THM,ACR,AS
M,FTL,MLX,MTL,PZM,ANZ,ATZ,MBZ,PRO,PMT,SZ,BSF,DFZ,DU,LNR,PPN,AMZ,BPH,BTN,DZM,EX
Q,FRM,ILL,IMC,IPD,MCPA,24DXY,PAQT,PDM,PCZ,SXD,TBAH,TPM,TDF,TFZ,TFN,TFR,TVMP,
VCZ,FTL,FNZ; Habitat: T; Effect Codes: BCM,CEL; Rejection Code: OK(ILL,PYN,DFPM),NO IN
VITRO(ALL OTHER CHEMS).

Tang, L. C. and Hou, R. F. (1998). Potential Application of the Entomopathogenic Fungus, *Nomuraea rileyi*, for Control of the Corn Earworm, *Helicoverpa armigera*. *Entomol.Exp.Appl.* 88: 25-30.

EcoReference No.: 98468

Chemical of Concern:

DM,BTC,TFN,24D,PDM,GYP,FXP,FNV,DCM,MOM,CPY,IPD,Zineb,Maneb,GYP,CBF,BFT,BPZ,MVP;

Habitat: T; Effect Codes: GRO,MOR; Rejection Code: LITE EVAL

CODED(CBF),TARGET(Maneb,IPD),NO

ENDPOINT(CPY,BFT,MOM,FNV,OXF,24D,GYP,DM,PDM,FNV,TFN).

Tsay, R. C. and Ashton, F. M. (1971). Effect of Several Herbicides on Dipeptidase Activity of Squash Cotyledons. *Weed Sci.* 19: 682-684.

EcoReference No.: 41917

Chemical of Concern: AMTL,TFN,DMB,DBN,BS,ATZ,24DXY,EDT,BSO; Habitat: T; Effect Codes:

BCM; Rejection Code: NO ENDPOINT,NO

CONTROL(AMTL,TFN,DMB,DBN,BS,ATZ,24DXY,EDT,BSO).

Turgut, C. (2005). The Effect of Pesticides on Duckweed at Their Predicted Environmental Concentrations in Europe. *Fresenius Environ.Bull.* 14: 783-787.

EcoReference No.: 85923

Chemical of Concern: DPP1,GYP,PYD,PDM,PCZ,TFN,CTN,MTSM,TSM,THFM,RIM; Habitat: A; Effect

Codes: BCM,GRO; Rejection Code: NO ENDPOINT(ALL CHEMS).

Turgut, C. (2005). Uptake and Modeling of Pesticides by Roots and Shoots of Parrotfeather (*Myriophyllum aquaticum*). *Environ.Sci.Pollut.Res.Int.* 12: 342-346.

EcoReference No.: 109754

Chemical of Concern: TFN,ATZ; Habitat: A; Effect Codes: ACC; Rejection Code: NO

CONTROL(TFN,ATZ).

Turnbull, A. B., Harrison, R. M., Williams, R. J., Matthiessen, P., Brooke, D. N., Sheahan, D. A., and Mills, M. (1997). Assessment of the Fate of Selected Adsorptive Pesticides at ADAS Rosemaund. *Water Environ.Manag.* 11: 24-30.

EcoReference No.: 60171

Chemical of Concern: TFN,DM,CPY; Habitat: A; Effect Codes: BEH,MOR; Rejection Code: NO

ENDPOINT(TFN,DM,CPY).

Unsal, M. (1992). Effects of Herbicides on the Growth of Marine Phytoplankton. In: G.P.Gabrielides (Ed.), *Proc.of the FAO/UNEP/IOC Workshop on the Biological Effects of Pollutants on Marine Organisms, Malta, 10-14 Sept., 1991, UNEP, Athens, Greece, MAP Tech.Rep.Ser.No.69:255-264.*

EcoReference No.: 275

Chemical of Concern: 24DXY,TFN; Habitat: A; Effect Codes: POP; Rejection Code: NO

ENDPOINT(24DXY,TFN).

Valencia, R. (1977). Mutagenesis Screening of Pesticides 'Drosophila'. *U.S.EPA 600/1-81-017, Rep.No.68-01-2474* 71 p. (NTIS/PB81-160848).

EcoReference No.: 90924

Chemical of Concern:

ACP,AZ,BMC,Captan,CBF,CPY,DEM,DMT,FNTH,Folpet,MLN,MOM,MXC,PRN,SID,SZ,TCF,TFN;

Habitat: T; Effect Codes: CEL,MOR; Rejection Code: NO ENDPOINT(ALL CHEMS),TARGET(CPY,DMT,AZ,ACP,TCF,CBF).

Vaughn, K. C., Marks, M. D., and Weeks, D. P. (1987). A Dinitroaniline-Resistant Mutant of *Eleusine indica* Exhibits Cross-Resistance and Supersensitivity to Antimicrotubule Herbicides and Drugs. *Plant Physiol.* 83: 956-964.

EcoReference No.: 97922

Chemical of Concern: BFL,TFN,DCPA,CPP,OYZ; Habitat: T; Effect Codes: CEL,MOR,GRO; Rejection Code: NO CONTROL,NO ENDPOINT(ALL CHEMS).

Verrengia Guerrero, N. R., Taylor, M. G., Davies, N. A., Lawrence, M. A. M., Edwards, P. A., Simkiss, K., and Wider, E. A. (2002). Evidence of Differences in the Biotransformation of Organic Contaminants in Three Species of Freshwater Invertebrates. *Environ.Pollut.* 117: 523-530.

EcoReference No.: 108610

Chemical of Concern: PYR,PCP,24DC,TFN; Habitat: A; Effect Codes: ACC,BCM; Rejection Code: NO ENDPOINT(TFN,PYR,PCP,24DC).

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PRN,MP,MLN,DEM,DMT,PRT,PPHD,AND,PYN,24DXY,DDT,EDB,MLH,PAQT,PCP,CBL,PCH,HPT,CB F,ADC,THM,Ziram,DU,LNR,AMTL,AZ,ACL,ACY,TBR,CCA,ATZ,TFN,DNT,DDT,PCL,DMB,DZ,TXP,C HD,EN,DOD,MB,HCCH,Captan,PYT,DU Rejection Code: REFS CHECKED/REVIEW.

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PRN,MP,MLN,DEM,DMT,PRT,PPHD,AND,PYN,24DXY,DDT,EDB,MLH,PAQT,PCP,CBL,PCH,HPT,CB F,ADC,THM,Ziram,DU,LNR,AMTL,AZ,ACL,ACY,TBR,CCA,ATZ,TFN,DNT,DDT,PCL,DMB,DZ,TXP,C HD,EN,DOD,MB,HCCH,Captan,PYT,DU Rejection Code: REFS CHECKED/REVIEW.

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Chemical of Concern:

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Chemical of Concern: GYPI,DMB,TFN,DCPA,PQT,DQTBr; Habitat: T; Effect Codes: POP,GRO

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Target: Toxicity of Chemical on Intended Pest

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EcoReference No.: 28983

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 81983

Chemical of Concern: PDM,OXF,MBZ,TFN,LNR,GYP; Habitat: T; Effect Codes: POP,ACC; Rejection Code: TARGET(LNR,GYP,OXF,PDM,TFN).

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EcoReference No.: 81982

Chemical of Concern: PDM,OXF,MBZ,TFN,LNR,GYP; Habitat: T; Effect Codes: POP,ACC; Rejection Code: TARGET(ALL CHEMS).

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Chemical of Concern: ACR,DU,LNR,SZ,TFN; Habitat: T; Effect Codes: POP; Rejection Code: TARGET(SZ,LNR,DU,ACR,TFN).

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Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Arle, H. F. (1968). Trifluralin-Systemic Insecticide Interactions on Seedling Cotton. *Weed Sci.* 16: 430-432.

EcoReference No.: 96629

Chemical of Concern: PRT,TFN,DS; Habitat: T; Effect Codes: GRO; Rejection Code: LITE EVAL CODED(DS,PRT),TARGET(TFN).

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Chemical of Concern: MTL,EPTC,TFN,PDM,IZT; Habitat: T; Effect Codes: POP; Rejection Code: NO MIXTURE,TARGET(MTL),TARGET(EPTC,PDM,TFN).

Askew, S. D., Street, J. E., and Shaw, D. R. (1998). Herbicide Programs for Red Rice (*Oryza sativa*) Control in Soybean (*Glycine max*). *Weed Technol.* 12: 103-107.

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Chemical of Concern: IZT,TFN,PDM,CMZ,MTL,ACR; Habitat: T; Effect Codes: POP,REP; Rejection Code: TARGET(CMZ,ACR,PDM,TFN).

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Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 41509

Chemical of Concern: PCL,TFN,DMB,GYP,24DXY,PDM; Habitat: T; Effect Codes: PHY,POP; Rejection Code: TARGET(DMB,TFN),OK(PCL,24DXY,PDM),NO ENDPOINT,NO CONTROL(GYP).

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EcoReference No.: 41434

Chemical of Concern: TFN,NPM,GYP,PCL,DMB,PAQT,AMTL,24DXY,PQT; Habitat: T; Effect Codes: PHY; Rejection Code: TARGET(DMB,TFN),OK(NPM,PCL,PAQT,AMTL),NO ENDPOINT,NO CONTROL(GYP,24DXY,PQT).

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Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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Chemical of Concern: PZM,TFN; Habitat: T; Rejection Code: TARGET (PZM,TFN).

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EcoReference No.: 73742

Chemical of Concern: MTL,ACR,TFN,PCH; Habitat: T; Effect Codes: POP,GRO,PHY; Rejection Code: LITE EVAL CODED(MTL),TARGET(ACR,TFN).

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EcoReference No.: 44021

Chemical of Concern: MBZ,DMM,TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 41702

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Bobak, M. (1975). Electron Microscopic Study of the Influence of Trifluralin (1,1,1-Trifluoro-2,4-Dinitro-N,N-Dipropyl-P-Toluidine) on the Ultrastructure of the Membrane System I. *Acta Fac.Rerum Nat.Univ.Comen.Physiol.Plant* 10: 11-20.

EcoReference No.: 30039

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 26694

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Bovey, R. W. and Voigt, P. W. (1983). Tolerance of Weeping Lovegrass Cultivars to Herbicides. *Crop Sci.* 23: 364-368.

EcoReference No.: 25364

Chemical of Concern:

TFN,SID,ACF,ACR,ASM,ATZ,BMN,BTY,CZE,DFP,DEE,DU,EFS,MTC,OYZ,MBZ,ODZ,PDM,PCH,PYZ,PPZ; Habitat: T; Effect Codes: PHY,MOR; Rejection Code: TARGET(SID,ATZ,OYZ,DU,ACR,BTY,PDM,TFN),OK(ALL CHEMS).

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EcoReference No.: 73421

Chemical of Concern: MTL,MBZ,TFN; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(MTL),TARGET(TFN).

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EcoReference No.: 73952

Chemical of Concern: MTL,ACR,MBZ,PMD,TFN,OYZ,PDM; Habitat: T; Effect Codes: GRO; Rejection Code: LITE EVAL CODED(MTL),TARGET(OYZ,ACR,PDM,TFN).

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12: 334-337.

EcoReference No.: 73339

Chemical of Concern: MTL,ACR,MBZ,OXF,PDM,TFN; Habitat: T; Effect Codes: POP,REP; Rejection Code: LITE EVAL CODED(MTL),TARGET(OXF,ACR,PDM,TFN).

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EcoReference No.: 71007

Chemical of Concern: 24DXY,TFN; Habitat: T; Effect Codes: POP; Rejection Code: TARGET(24DXY,TFN).

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Chemical of Concern: IXB,TFN; Habitat: T; Rejection Code: TARGET(IXB,TFN).

Brock, J. L. (1972). Effects of the Herbicides Trifluralin and Carbetamide on Nodulation and Growth of Legume Seedlings. *Weed Res.* 12: 150-154.

EcoReference No.: 41826

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Brown, J. F. and Swingle, H. D. (1977). Herbicide Evaluation in Vegetable Crops. *Prod.South.Weed Sci.Soc.* 30: 168-175.

EcoReference No.: 40627

Chemical of Concern: OYZ,MTL,PDM,TFN,VNT,BTL; Habitat: T; Effect Codes: GRO,POP; Rejection Code: LITE EVAL CODED(MTL),NO ENDPOINT(OYZ),TARGET(TFN).

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EcoReference No.: 73802

Chemical of Concern: MTL,OYZ,NFZ,ACR,BT,ACF,FZF,TFN; Habitat: T; Effect Codes: GRO,PHY; Rejection Code: NO MIXTURE(MTL),CONTROL,TARGET(NFZ,ACR,OYZ,TFN).

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Chemical of Concern: ACR,TFN; Habitat: T; Effect Codes: BCM,GRO; Rejection Code: TARGET(ACR,TFN).

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EcoReference No.: 26032

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 73964

Chemical of Concern: MTL,FZFP,VNT,TFN,IMQ,ACF,FSF,MBZ,CRM,BT,NFZ; Habitat: T; Effect Codes: GRO,MOR; Rejection Code: LITE EVAL CODED(MTL),TARGET(MTL,FSF,NFZ,TFN).

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EcoReference No.: 106767

Chemical of Concern: ACR,24D,BT,GYP,TFN; Habitat: T; Effect Codes: PHY,GRO; Rejection Code: TARGET(ACR,24D,BT,GYP,TFN).

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EcoReference No.: 96736

Chemical of Concern: DS,PRT,TFN; Habitat: T; Effect Codes: PHY,GRO; Rejection Code: LITE EVAL CODED(DS),CROP(PRT),TARGET(TFN).

Catanzaro, C. J., Skroch, W. A., and Henry, P. H. (1993). Rooting Performance of Hardwood Stem Cuttings from Herbicide-Treated Nursery Stock Plants. *J.Environ.Hortic.* 11: 128-130.

EcoReference No.: 73737

Chemical of Concern: MTL,NPP,PQT,PDM,OYZ,TFN,OXF,ODZ; Habitat: T; Effect Codes: GRO; Rejection Code: TARGET(OYZ,MTL,OXF,PDM,PQT,TFN).

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Chemical of Concern: IMQ,TFN,PDM,CMZ; Habitat: T; Effect Codes: MOR,GRO,PHY; Rejection Code: TARGET(CMZ,PDM,TFN).
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Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).
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Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).
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- EcoReference No.: 79710
Chemical of Concern: ATZ,AMTL,24DXY,DQTBBr,DFPM,PAQT,TFN; Habitat: T; Effect Codes: GRO,BCM; Rejection Code: TARGET(ATZ,24DXY,PAQT,TFN,DQTBBr).
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- EcoReference No.: 97086
Chemical of Concern: ATZ,AMTL,24D,CSF,DFPM,GYP,PAQT,TFN; Habitat: T; Effect Codes: GRO; Rejection Code: TARGET(ATZ,24D,GYP,PAQT,TFN).
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- EcoReference No.: 74003
Chemical of Concern: MTL,ACR,BTC,PCH,TBC,TRL,FZFB,SXD,CYC,EPTC,TFN,HFP,CBL; Habitat: T; Effect Codes: POP,GRO; Rejection Code: TARGET (MTL,SXD,CBL,EPTC,ACR,TBC,TFN).
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Chemical of Concern: TFN; Habitat: T; Effect Codes: CEL; Rejection Code: TARGET(TFN).

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Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 25078

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Frans, R., McClelland, M., Jordan, D., and Carey, F. (1991). Herbicide Trials on Field Crops, 1990. *Ark.Agric.Exp.Stn.Res.Ser.* 413 88 p.

EcoReference No.: 73743

Chemical of Concern:

ACF,CLT,CMZ,CZE,FZF,FMU,FSF,HFP,IMQ,IZT,LCF,MTZ,MBZ,DMM,MSMA,BMN,BT,DMB,24DXY,ATZ,ACR,PDM,DU,OXF,LNR,PMT,MTL,PAQT,NSF,NFZ,PYD,SXD,THFM,TFN,24DB; Habitat: T; Effect Codes: POP,PHY; Rejection Code: TARGET(SXD,DMB,ATZ,24DXY,LCF,CMZ,FSF,LNR,MTL,OXF,CLT,NFZ,DU,ACR,PMT,PDM,PAQT,TFN).

Frans, R., McClelland, M., Smith, C., and Jordan, D. (1993). Herbicide Trials on Field Crops, 1992. *Ark.Agric.Exp.Stn.Res.Ser.* #427, University of Arkansas 63 p.

EcoReference No.: 73962

Chemical of Concern:

PYD,PMT,PMD,PAQT,OXF,NFZ,MTL,CMZ,SYD,TFN,24DXY,24BF,QZF,ACF,CZE,ACR,DU,ATZ,FZF P,BT,,BMN,FMU,CRM,FSF,CLT,IMQ,IZT,LCF,FNP,MTZ,MBZ,MSMA,NSF; Habitat: T; Effect Codes: POP,PHY; Rejection Code: NO MIXTURE(MR,FSF),LITE EVAL CODED(FNP),OK(24DXY),TARGET(OXF,NFZ,DU,ACR,PMT,PAQT,TFN),NO COC(LNR).

Frans, R. E., Blythe, T. O., and Richardson, J. T. (1976). Herbicide Field Evaluation Trials on Field Crops, 1975. *Mimeogr.Ser.Rep.No.240*, Ark.Agric.Exp.Stn., Univ.of Ark, Fayetteville, AK 51 p.

EcoReference No.: 96793

Chemical of Concern: PDM,DLD,CZE,NFZ,BTL,MBZ,TFN,FMU,DU,PMT; Habitat: T; Effect Codes: PHY,POP; Rejection Code: TARGET(NFZ,DU,PMT,PDM,TFN) .

Fretz, T. A. (1973). Effects of Herbicides on the Rooting Response of Container-Grown Azaleas. *Ohio Ardc.S* 71: 23-25.

EcoReference No.: 26432

Chemical of Concern: TFN,EPTC,SZ,CPP,DBN; Habitat: T; Effect Codes: GRO; Rejection Code: TARGET(TFN).

Friesen, G. H. and Wall, D. A. (1986). Tolerance of Lentil (*Lens culinaris* Medik.) to Herbicides. *Can.J.Plant Sci.* 66:

131-140.

EcoReference No.: 73257

Chemical of Concern: MTL,TFN,MBZ,DMM,SXD; Habitat: T; Effect Codes: GRO,POP; Rejection Code: LITE EVAL CODED(MTL),TARGET(SXD,TFN).

Gilbertson, R. L., Ruppel, E. G., and Schweizer, E. E. (1987). Effects of Herbicides on Root Rot of Pinto Bean, Weeds, and Two Soilborne Fungi. *Plant Dis.* 71: 627-629 .

EcoReference No.: 98843

Chemical of Concern: EPTC,TFL,ACR,TFN; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(EPTC),NO MIXTURE(ACR,TFL),CROP(TFN).

Gilreath, J. P., Santos, B. M., Motis, T. N., Noling, J. W., and Mirusso, J. M. (2005). Methyl Bromide Alternatives for Nematode and Cyperus Control in Bell Pepper (*Capsicum annuum*). *Crop Prot.* 24: 903-908.

EcoReference No.: 88743

Chemical of Concern: CLP,MTAS,MB,NPP,TFN,DPDP; Habitat: T; Effect Codes: POP; Rejection Code: TARGET(MTAS,TFN),NO MIXTURE(CLP,DPDP),NO COC(CLPM).

Golab, T., Herberg, R. J., Parka, S. J., and Tepe, J. B. (1967). Metabolism of Carbon-14 Trifluralin in Carrots. *J.Agric.Food Chem.* 15: 638-641.

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 106768

Chemical of Concern: DZ,TFN,ACR; Habitat: T; Effect Codes: PHY,POP; Rejection Code: EFFICACY(DZ,TFN,ACR).

Greenfield, P. L. (1990). The Influence of Method of Inoculation and Certain Herbicides on Nodulation and Seed Yield of Soybeans . *S.Afr.J.Plant Soil* 8: 119-122.

EcoReference No.: 73761

Chemical of Concern: MTL,TFN; Habitat: T; Effect Codes: GRO; Rejection Code: TARGET(MTL,TFN).

Grichar, W. J., Sestak, D. C., Brewer, K. D., Besler, B. A., Stichler, C. R., and Smith, D. T. (2001). Sesame (*Sesamum indicum* L.) Tolerance and Weed Control with Soil-Applied Herbicides. *Crop Prot.* 20: 389-394.

EcoReference No.: 73934

Chemical of Concern: MTL,PDM,EFL,TFN,IZT; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(MTL),TARGET(PDM,TFN).

Hacskaylo, J. and Amato, V. A. (1968). Effect of Trifluralin on Roots of Corn and Cotton. *Weed Sci.* 16: 513-515.

EcoReference No.: 43890

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Hansen, N. and Andersen, S. B. (1996). In Vitro Chromosome Doubling Potential of Colchicine, Oryzalin, Trifluralin, and Amp in *Brassica napus* Microspore Culture. *Euphytica* 88: 159-164.

Chemical of Concern: OYZ,TFN; Habitat: T; Rejection Code: TARGET (OYZ,TFN).

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Chemical of Concern: TFN; Habitat: T; Rejection Code: EFFICACY(TFN).

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Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 41476

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Hassawy, G. S. (1970). Effects of Trifluralin and/or Phorate on Cotton Roots. *Ph.D.Thesis, Univ.of Arizona, AZ* 152 p.

EcoReference No.: 99112

Chemical of Concern: TFN,PRT; Habitat: T; Effect Codes: GRO,REP; Rejection Code: LITE EVAL CODED(PRT),TARGET(TFN).

Hassawy, G. S. and Hamilton, K. C. (1971). Effects of IAA, Kinetin, and Trifluralin on Cotton Seedlings. *Weed Sci.* 19: 265-268.

EcoReference No.: 43724

Chemical of Concern: TFN,IAA; Habitat: T; Effect Codes: GRO; Rejection Code: TARGET(IAA,TFN).

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EcoReference No.: 41915

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 73803

Chemical of Concern: MTL,FZF,TFN,24DXY,LNR,MBZ,DMM; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(MTL),TARGET(24DXY,LNR,TFN).

Helmer, J. D., Harris, F. A., Hobbs, C. D., Keaton, J. A., Pafford, J. L., Watson, J. H., and Polzin, W. J. (1969). The Effects of Seed Quality, Systemic Insecticides and Trifluralin on Cotton and Spanish Peanuts. *Proc.South.Weed Sci.Soc.* 22: 132-137.

EcoReference No.: 99387

Chemical of Concern: TFN,DS,PRT,ADC; Habitat: T; Effect Codes: GRO,POP; Rejection Code: NO MIXTURE(DS,PRT,ADC),TARGET(TFN).

Heydari, A. and Misaghi, I. J. (1998). Biocontrol Activity of Burkholderia cepacia Against Rhizoctonia solani in Herbicide-Treated Soils. *Plant Soil* 202: 109-116.

EcoReference No.: 63883

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Heydari, A. and Misaghi, I. J. (1998). The Impact of Herbicides on the Incidence and Development of Rhizoctonia solani-Induced Cotton Seedling Damping-Off. *Plant Dis.* 82: 110-113.

EcoReference No.: 63884

Chemical of Concern: PMT,PDM,TFN; Habitat: T; Rejection Code: TARGET(PDM,PMT,TFN).

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EcoReference No.: 106173

Chemical of Concern: PMT,PDM,TFN,THM,MLX,TDM; Habitat: T; Effect Codes: POP; Rejection Code: CROP(PMT,PDM),NO MIXTURE(MLX,THM),TARGET(TFN).

Hilton, J. L. and Christiansen, M. N. (1972). Lipid Contribution to Selective Action of Trifluralin. *Weed Sci.* 20: 290-294.

EcoReference No.: 25495

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Hollist, R. L. and Foy, C. L. (1971). Trifluralin Interactions with Soil Constituents. *Weed Sci.* 19: 11-16.

EcoReference No.: 25134

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Horowitz, M., Hulin, N., and Blumenfeld, T. (1974). Behaviour and Persistence of Trifluralin in Soil. *Weed Res.* 14: 213-220.

EcoReference No.: 40824

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Huckaba, R. M. (1985). Effects of Soybean Thrips (*Sericothrips variabilis*) Feeding and Certain Herbicides on Soybean (*Glycine max*). *Ph.D.Thesis*, 53 p. (Publ. As 71052) (UMI# 8518248).

Chemical of Concern: TFN,ACR; Habitat: T; Rejection Code: EFFICACY(ACR,TFN).

Huckaba, R. M. and Coble, H. D. (1990). Effect of Herbicides on Soybean Thrips (*Sericothrips variabilis*) in Soybeans (*Glycine max*). *Weed Technol.* 4: 475-477.

EcoReference No.: 71052

Chemical of Concern: ACR,MBZ,BT,DMM,TDN; Habitat: T; Effect Codes: POP,PHY; Rejection Code: EFFICACY(ACR,TFN).

Hunyadi, K. and Bogdan, I. (1976). The Effect of Trifluralin Herbicide on the Root Development of Soybean. *Novenyvedel* 12: 58-63.

EcoReference No.: 26643

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Illicki, R. D., Herman, D. J., and Somody, J. (1975). Effects of Some Preplant Incorporated Herbicides on Weed Control in Snapbeans and Lima Beans. *Proc.Northeast.Weed Sci.Soc.* 29: 197-198.

EcoReference No.: 26135

Chemical of Concern: TFN,BTL; Habitat: T; Rejection Code: TARGET(TFN,BTL).

Isakson, P. J. (1994). Efficacy and Volatility of Polyvinyl Alcohol Coated Granular Triallate and Trifluralin.

M.S.Thesis, North Dakota State University,ND.

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Isgrigg, J., Yelverton, F. H., Brownie, C., and Warren, L. S. Jr. (2002). Dinitroaniline Resistant Annual Bluegrass in North Carolina. *Weed Sci.* 50: 86-90.

EcoReference No.: 87374

Chemical of Concern: TFN,OYZ,DTP,ODZ,PDM,PRM; Habitat: T; Effect Codes: GRO,POP; Rejection Code: TARGET(OYZ,PDM,TFN).

Ivany, J. A. and McCully, K. V. (1994). Evaluation of Herbicides for Sweet White Lupin (*Lupinus albus*). *Weed Technol.* 8: 819-823.

EcoReference No.: 73944

Chemical of Concern: MTL,EFL,FZFP,IZT,LNR,TFN; Habitat: T; Effect Codes: POP,PHY; Rejection Code: LITE EVAL CODED(MTL),TARGET(LNR,TFN).

Ivens, G. W. and Withers, N. J. (1976). Effect of Herbicide Treatments on Three Lupin Species. *Proc.N.Z.Weed Pest Control* 29: 89-92.

EcoReference No.: 40813

Chemical of Concern: SZ,ATZ,EFL,LNR,TFN,DU; Habitat: T; Effect Codes: POP; Rejection Code: TARGET(ATZ,SZ,TFN),NO ENDPOINT,NO CONTROL(LNR,DU).

Ivy, H. W. (1971). Response of Cotton to Combinations of Herbicides and Disulfoton. *Weed Sci.* 19: 338-340.

EcoReference No.: 96724

Chemical of Concern: FMU,DU,TFN,DS; Habitat: T; Effect Codes: POP,GRO; Rejection Code: EFFICACY(DS,TFN),TARGET(DU).

Jacques, G. L. and Harvey, R. G. (1979). Vapor Absorption and Translocation of Dinitroaniline Herbicides in Oats and Peas. *Weed Sci.* 27: 371-374.

EcoReference No.: 26005

Chemical of Concern: BFL,DYZ,TFN; Habitat: T; Effect Codes: ACC; Rejection Code: TARGET(BFL,DYZ,TFN).

James, T. K. and Atkinson, G. C. (1978). Herbicide Tolerance of Sainfoin. *Proc.N.Z.Weed Control Conf.* 31: 121-123.

EcoReference No.: 25882

Chemical of Concern: TFN,EPTC,24DB,MCPB,PZM,PAQT,CZE,SZ,MBZ,TRB,OYZ; Habitat: T; Effect Codes: POP,PHY; Rejection Code: OK(24DB,MCPB,PZM,CZE,MBZ,TRB,OYZ),TARGET(PZM,OYZ,SZ,EPTC,PAQT,TFN).

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EcoReference No.: 25435

Chemical of Concern: EFL,TFN; Habitat: T; Effect Codes: GRO,POP; Rejection Code: TARGET(TFN).

Johnson, B. J. (1970). Combinations of Herbicides and Other Pesticides on Soybeans. *Weed Sci.* 18: 128-131.

EcoReference No.: 96735

Chemical of Concern: LNR,PRT,DS,MOM,TFN; Habitat: T; Effect Codes: GRO,POP; Rejection Code: OK(MOM),TARGET(LNR,TFN),CROP(PRT),LITE EVAL CODED(DS).

Johnson, D. H. and Talbert, R. E. (1993). Imazethapyr and Imazaquin Control Puncturevine (*Tribulus terrestris*) but Carry over to Spinach (*Spinacia oleracea*). *Weed Technol.* 7: 79-83.

EcoReference No.: 73749

Chemical of Concern: MTL,BT,TFN,CMZ,IMQ,IZT,PAQT,CBL; Habitat: T; Effect Codes: GRO,POP; Rejection Code: TARGET(CMZ,PQT,MTL,CBL,TFN).

Jones, R. J. and Aliynt, A. S. (1976). The Effect of Eleusine Indica, Herbicides on the Seedling Growth of *Leucaena Leucocephala* Cv. Peru. *Trop.Grassl.* 10: 195-203 .

EcoReference No.: 25074

Chemical of Concern: DCPA,TFN,24DXY; Habitat: T; Effect Codes: GRO,POP,INJ; Rejection Code: TARGET(DCPA,TFN,24DXY).

Jordan, D. L., Reynolds, D. B., and Crawford, S. H. (1997). Rice (*Oryza sativa*) Response to Soil Residues of Selected Herbicides. *Weed Technol.* 11: 379-383 .

EcoReference No.: 64683

Chemical of Concern: CMZ,SFZ,TFN; Habitat: T; Rejection Code: TARGET (SFZ,TFN).

Jordan, D. L., York, A. C., McClelland, M. R., and Frans, R. E. (1993). Clomazone as a Component in Cotton (*Gossypium hirsutum*) Herbicide Programs. *Weed Technol.* 7: 202-211.

EcoReference No.: 100261

Chemical of Concern: TFN,PDM,NFZ,CMZ; Habitat: T; Effect Codes: POP,PHY; Rejection Code: NO COC(DS),TARGET(PDM,NFZ,CMZ,TFN).

Kabarity, A. and Nahas, A. (1979). Induction of Polyploidy and C-Tumors After Treating *Allium Cepa* Root Tips with the Herbicide "Treflan". *Biol.Plant* 21: 253-258.

EcoReference No.: 28981

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Kahn, B. A. and Schatzer, R. J. (1992). Economic and Horticultural Evaluation of Chemical and Mechanical Weed Control Strategies for Cowpea. *J.Am.Soc.Hortic.Sci.* 117: 255-259.

EcoReference No.: 73307

Chemical of Concern: MTL,TFN,PQT; Habitat: T; Effect Codes: POP,GRO; Rejection Code: LITE EVAL CODED(MTL),TARGET(TFN,PQT).

Kappelman, A. J. and Buchanan, G. A. (1968). Influence of Fungicides, Herbicides and Combinations on Emergence and Seedling Growth of Cotton. *Agron.J.* 60: 660-663 .

EcoReference No.: 25499

Chemical of Concern: DSMA,FMU,PMT,TFN; Habitat: T; Effect Codes: GRO; Rejection Code: TARGET(PMT,TFN).

Khalifa, M. A., Whitmuss, H. D., and Burnside, O. D. (1983). Subsurface Placement Methods for Metribuzin and Trifluralin. *Weed Sci.* 31: 840-844.

EcoReference No.: 25210

Chemical of Concern: MBZ,DMM,TFN; Habitat: T; Rejection Code: TARGET(TFN).

Kirby, C. J., Standifer, L. C., and Normand, W. C. (1968). Changes in Soybean Stem Tissue Apparently Induced by Trifluralin. *Proc.South.Weed Conf.* 21: 343 -.

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Kleifeld, Y. (1970). Combined Effect of Trifluralin, and MSMA on Johnsongrass Control in Cotton. *Weed Sci.* 18: 16-18.

EcoReference No.: 51009

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Kumar, A., Beena, K., Athpal, T. S., and Umari, B. (2007). Dissipation of Trifluralin in Soil Under Mungbean (*Phaseolus aureus* (P. radiatus)) Crop. *Pestic.Res.J.* 19: 254-256.

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Kurtz, M. E. (1986). Control of *Sorghum halpense* (L.) Pers. in Cotton with Post-Emergence Herbicides and Trifluralin. *Weed Res.* 26: 83-87.

EcoReference No.: 31109

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Kurtz, M. E. and Brown, M. A. (1985). Postemergence Herbicides and Trifluralin for Control of Rhizome Johnsongrass in Cotton. *Miss Ape Tb* 934: 1-6.

EcoReference No.: 31517

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Kust, C. A. and Struckmeyer, B. E. (1971). Effects of Trifluralin on Growth, Nodulation, and Anatomy of Soybeans. *Weed Sci.* 19: 147-152.

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Landi, P., Frascaroli, E., and Giuliani, M. M. (1999). Genetic Variability for Resistance to Trifluralin in Zea mays. *Weed Sci.* 47: 369-374.

EcoReference No.: 64782

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 25129

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Lawson, H. M. and Wiseman, J. S. (1974). Experiments on the Tolerance of Newly-Planted Raspberries and Strawberries to Trifluralin. *Proc.Br.Weed Control Conf.* 12: 669-674.

EcoReference No.: 41743

Chemical of Concern: SZ,TFN; Habitat: T; Effect Codes: GRO,POP; Rejection Code: TARGET(SZ,TFN).

Lee, J. and Norbury, L. (1991). Effects of Herbicide Treatments on Infection of Oil Seed Rape with Light Leaf Spot. *Tests Agrochem.Cultiv.* 12: 50-51.

EcoReference No.: 70425

Chemical of Concern: SZ,DCPA,GYP,TFN; Habitat: T; Effect Codes: PHY,GRO,POP; Rejection Code: TARGET(SZ,DCPA,GYP,TFN).

Li, H., Sheng, G., Sheng, W., and Xu, O. (2002). Uptake of Trifluralin and Lindane from Water by Ryegrass. *Chemosphere* 48: 335-341.

EcoReference No.: 72502

Chemical of Concern: HCCH,TFN; Habitat: T; Effect Codes: ACC; Rejection Code: TARGET(TFN).

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EcoReference No.: 51722

Chemical of Concern: TFN,MTL,ATZ; Habitat: T; Effect Codes: BCM; Rejection Code: OK(ALL CHEMS),TARGET(ATZ,MTL,TFN).

Mallory, T. E. and Bayer, D. E. (1972). The Effect of Trifluralin on the Growth and Development of Cotton and Safflower Roots. *Bot.Gaz.* 133: 96-102.

EcoReference No.: 42624

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 58170

Chemical of Concern:

SZ,TFN,ODZ,24DXY,PMT,MCPB,MBZ,TRB,LNR,BMC,DU,ASM,AMTL,HXZ,GYP,PPZ; Habitat: T; Effect Codes: GRO,MOR; Rejection Code: LITE EVAL CODED(SZ,PPZ),TARGET(MCPB,BMC,HXZ,24DXY,LNR,GYP,DU,PMT,TFN),OK(ALL CHEMS).

McWhorter, C. G. (1974). Johnsongrass Control in Soybeans with Trifluralin and Nitratin. *Weed Sci.* 22: 111-115.

EcoReference No.: 25133

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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Chemical of Concern: BS,TFN; Habitat: T; Rejection Code: TARGET (BS,TFN).

Menges, R. M. and Tamez, S. (1974). Movement and Persistence of Bensulfide and Trifluralin in Irrigated Soil. *Weed Sci.* 22: 67-71.

Chemical of Concern: BS,TFN; Habitat: T; Rejection Code: TARGET(BS,TFN).

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Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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Chemical of Concern: PZM,TFN; Habitat: T; Rejection Code: TARGET(PZM,TFN).

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Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Miller, J. H., Carter, L. M., and Carter, C. H. (1983). An Experimental Incorporator-Planter for Cotton (*Gossypium hirsutum*). *Weed Sci.* 31: 208-214.

EcoReference No.: 41093

Chemical of Concern: PMT,PDM,TFN; Habitat: T; Effect Codes: POP,GRO; Rejection Code: TARGET(PDM,TFN,PMT).

Millhollon, R. W. (1978). Toxicity of Soil-Incorporated Trifluralin to Johnsongrass Rhizomes. *Weed Sci.* 26: 171-174.

EcoReference No.: 42989

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Mitchell, G. A. (1985). Effects of Trifluralin and Pendimethalin on Selected Characteristics of Cotton. *M.S.Thesis, Miss.State Univ., Miss.State, MS*.

Chemical of Concern: PDM,TFN; Habitat: T; Rejection Code: TARGET(PDM,TFN).

Mitchell, G. A. and Bourland, F. M. (1986). Effects of Trifluralin and Pendimethalin on Cotton Emergence and Seedling Characteristics. *In: Proc.Natl.Cotton Counc.Beltwide Cotton Prod.Res.Conf.* 64-66.

EcoReference No.: 68149

Chemical of Concern: PDM,TFN; Habitat: T; Effect Codes: GRO; Rejection Code: TARGET(PDM,TFN).

Mock, I. T. and Amor, R. L. (1985). Use of Simazine and Trifluralin for Weed Control in Lupines in the Victoria Mallee. *Plant Prot.Q.* 1: 76-78.

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Chemical of Concern: SZ,TFN; Habitat: T; Effect Codes: POP; Rejection Code: TARGET(SZ,TFN).

Moomaw, R. S. and Martin, A. R. (1978). Interaction of Metribuzin and Trifluralin with Soil Type on Soybean (*Glycine max*) Growth. *Weed Sci.* 26: 327-331.

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Chemical of Concern: MBZ,DMM,TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 40829

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 73794

Chemical of Concern: MTL,OXF,TFN,PDM,DU,TRB; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(MTL),TARGET(OXF,DU,PDM,TFN).

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EcoReference No.: 73988

Chemical of Concern: MTL,OXF,PDM,TFN,DU,MBZ,DMM,TBC; Habitat: T; Effect Codes: POP; Rejection Code: NO MIXTURE,TARGET(MTL),TARGET(OXF,DU,PDM,TBC,TFN).

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Chemical of Concern: OYZ,TFN; Habitat: T; Rejection Code: TARGET(OYZ,TFN).

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Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 69003

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Normand, W. C., Rizk, T. Y., and Thomas, C. H. (1968). Some Responses of Excised Cotton Roots to Treatment with Trifluralin or Nitratin. *Proc.South.Weed Conf.* 21: 344 -.

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Novo, R. J., Darre, C. A., and Zumelzu, G. (1998). Weed Control in *Aloysia polystachya* with Pre and Post Emergence Herbicides. *J.Med.Aromat.Plant Sci.* 20: 679-682.

EcoReference No.: 70779

Chemical of Concern: SZ,TFN,PDM,PAQT,PMT,DMN; Habitat: T; Effect Codes: POP,PHY; Rejection Code: LITE EVAL CODED(SZ),TARGET(PMT,PDM,PAQT,TFN).

O'Donovan, J. T. and Prendeville, G. N. (1975). Shoot Zone Uptake of Soil-Applied Herbicides in Some Legume Species. *Weed Res.* 15: 413-417.

EcoReference No.: 43430

Chemical of Concern: SZ,ATZ,PMT,TFN,CNR,DU; Habitat: T; Effect Codes: GRO; Rejection Code: TARGET(ATZ,SZ,DU,PMT,TFN).

O'Sullivan, P. A. and Prendeville, G. N. (1974). Studies on the Rate of Root Growth of Intact Seedlings in a Herbicide Medium. *Weed Res.* 14: 345-348.

EcoReference No.: 43666

Chemical of Concern: SZ,PAQT,TFN; Habitat: T; Effect Codes: GRO; Rejection Code: TARGET(SZ,PAQT,TFN).

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Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Olson, B. M. and Mckercher, R. B. (1985). Wheat and Triticale Root Development as Affected by Trifluralin. *Can.J.Plant Sci.* 65: 723-729.

EcoReference No.: 44093

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Ozair, C. A. and Moshier, L. J. (1988). Effect of Soil Incorporated Trifluralin and Selected Postemergent Herbicides on Growth Nodulation and Nitrogen Fixation of Soybean. *Pak.J.Agric.Res.* 9: 316-320.

Chemical of Concern: FNP,TFN; Habitat: T; Rejection Code: TARGET (FNP,TFN).

Pahwa, S. K. and Bajaj, K. (2000). Effect of Pre-emergence Herbicides on the Activity of Ribonuclease and Deoxyribonuclease Enzyme During Germination in Pigeonpea and Carpetweed. *Indian J.Weed Sci.* 32: 21-24.

EcoReference No.: 69002

Chemical of Concern: TFN,PDM; Habitat: T; Effect Codes: BCM; Rejection Code: TARGET(PDM,TFN).

Parker, M. B. and Dowler, C. C. (1976). Effect of Nitrogen with Trifluralin and Vernolate on Soybeans. *Weed.Sci.* 24: 131-133.

EcoReference No.: 71054

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Pchajek, D. A., Morrison, I. N., and Webster, G. R. B. (1983). Comparison of the Efficacy and Soil Concentrations of Fall-Applied and Spring-Applied Trifluralin in Flax. *Can.J.Plant Sci.* 63: 1031-1038.

EcoReference No.: 25245

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

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EcoReference No.: 25104

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Pife, A. E. (1967). The Influence of the Herbicide Trifluralin, Alone and in the Presence of Simulated Acid Rain, on the Algae and Cyanobacteria of a Sandy Loam Soil. *Proc.1987 British Crop Protect.Conf., Weeds* 2: 507-514.

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Prosch, S. D. and Weber, J. B. (1988). Trifluranlin-Substitued Amide Herbicide Interactions. *Agron.J.* 80: 567-570.

EcoReference No.: 73981

Chemical of Concern: MTL,TFN,ACR; Habitat: T; Effect Codes: POP; Rejection Code: TARGET(MTL,ACR,TFN).

Purohit, S. S. (1979). Stomatal Closure by Trifluralin Herbicide in *Helianthus annuus* l. *Comp Phys e* 4: 17-18.

EcoReference No.: 26618

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Qasem, J. R. (1998). Chemical Control of Branched Broomrape (*Orobanche ramosa*) in the Glasshouse Grown Tomato. *Crop Prot.* 17: 625-630.

EcoReference No.: 99678

Chemical of Concern: TFN,PDM,ODZ,MBZ,GYPI,FNPE,DMM,DFQ,DFPM,DCPA,CSF; Habitat: T; Effect Codes: GRO; Rejection Code: TARGET(DCPA,GYPI,PDM,TFN,DFQ).

Qasem, J. R. (1996). Chemical Weed Control in Garlic (*Allium sativum* L.) in Jordan. *Crop Prot.* 15: 21-26.

EcoReference No.: 105806

Chemical of Concern: LNR,PDM,OXF,PZM,PYZ,TFN,QZFE; Habitat: T; Effect Codes: POP,GRO; Rejection Code: TARGET(LNR,PDM,OXF,PZM,PYZ,TFN,QZFE), NO COC(GLO).

Qasem, J. R. (2006). Chemical Weed Control in Seedbed Sown Onion (*Allium cepa* L.). *Crop Prot.* 25: 618-622.

EcoReference No.: 87396

Chemical of Concern: TFN,QZFE,PYZ,PMT,PDM,PAQT,OXF,ODZ,MBZ,FZFPB; Habitat: T; Effect Codes: POP; Rejection Code: TARGET(OXF,QZFE,PMT,PDM,PAQT,TFN).

Qasem, J. R. (2007). Weed Control in Cauliflower (*Brassica oleracea* var. botrytis L.) with Herbicides. *Crop Prot.* 26: 1013-1020.

EcoReference No.: 99677

Chemical of Concern: QZFE,LNR,PDM,TFN,CTHM,OXF; Habitat: T; Effect Codes: POP; Rejection Code: TARGET(QZFE,LNR,DCPA,PDM,TFN).

Raafat, A., Abdel-Halim, M. A., Amer, M. A., and El-Hadidy, M. F. (1977). Growth and Physiological Responses of Bean Plants to Some Herbicides, Insecticides and Their Combinations. *Ann.Agric.Sci.* 20: 141-150.

EcoReference No.: 103879

Chemical of Concern: DS,TFN,EPTC; Habitat: T; Effect Codes: GRO,PHY; Rejection Code: OK(DS,EPTC),TARGET(TFN).

Radford, B. J. and Wildermuth, G. B. (1987). Effect of Sowing Depth, Seed Dressings, a Press Wheel, Cultivars and Trifluralin on the Establishment of Barley. *Aust.J.Exp.Agric.* 27: 579-584.

EcoReference No.: 77683

Chemical of Concern: TDF,TFN,CBX; Habitat: T; Effect Codes: GRO; Rejection Code: LITE EVAL CODED(TDF),OK(ALL CHEMS),TARGET(TFN).

Radke, V. L. and Grau, C. R. (1986). Effects of Herbicides on Carpogenic Germination of *Sclerotinia sclerotiorum*. *Plant Dis.* 70: 19-23.

EcoReference No.: 70401

Chemical of Concern: SZ,ATZ,LNR,ACR,TFN; Habitat: T; Effect Codes: GRO,REP; Rejection Code:

TARGET(ALL CHEMS).

Raghavaiah, C. V. and Subbarao, R. (1986). Herbicidal Control of Weeds in Monsoon Grown Burley Tobacco. *Indian J.Agron.* 31: 331-334.

EcoReference No.: 110194

Chemical of Concern: TFN,ACR,OXF; Habitat: AT; Effect Codes: POP,GRO,BCM,PHY; Rejection Code: TARGET(TFN,ACR,OXF).

Rahman, A. (1977). Persistence of Terbacil and Trifluralin Under Different Soil and Climatic Conditions. *Weed Res.* 17: 145-152.

EcoReference No.: 40833

Chemical of Concern: TRB,TFN; Habitat: T; Effect Codes: GRO,POP; Rejection Code: TARGET(TFN), OK (TRB).

Ravetta, D., Vilela, A., Wassner, D., and Ciano, N. (2002). Tolerance of Grindelia chiloensis (Asteraceae) to Pre- and Postemergence Herbicides. *Ind.Crops Prod.* 15: 207-211.

EcoReference No.: 74198

Chemical of Concern: MTL,NFZ,DU,PMT,TFN,ATZ; Habitat: T; Effect Codes: MOR,POP; Rejection Code: TARGET(ATZ,MTL,NFZ,DU,PMT,TFN).

Reddy, K. N. and Singh, M. (1993). Response of Citrus (Citrus spp.) Rootstock Seedlings to Soil-Applied Herbicides. *J.Environ.Hortic.* 11: 39-40.

EcoReference No.: 73256

Chemical of Concern: MTL,NPP,NFZ,OYZ,PDM,TFN; Habitat: T; Effect Codes: GRO; Rejection Code: LITE EVAL CODED(MTL),TARGET(OYZ,MTL,NFZ,PDM,TFN).

Reinhardt, C. F. and Nel, P. C. (1989). Use of Prometryn in Combination with Nine Herbicides in Sunflower (Helianthus annuus L.). *Appl.Plant Sci.* 3: 99-102.

EcoReference No.: 73369

Chemical of Concern: MTL,ACR,TFN,PDM,PMT; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(MTL),TARGET(ACR,PMT,PDM,TFN).

Rizk, T. Y. (1973). Anatomical and Cytological Changes in Excised Cotton Roots in Response to Trifluralin or Nitratin Treatments. *Egypt.J.Bot.* 16: 281-289.

EcoReference No.: 41698

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Roggenbuck, F. C. and Penner, D. (1987). Factors Influencing Corn (Zea mays) Tolerance to Trifluralin. *Weed Sci.* 35: 89-94.

EcoReference No.: 59152

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Roseberg, R. J. (1997). Herbicide Tolerance by Vernonia Grown in the Temperate Zone. *Ind.Crops Prod.* 6: 89-96.

EcoReference No.: 73987

Chemical of Concern:

MTL,TFN,PDM,EFL,FZF,SXD,PCH,ATZ,CPR,DCPA,NPP,24DXY,DMB,OXF,24DB,EPTC,OYZ,DU,MB Z,DMM,OXF,BMN; Habitat: T; Effect Codes: PHY; Rejection Code: LITE EVAL CODED(MTL),TARGET(SXD,DMB,ATZ,24DXY,OYZ,OXF,EPTC,DU,DCPA,PDM,TFN).

Saghir, A. R. and Abu-Shakra, S. (1971). Effect of Diphenamide and Trifluralin on the Germination of Orobanche Seeds In Vitro . *Weed Res.* 11: 74-79.

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Sanok, W. J., Selleck, G. W., and Creighton, J. F. (1979). Weed Control and Phytotoxicity with Herbicides in Five Tomato Varieties. *Proc.Northeast.Weed Sci.Soc.* 33: 332-335.

EcoReference No.: 25888

Chemical of Concern: NPP,MBZ,TFN; Habitat: T; Effect Codes: POP,GRO; Rejection Code: TARGET(TFN).

Santos, R. P. D., Saccol, A. V., Schneider, F. M., and Buriol, G. A. (1982). Influence of Incorporation Methods and Time on the Efficiency of Trifluralin in the Control of Cockspur Grasses (*Echinochloa* Spp.) in Soybeans. *Rev Cent Cienc Rurais* 12: 129-135.

EcoReference No.: 32219

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Savage, K. W. and Barrentine, W. L. (1969). Trifluralin Persistence as Affected by Depth of Soil Incorporation. *Weed Sci.* 17: 349-352.

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Schnelle, M. A. and Hensley, D. L. (1990). Effects of Pesticides upon Nitrogen Fixation and Nodulation by Dry Bean. *Pestic.Sci.* 28: 83-88.

EcoReference No.: 53973

Chemical of Concern:

DCPA,CuOH,BT,TFN,ACR,Maneb,EPTC,CTN,Captan,BMY,FNV,SXD,PNB,DZ,TBA,DCF,MLN,ES,CBL ; Habitat: T; Effect Codes: GRO,BCM; Rejection Code: LITE EVAL CODED(DZ,ES),OK(BT),CROP(CBL,MLN,DCF,CTN,Maneb,ACR,DCPA,EPTC,CTN,Captan),TARGET(SXD,FNV,BMY,CuOH,TFN).

Schreiber, M. M., White, M. D., and Shasha, B. S. (1987). Efficacy of Controlled-Release Formulation of Trifluralin in No-Till Soybeans (*Glycine max*). *Weed Sci.* 35: 407-411.

EcoReference No.: 31008

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Schweizer, E. E. (1970). Aberrations in Sugarbeet Roots as Induced by Trifluralin. *Weed Sci.* 18: 131-134.

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Scursoni, J. A. and Satorre, E. H. (1997). The Effect of Trifluralin Applied Preplant on Grass Weed Control and Establishment and Yield of Barley (*Hordeum vulgare*). *Weed Technol.* 11: 515-519.

EcoReference No.: 62712

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Smeda, R. J., Vaughn, K. C., and Morrison, I. N. (1992). A Novel Pattern of Herbicide Cross-Resistance in a Trifluralin-Resistant Biotype of Green Foxtail (*Setaria viridis* (L.) Beauv.). *Pestic.Biochem.Physiol.* 42: 227-241.

EcoReference No.: 109896

Chemical of Concern: CPP,DTP,PZM,PDM,PRM,IPN,DCPA,OYZ,TFN; Habitat: T; Effect Codes:

GRO,CEL; Rejection Code: TARGET(PZM,TFN,OYZ,DCPA).

Smith, R. J. Jr. (1989). Cropping and Herbicide Systems for Red Rice (*Oryza sativa*) Control. *Weed Technol.* 3: 414-419.

EcoReference No.: 73748

Chemical of Concern: MTL,TFN,PAQT,ACR,BT,MFD; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(MTL),NO MIXTURE(MFD,BT),TARGET(ACR,PAQT,TFN).

Smith, T. F., Noack, A. J., and Cosh, S. M. (1981). The Effect of Some Herbicides on Vesicular-Arbuscular Endophyte Abundance in the Soil and on Infection of Host Roots. *Pestic.Sci.* 12: 91-97.

EcoReference No.: 72606

Chemical of Concern: DU,PQT,TFN,DQTB; Habitat: T; Effect Codes: GRO,POP,PHY,BCM; Rejection Code: TARGET(DU,PQT,TFN,DQTB).

Staats, D. and Klett, J. E. (1993). Evaluation of Weed Control and Phytotoxicity of Preemergence Herbicides Applied to Container-Grown Herbaceous and Woody Plants. *J.Environ.Hortic.* 11: 78-81.

EcoReference No.: 73252

Chemical of Concern: MTL,OYZ,TFN; Habitat: T; Effect Codes: POP,GRO,PHY; Rejection Code: LITE EVAL CODED(MTL),TARGET(MTL,OYZ,TFN).

Stanifer, L. C. and Thomas, C. H. (1965). Response of Johnsongrass to Soil-Incorporated Trifluralin. *Weeds* 13: 302-306.

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Stephenson, G. R., Phatak, S. C., Makowski, R. I., and Bouw, W. J. (1980). Phytotoxic Interactions Involving Metribuzin and Other Pesticides in Tomatoes. *Can.J.Plant Sci.* 60: 167-175.

EcoReference No.: 26089

Chemical of Concern: MBZ,CBL,DZ,ES,MLN,CBF,DEM,MVP,CTN,MZB,Maneb,TFN; Habitat: T; Effect Codes: GRO,POP; Rejection Code: LITE EVAL CODED(DZ,ES,MLN,CBF),CROP(MZB,CTN,Maneb),OK(MVP),TARGET(CBL,TFN).

Stilkowski, G. D. and Brule-Babel, A. L. (1998). Inheritance of Fenoxaprop-p-Ethyl and Trifluralin Resistance, and Genetic Variability Among Green Foxtail (*Setaria viridis* (L.) Beauv.) Populations. *M.S.Thesis, Univ.of Manitoba, Canada* 88 p.

Chemical of Concern: FNP,TFN; Habitat: T; Rejection Code: TARGET (FNP,TFN).

Stoller, E. W. and Wax, L. M. (1977). Persistence and Activity of Dinitroaniline Herbicides in Soil. *J.Environ.Qual.* 6: 124-127.

EcoReference No.: 106399

Chemical of Concern: OYZ,TFN,BFL,IPN,BTL; Habitat: T; Effect Codes: GRO; Rejection Code: TARGET(OYZ,TFN),OK(BFL,IPN,BTL).

Strang, R. H. and Rogers, R. L. (1971). A Microradioautographic Study of ¹⁴C-Trifluralin Absorption. *Weed Sci.* 19: 363-369.

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Swann, C. W. and Behrens, R. (1972). Phytotoxicity of Trifluralin Vapors from Soil. *Weed Sci.* 20: 143-146.

EcoReference No.: 41615

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Talbert, R. E. (1965). Effects of Trifluralin on Soybean Root Development. *Proc.South.Weed Control Conf.* 18: 652 -.

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Talbert, R. E., Johnson, D. H., Wichert, R. A., and Kendig, J. A. (1987). Field Evaluations of Herbicides on Small Fruit and Vegetable Crops, 1987. *Ark.Agric.Exp.Stn.Res.Ser.#364* 25 p.

EcoReference No.: 73744

Chemical of Concern:

HXZ,GYP,OXF,ACF,OYZ,SZ,CYC,PHMD,DEE,MBZ,DMM,ACR,BS,NPM,NPP,EFL,FZP,IMQ,CMZ,IZT ,FZFPB,MTL,SXD,FSF,EPTC,TFN,BT,PAQT,TRB; Habitat: T; Effect Codes: POP; Rejection Code: NO MIXTURE(SXD,PHMD),OK(ALL CHEMS),TARGET(CMZ,OYZ,FSF,HXZ,MYL,SZ,BS,GYP,OXF,EPTC,ACR,PAQT,TFN).

Talbert, R. E., Kendig, J. A., Earnest, L. D., Guy, C., Barnes, C. J., Lavy, T. L., Frans, R. E., and Oliver, L. R. (1989). Winter Wheat Response to Carryover from Herbicides Used on Corn, Cotton, Grain Sorghum and Soybeans. *Ark.Agric.Exp.Stn.Res.Ser.* 394: 1-50.

EcoReference No.: 73915

Chemical of Concern:

ACF,ACR,ATZ,TFN,BFL,BT,BMN,CRM,CLT,CMZ,CZE,DMB,DU,FNP,FZFP,FSF,HFP,IMQ,IZT,LCF,L NR,MTZ,MTL,MBZ,NFZ,MSMA,OXF,PAQT,PDM,PMS,PMT,PYD,QZF,SXD,24DXY,24DB,DMM; Habitat: T; Effect Codes: POP,PHY; Rejection Code: LITE EVAL CODED(MTL),TARGET(DMB,ATZ,24DXY,LCF,FSF,LNR,OXF,CLT,NFZ,DU,ACR,PDM,PAQT,TFN), MIXTURE(FNP).

Talbert, R. E., Oliver, L. R., Frans, R. E., Wichert, R. A., Carey, V. F., Johnson, D. H., and Ruff, D. F. (1993). Field Screening of new Chemicals for Herbicidal Activity 1992. *Ark.Agric.Exp.Stn.Res.Ser.* 426 22 p.

EcoReference No.: 73424

Chemical of Concern: MTL,TFN,MBZ,DMB; Habitat: T; Effect Codes: POP,PHY; Rejection Code: LITE EVAL CODED(MTL),TARGET(DMB,TFN).

Talbert, R. E., Tierney, M. J., Burgos, N. R., Strebe, T. A., Curless, J. K., and Miesner, J. (1996). Field Evaluations of Herbicides on Small Fruit Vegetable and Ornamental Crops 1995. *Ark.Agric.Exp.Stn.Res.Ser.* 452 38 p.

EcoReference No.: 73745

Chemical of Concern:

MTL,MBZ,DMM,BT,24DXY,EPTC,GYP,OYZ,DU,TPZ,OXF,ACF,TFN,CYC,CMZ,FTS,FZF,IZT,FSF,CP R,DCPA,HSE,PRM,SXD,PPP,NPP,DDP,ACO,GFSNH,PAQT,PHMD,PMR; Habitat: T; Effect Codes: PHY,POP; Rejection Code: LITE EVAL CODED(SXD,PHMD),TARGET(MTL,24DXY,CMZ,OYZ,FSF,GYP,OXF,EPTC,GFSNH,FTS,DU,DCPA,P AQT,TFN).

Talbert, R. E., Tierney, M. J., Burgos, N. R., Strebe, T. A., and Kitt, M. J. (1995). Field Evaluation of Herbicides on Small Fruit, Vegetable and Ornamental Crops, 1994. *Ark.Agric.Exp.Stn.Res.Ser.* 447 53 p.

EcoReference No.: 73916

Chemical of Concern:

BT,PPP,CLT,CMZ,CPR,CYC,DCPA,DDP,DEE,DMM,DU,EPTC,EFL,FZP,FTS,FSF,GFS,GYP,IZT,MLX, Cu,MTL,MBZ,NPP,OYZ,PQT,PMD,PHMD,QNC,SXD,SFZ,TPZ,TPR,TFN,24DXY; Habitat: T; Effect Codes: POP,PHY; Rejection Code: LITE EVAL CODED(MTL,PHMD),NO MIXTURE(SXD),NO

COC(Ziram),TARGET(24DXY,CMZ,OYZ, FSF,GYP,EPTC, GFS,CLT,DU,FTS,QNC,TFN),OK(MLX).

Talbert, R. E., Tierney, M. J., Carey III, V. F., and Kitt, M. J. (1994). Field Evaluations of Herbicides on Small Fruit, Vegetable and Ornamental Crops, 1993. *Ark.Agric.Exp.Stn.Res.Ser.440* 60 p.

EcoReference No.: 73236

Chemical of Concern:

PDM,MTL,TFN,TBC,OXF,EFL,24DXY,ATZ,NPP,GYP,BT,MBZ,SXD,DMB,PYZ,DSP; Habitat: T; Effect Codes: POP,PHY; Rejection Code: LITE EVAL CODED(MTL,PHMD),NO MIXTURE(SXD),OK(ALL CHEMS),TARGET(DMB,PYZ,ATZ,GYP,OXF,24DXY,PDM,TBC,TFN).

Talbert, R. E., Wichert, R. A., Carey III, V. F., Johnson, D. H., Ruff, D. F., and Burgos, N. R. (1993). Field Evaluations of Herbicides on Small Fruit, Vegetable and Ornamental Crops, 1992. *Ark.Agric.Exp.Stn.Res.Ser.429* 29 p.

EcoReference No.: 70441

Chemical of Concern: ATZ,NPP,MTL,PQT,OXF,DU,PDM,BT,TFN,24DXY,OYZ,SZ; Habitat: T; Effect Codes: PHY,POP; Rejection Code: LITE EVAL CODED(MTL),OK(ALL CHEMS),TARGET(24DXY,OYZ,ATZ,SZ,OXF,DU,PDM,PQT,TFN).

Tiryaki, O. and Gozek, K. (1997). Total, Extractable and Bound 14C-Trifluralin Residues in the Soil and Melon. *J.Turk.Phytopathol.* 26: 39-49.

EcoReference No.: 64122

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Tiryaki, O., Gozek, K., and Khan, S. U. (1997). 14C-Residues of Trifluralin in a Soil and Their Uptake by Carrots. *Bull.EnvIRON.Contam.Toxicol.* 59: 58-64.

EcoReference No.: 64121

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Tiryaki, O., Maden, S., and Tuncbilek, A. S. (1997). 14C-Residues of Trifluralin in Soil and Melon. *Bull.EnvIRON.Contam.Toxicol.* 59: 750-756.

EcoReference No.: 54866

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Tu, C. M. (1992). Effect of Some Herbicides on Activities of Microorganisms and Enzymes in Soil. *J.EnvIRON.Sci.Health Part B* 27: 695-709.

EcoReference No.: 73261

Chemical of Concern: MTL,ATZ,EFL,LNR,MBZ,TFN,IZT,BTY; Habitat: T; Effect Codes: POP; Rejection Code: LITE EVAL CODED(MTL),OK(EFL,MBZ,IZT),TARGET(ATZ,LNR,BTY,TFN).

Tu, J. C. (1991). Etiology, Biology and Control of a Soilborne Root Rot Complex of Green Peas. *Plant Prot.Bull.* 33: 17-35.

EcoReference No.: 107787

Chemical of Concern: MLX,PPM,ODL,Captan,TFN; Habitat: T; Effect Codes: GRO,POP,PHY; Rejection Code: EFFICACY(MLX,Captan,TFN),NO COC(PMT).

Tyunyayeva, G. N., Minenko, A. K., and Pen'kov, L. A. (1974). Effect of Trifluralin on the Biological Properties of Soil. *Sov .Soil Sci.* 6: 320-324.

EcoReference No.: 55011

Chemical of Concern: TFN; Habitat: T; Effect Codes: POP; Rejection Code: TARGET(TFN).

Udoh, D. J. and Nelson, L. E. (1986). Trifluralin-Induced Chlorosis in Soybean (*Glycine max* L. Merr.) Grown on Clayey, High pH Soils. *Plant Soil* 96: 175-184.

EcoReference No.: 55015

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Vahidy, A. A. (1973). Differential Tolerance Within Certain Cruciferous Crops to Vegadex, Cipc, Dymid and Treflan. *Pak J Bot.* 5: 79-85.

EcoReference No.: 25128

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Vaughn, K. C. and Koskinen, W. C. (1987). Effects of Trifluralin Metabolites on Goosegrass (*Eleusine indica*) Root Meristems. *Weed Sci.* 35: 36-44.

EcoReference No.: 31149

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Vianello, A., Macri, F., Nardi, S., Chandler, C., and Renosto, F. (1981). Effect of Trifluralin Synthesis Intermediates on Plant Cell Membrane Permeability and Growth of Plants and Fungi. *J.Environ.Qual.* 10: 392-395.

EcoReference No.: 109692

Chemical of Concern: TFN; Habitat: T; Effect Codes: POP,ACC,PHY,GRO; Rejection Code: TARGET(TFN).

Waddington, J., Cessna, A. J., Moyer, J. R., and Holt, N. W. (1986). Sainfoin Establishment and Production on Trifluralin-Treated Soils, and Herbicide Residues in Green Forage and Hay. *Can.J.Plant Sci.* 66: 103-110.

EcoReference No.: 44091

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Weatherspoon, D. M. and Currey, W. L. (1975). Evaluation of Treflan, Lasso, and Ronstar Herbicides for Use in Woody Ornamental Nurseries. *Proc.Fla.State Hortic.Soc.* 88: 535-540.

EcoReference No.: 26778

Chemical of Concern: ACR,TFN; Habitat: T; Effect Codes: GRO,POP; Rejection Code: TARGET(ACR,TFN).

Webber III, C. L. (1992). The Influence of Metolachlor and Trifluralin on Kenaf (*Hibiscus cannabinus* L.) Yield Components. *Ind.Crops Prod.* 1: 17-20.

EcoReference No.: 73963

Chemical of Concern: MTL,TFN; Habitat: T; Effect Codes: POP,GRO; Rejection Code: LITE EVAL CODED(MTL),TARGET(TFN).

Webster, G. R. B., Shaykewich, C. F., Kanhai, S., and Reimer, G. J. (1978). Availability of the Herbicide Trifluralin for Control of Wild Oats as Influenced by Soil Characteristics in Four Manitoba Soils. *Can.J.Soil Sci.* 58: 397-404.

EcoReference No.: 68600

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

White, J. G. (1984). Seedling Diseases of Cotton Damage Loss and Control. In: R.K.S.Wood and G.J.Jellis (Eds.),

Plant Diseases: Infection, Damage and Loss, Meeting, Dec.1982, London, England, Blackwell Sci.Publ.Inc., Palo Alto CA 247-254.

Chemical of Concern: CAPTAN,TFN; Habitat: T; Rejection Code: CROP(Captan,TFN).

White, M. D. and Schreiber, M. M. (1984). Herbicidal Activity of Starch Encapsulated Trifluralin. *Weed Sci.* 32: 387-394.

EcoReference No.: 107185

Chemical of Concern: TFN; Habitat: T; Effect Codes: GRO,POP; Rejection Code: TARGET(TFN).

Whitwell, T. and Kelly, J. (1989). Effects of Preemergence Herbicides on Hosta and Daylily. *J.Environ.Hortic.* 7: 29-31.

EcoReference No.: 73254

Chemical of Concern: MTL,OXF,TFN,OYZ,PDM,NPP,FTN; Habitat: T; Effect Codes: PHY,GRO; Rejection Code: LITE EVAL CODED(FTN,MTL),OK(ALL CHEMS),TARGET(OYZ,OXF,PDM,TFN).

Young, L. W. and Camper, N. D. (1979). Trifluralin Effects on Tobacco Callus Tissue: Mitosis and Selected Metabolic Effects . *Pest Bioc* 12: 117-123.

EcoReference No.: 29097

Chemical of Concern: TFN; Habitat: T; Rejection Code: TARGET(TFN).

Yueh, L. Y. and Hensley, D. L. (1993). Pesticide Effect on Acetylene Reduction and Nodulation by Soybean and Lima Bean. *J.Am.Soc.Hortic.Sci.* 118: 73-76.

EcoReference No.: 70497

Chemical of Concern: Captan,Maneb,Zineb,MOM,MLN,PMR,BT,SXD,TFN,DZ,CBL,PNB; Habitat: T; Effect Codes: BCM,PHY; Rejection Code: LITE EVAL CODED(MLN,MOM,DZ,Captan,Maneb),TARGET(CBL,SXD,TFN),OK(PMR,BT,PNB).

Accepted ECOTOX Data Table

The code list for ECOTOX can be found at: <http://cfpub.epa.gov/ecotox/blackbox/help/codelist.pdf>

Chemical Name	Genus	Species	Common Name	Effect Group	Effect	Meas	Endpt1	Endpt2	Dur Preferred Mean	Dur Unit Preferred	Conc Value1 Preferred Mean	Conc Value2 Preferred Mean	Conc Units Preferred	% Purity	Ref #
Trifluralin	Capra	hircus	Wild Goat	ACC	ACC	RSDE	LOEL		15 d		1		ppm	100	36819
Trifluralin	Capra	hircus	Wild Goat	ACC	ACC	RSDE	LOEL		18 d		1		ppm	100	36819
Trifluralin	Capra	hircus	Wild Goat	ACC	ACC	RSDE	NOEL		26 d		1		ppm	100	36819
Trifluralin	Capra	hircus	Wild Goat	ACC	ACC	RSDE	NOEL		26 d		1		ppm	100	36819
Trifluralin	Cyprinodon	variegatus	Sheepshead minnow	ACC	ACC	RSDE	BCF		28 d		0.0048		mg/L	99	2080
Trifluralin	Cyprinodon	variegatus	Sheepshead minnow	ACC	ACC	RSDE	BCF		28 d		0.0177		mg/L	99	2080
Trifluralin	Cyprinodon	variegatus	Sheepshead minnow	ACC	ACC	RSDE	BCF		28 d		0.0096		mg/L	99	2080
Trifluralin	Cyprinodon	variegatus	Sheepshead minnow	ACC	ACC	RSDE	BCF		166 d		0.0096		mg/L	99	2080
Trifluralin	Cyprinodon	variegatus	Sheepshead minnow	ACC	ACC	RSDE	BCF		28 d		0.0013		mg/L	99	2080
Trifluralin	Cyprinodon	variegatus	Sheepshead minnow	ACC	ACC	RSDE	BCF		166 d		0.0177		mg/L	99	2080
Trifluralin	Cyprinodon	variegatus	Sheepshead minnow	ACC	ACC	RSDE	BCF		166 d		0.0048		mg/L	99	2080
Trifluralin	Cyprinodon	variegatus	Sheepshead minnow	ACC	ACC	RSDE	BCF		166 d		0.0013		mg/L	99	2080
Trifluralin	Porcellio	scaber	Common rough woodlouse	ACC	ACC	RSDE	BCF		28 d		2.5		L/ha	100	106088
Trifluralin	Phaseolus	vulgaris	Bean	BCM	BCM	CACO	NOAEL		23 d		0.99904		lb/acre	100	52039
Trifluralin	Pisum	sp.	pea	BCM	BCM	CHLO	NOAEL		54 d		0.7136		lb/acre	100	77521

Trifluralin	Mus	musculus	House mouse	BCM	BCM	BCM	MCPR	LOAEL		3 d		245		mg/kg/d	>98	77500
Trifluralin	Aspergillus	parasiticus	Fungus	BCM	BCM	BCM	AFB1	NOAEL		6 d		20		ppm	100	89314
Trifluralin	Anabaena	oryzae	Blue-green algae	BCM	BCM	BCM	CARB	LOAEL		7 d		5		mg/L	100	67667
Trifluralin	Nostoc	muscorum	Blue-green algae	BCM	BCM	BCM	CARB	LOAEL		7 d		5		mg/L	100	67667
Trifluralin	Mus	musculus	House mouse	BCM	BCM	BCM	ALGL	LOAEL		30 d		50		mg/kg bdw	100	109660
Trifluralin	Rattus	novegicus	Norway rat	BCM	BCM	BCM	BLAC	LOAEL		15 d		428.211		ppm	97.1	109665
Trifluralin	Anabaena	oryzae	Blue-green algae	BCM	BCM	BCM	PCON	LOAEL		7 d		5		mg/L	100	93338
Trifluralin	Nostoc	muscorum	Blue-green algae	BCM	BCM	BCM	PCON	NOAEL	LOAEL	7 d		5	10 mg/L		100	93338
Trifluralin	Anabaena	oryzae	Blue-green algae	BCM	BCM	BCM	NCON	LOAEL		7 d		5		mg/L	100	75051
Trifluralin	Nostoc	muscorum	Blue-green algae	BCM	BCM	BCM	NCON	LOAEL		7 d		5		mg/L	100	75051
Trifluralin	Mus	musculus	House mouse	BCM	BCM	BCM	UREN	LOAEL		730 d		563		ppm	100	110038
Trifluralin	Mus	musculus	House mouse	BCM	BCM	BCM	UREN	NOAEL	LOAEL	730 d		563	2250	ppm	100	110038
Trifluralin	Colinus	virginianus	northern bobwhite	BCM	BCM	BCM	PRCO	NOAEL		11 d		12.4		AI ug/g org	100	62941
Trifluralin	Colinus	virginianus	northern bobwhite	BCM	BCM	BCM	PRCO	NOAEL	LOAEL	ht		1.2	3.2 AI lb/acre		100	62941
Trifluralin	Myriophyllum	aquaticum	Parrot feather watermilfoil	BCM	BCM	BCM	CHLA	LOAEL		14 d		0.2304		mg/L	48	105140
Trifluralin	Leishmania	donovani	Protist	BCM	BCM	BCM	ATUB	NOAEL		2 d		15		ppm	100	109940
Trifluralin	Leishmania	donovani	Protist	BCM	BCM	BCM	ATUB	LOAEL		2 d		30		ppm	100	109940
Trifluralin	Plankton	Plankton	NR	BCM	BCM	BCM	GBCM	EC50		0.125 d		33		mg/L	100	13724
Trifluralin	Plankton	Plankton	NR	BCM	BCM	BCM	GBCM	EC50		0.125 d		1.02		mg/L	100	13724
Trifluralin	Plankton	Plankton	NR	BCM	BCM	BCM	GBCM	EC50		0.125 d		2.2		mg/L	100	13724

Trifluralin	Leishmania	donovani	Protist	BCM	BCM	ATUB	NOAEL		2 d		15		ppm	100	109940
Trifluralin	Leishmania	donovani	Protist	BCM	BCM	ATUB	LOAEL		2 d				ppm	100	109940
Trifluralin	Glycine	max	Soybean	BCM	BCM	PCON	NOAEL		60 d		3.568		lb/acre	100	56262
Trifluralin	Glycine	max	Soybean	BCM	BCM	PCON	NOAEL		60 d		3.568		lb/acre	100	56262
Trifluralin	Cancer	magister	Dungeness or edible crab	BEH	BEH	EQU	EC50		4 d		1		mg/L	93	6793
Trifluralin	Mytilus	edulis	Common bay mussel, blue	BEH	BEH	DTCH	EC50		4 d		0.35		mg/L	100	8127
Trifluralin	NR	Ascomyco	Fungi phylum	BEH	BEH	GBHV	NOAEL	LOAEL	10 d		10	100	ppm	100	70527
Trifluralin	Mus	musculus	House mouse	CEL	CEL	PCCM	NOAEL		2 d		2288.5		mg/kg bdwt	99.5	100768
Trifluralin	Mus	musculus	House mouse	CEL	CEL	PCCM	LOAEL		2 d		1671.6		mg/kg bdwt	99.5	100768
Trifluralin	Rattus	norvegicus	Norway rat	CEL	CEL	FOCI	LOAEL		42 d		5000		ppm	100	75839
Trifluralin	Anabaena	oryzae	Blue-green algae	CEL	CEL	HTCY	NOAEL		7 d		75		mg/L	100	75043
Trifluralin	Nostoc	muscorum	Blue-green algae	CEL	CEL	HTCY	NOAEL	LOAEL	7 d		25	50	mg/L	100	75043
Trifluralin	Mus	musculus	House mouse	CEL	CEL	RBCE	NOAEL	LOAEL	730 d		563	2250	ppm	100	110038
Trifluralin	Mus	musculus	House mouse	CEL	CEL	RBCE	NOAEL	LOAEL	730 d		563	2250	ppm	100	110038
Trifluralin	Rattus	norvegicus	Norway rat	CEL	CEL	NCEL	LOAEL		28 d		17.5		mg/kg bdwt	100	93627
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		4	16	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	EC50		30 d		38		mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		4	16	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	EC50		30 d		38		mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		16	64	mg/L	100	109655

Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	EC50		30 d		64		mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	EC50		30 d		64		mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		16	64	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	EC50		30 d		64		mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		1	4	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	EC50		30 d		35		mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		1	4	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	EC50		30 d		9		mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		1	4	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	EC50		30 d		38		mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		1	4	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	EC50		30 d		25		mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		1	4	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	EC50		30 d		25		mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		16	64	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		16	64	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		16	64	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		16	64	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		4	16	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		4	16	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		4	16	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		1	4	mg/L	100	109655
Trifluralin	Chironomus	riparius	Midge	GRO	DVP	EMRG	NOEC	LOEC	30 d		4	16	mg/L	100	109655

Trifluralin	Linum	usitatissim	Flax	GRO	DVP	EMRG	LOAEL		450 d	0.75		AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	GRO	DVP	EMRG	LOAEL		450 d	0.75		AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	GRO	DVP	EMRG	LOAEL		450 d	0.75		AI l/ha	100	109663
Trifluralin	Gossypium	barbadense	American- Egyptian cotton	GRO	DVP	EMRG	NOAEL		15 d	456		cm3/fed	48	95401
Trifluralin	Rattus	norvegicus	Norway rat	GRO	DVP	WGHT	NOAEL	LOAEL	15 d	475	1000	mg/kg bdwt	100	109382
Trifluralin	Rattus	norvegicus	Norway rat	GRO	DVP	NORM	NOAEL		15 d	1000		mg/kg bdwt	100	109382
Trifluralin	Oryctolagus	cuniculus	European Rabbit	GRO	DVP	WGHT	NOAEL	LOAEL	23 d	225	500	mg/kg bdwt	100	109382
Trifluralin	Oryctolagus	cuniculus	European Rabbit	GRO	DVP	NORM	NOAEL		23 d	500		mg/kg bdwt	100	109382
Trifluralin	Cancer	Dungeness or magister												
Trifluralin	Glycine	max	Soybean	GRO	DVP	MOLT	NOEC		1 d	0.33		mg/L	93	6793
Trifluralin	Glycine	max	Soybean	GRO	DVP	ABNM	LOAEL		14 d	0.112		L/ha	4	109607
Trifluralin	Mus	musculus	House mouse	GRO	DVP	TERA	LOAEL		10 d	1000		mg/kg bdwt	100	82909
Trifluralin	Mus	musculus	House mouse	BCM	ENZ	P450	LOAEL		3 d	245		mg/kg/d	>98	77500
Trifluralin	Mus	musculus	House mouse	BCM	ENZ	CRKI	LOAEL		30 d	50		mg/kg bdwt	100	109660
Trifluralin	Rattus	norvegicus	Norway rat	BCM	ENZ	UDPT	LOAEL		15 d	428.211		ppm	97.1	109665
Trifluralin	Anabaena	oryzae	Blue-green algae	BCM	ENZ	ACPH	LOAEL		7 d	5		mg/L	100	93338
Trifluralin	Nostoc	muscorum	Blue-green algae	BCM	ENZ	ACPH	NOAEL	LOAEL	7 d	5	10	mg/L	100	93338
Trifluralin	Anabaena	oryzae	Blue-green algae	BCM	ENZ	NRDT	NOAEL		7 d	75		mg/L	100	75051
Trifluralin	Nostoc	muscorum	Blue-green algae	BCM	ENZ	NRDT	NOAEL	LOAEL	7 d	10	25	mg/L	100	75051
Trifluralin	Anabaena	oryzae	Blue-green algae	BCM	ENZ	GOTR	LOAEL		7 d	5		mg/L	100	75043

Trifluralin	Nostoc	muscorum	Blue-green algae	BCM	ENZ	GOTR	NOAEL			7 d		75		mg/L	100	75043
Trifluralin	Mus	musculus	House mouse	BCM	ENZ	AATT	LOAEL			730 d		563		ppm	100	110038
Trifluralin	Mus	musculus	House mouse	BCM	ENZ	ALPH	NOAEL	LOAEL		730 d		563	2250	ppm	100	110038
Trifluralin	Mus	musculus	House mouse	BCM	ENZ	GSTR	NOAEL			4 d		100		ppm	100	92613
Trifluralin	Mus	musculus	House mouse	BCM	ENZ	NDMT	LOAEL			3 d		100		mg/kg bdwt	100	92612
Trifluralin	Porcellio	scaber	Common rough woodlouse	BEH	FDB	FCNS	NOAEL			21 d		5		L/ha	100	106088
Trifluralin	Rattus	norvegicus	Norway rat	BEH	FDB	FCNS	LOAEL			1 d		100		mg/kg bdwt	100	109382
Trifluralin	Oryctolagus	cuniculus	European Rabbit	BEH	FDB	FCNS	NOAEL	LOAEL		1 d		100	225	mg/kg bdwt	100	109382
Trifluralin	Drosophila	melanogaster	Fruit fly	CEL	GEN	GEXP	NOAEL			18 d		4.75		mM	>95	107551
Trifluralin	Drosophila	melanogaster	Fruit fly	CEL	GEN	PHFQ	NOAEL	LOAEL		lvp		1	2	mM	98	74251
Trifluralin	Drosophila	melanogaster	Fruit fly	CEL	GEN	PHFQ	NOAEL	LOAEL		lvp		0.1	0.5	mM	98	74251
Trifluralin	Drosophila	melanogaster	Fruit fly	CEL	GEN	PHFQ	NOAEL	LOAEL		lvp		1	2	mM	98	74251
Trifluralin	Drosophila	melanogaster	Fruit fly	CEL	GEN	PHFQ	NOAEL	LOAEL		lvp		5	10	mM	98	74251
Trifluralin	Mus	musculus	House mouse	CEL	GEN	CABR	LOAEL			2 d		0.052		g/kg	26	110035
Trifluralin	Mus	musculus	House mouse	CEL	GEN	CABR	LOAEL			5 d		0.026		g/kg	26	110035
Trifluralin	Mus	musculus	House mouse	CEL	GEN	CABR	LOAEL			11 d		0.013		g/kg	26	110035
Trifluralin	Mus	musculus	House mouse	CEL	GEN	CABR	NOAEL			2 d		0.013		g/kg	26	110035
Trifluralin	Mus	musculus	House mouse	CEL	GEN	CABR	LOAEL			7 d		0.052		g/kg	26	110036
Trifluralin	Mus	musculus	House mouse	CEL	GEN	CABR	LOAEL			35 d		0.00156		g/kg	26	110036
Trifluralin	Rattus	norvegicus	Norway rat	CEL	GEN	U6MR	LOAEL			15 d		428.211		ppm	97.1	109665
Trifluralin	Drosophila	melanogaster	Fruit fly	CEL	GEN	MUTA	LOAEL			18 d		10000		ppm	100	40147

Trifluralin	Colinus	virginianus	northern bobwhite	CEL	GEN	DNAC	NOAEL	LOAEL		11 d	3.01	4.82	Al ug/g org	100	62941
Trifluralin	Colinus	virginianus	northern bobwhite	CEL	GEN	DNPR	LOAEL			ht	1.2		Al lb/acre	100	62941
Trifluralin	Drosophila	melanogaster	Fruit fly	CEL	GEN	BRK	NOAEL			7 d	400		ppm	100	110054
Trifluralin	Drosophila	melanogaster	Fruit fly	CEL	GEN	BRK	LOAEL			10 d	400		ppm	100	110053
Trifluralin	Triticum	aestivum	Bread wheat	GRO	GRO	LGTH	LOAEL			2 d	0.4985		ppm	99.7	92473
Trifluralin	Sclerotinia	m	Fungus	GRO	GRO	WGHT	NOAEL			14 d	1000		ppm	100	98275
Trifluralin	Pisum	sp.	pea	GRO	GRO	WGHT	NOAEL			54 d	0.7136		lb/acre	100	77521
Trifluralin	Abutilon	theophrasti	Butter print	GRO	GRO	LGTH	NOAEL			4 d	6		ppm	>=95	106960
Trifluralin	Porcellio	scaber	Common rough woodlouse	GRO	GRO	WGHT	NOAEL			21 d	5		L/ha	100	106088
Trifluralin	Medicago	truncatula	Barrelclover	GRO	GRO	WGHT	NOAEL			56 d	0.49952		lb/acre	100	110037
Trifluralin	Mus	musculus	House mouse	GRO	GRO	GAIN	NOAEL			90 d	200		mg/kg bdwt	100	109660
Trifluralin	Rattus	norvegicus	Norway rat	GRO	GRO	WGHT	LOAEL			15 d	428.211		ppm	97.1	109665
Trifluralin	Mus	musculus	House mouse	GRO	GRO	WGHT	NOAEL			44 d	1		g/kg bdwt	100	80990
Trifluralin	Mus	musculus	House mouse	GRO	GRO	WGHT	NOAEL			44 d	1		g/kg bdwt	100	80990
Trifluralin	Mus	musculus	House mouse	GRO	GRO	WGHT	NOAEL	LOAEL		730 d	563	2250	ppm	100	110038
Trifluralin	Mus	musculus	House mouse	GRO	GRO	WGHT	NOAEL	LOAEL		730 d	563	2250	ppm	100	110038
Trifluralin	Glycine	max	Soybean	GRO	GRO	WGHT	NOAEL			30 d	1.99808		lb/acre	100	109383
Trifluralin	Glycine	max	Soybean	GRO	GRO	WGHT	NOAEL			30 d	1.99808		lb/acre	100	109383
Trifluralin	Glycine	max	Soybean	GRO	GRO	WGHT	NOAEL			30 d	1.99808		lb/acre	100	109383
Trifluralin	Glycine	max	Soybean	GRO	GRO	WGHT	NOAEL			30 d	1.99808		lb/acre	100	109383
Trifluralin	Colinus	virginianus	northern bobwhite	GRO	GRO	WGHT	NOAEL			ht	16		Al lb/acre	100	62941
Trifluralin	Colinus	virginianus	northern bobwhite	GRO	GRO	WGHT	NOAEL	LOAEL		ht	3.2	8	Al lb/acre	100	62941
Trifluralin	Colinus	virginianus	northern bobwhite	GRO	GRO	WGHT	NOAEL	LOAEL		ht	3.01	4.82	Al ug/g org	100	62941
Trifluralin	Rattus	norvegicus	Norway rat	GRO	GRO	GAIN	NOAEL			28 d	17.5		mg/kg bdwt	100	93627

Trifluralin	Rattus	norvegicus	Norway rat	GRO	GRO	WGHT	NOAEL	LOAEL	6 d	225	475	mg/kg bdwt	100	109382
Trifluralin	Oryctolagus	cuniculus	European Rabbit	GRO	GRO	WGHT	NOAEL	LOAEL	23 d	225	500	mg/kg bdwt	100	109382
Trifluralin	Cyprinodon	variegatus	Sheepshead minnow	GRO	GRO	LGTH	LOAEL		570 d			mg/L	100	48406
Trifluralin	Cyprinodon	variegatus	Sheepshead minnow	GRO	GRO	LGTH	LOAEL		570 d			mg/L	100	48406
Trifluralin	Glycine	max	Soybean	GRO	GRO	NODE	NOAEL		58 d	0.112		L/ha	4	109607
Trifluralin	Glycine	max	Soybean	GRO	GRO	NODE	NOAEL		58 d	0.112		L/ha	4	109607
Trifluralin	Glycine	max	Soybean	GRO	GRO	WGHT	NOAEL		60 d	3.568		lb/acre	100	56262
Trifluralin	Glycine	max	Soybean	GRO	GRO	WGHT	NOAEL	LOAEL	25 d	1.784	3.568	lb/acre	100	56262
Trifluralin	Ovis	aries	Domestic Sheep	CEL	HIS	CSTS	NOEL		43 d	17.5		mg/kg bdwt	100	61494
Trifluralin	Ovis	aries	Domestic Sheep	CEL	HIS	CSTS	NOEL		43 d	17.5		mg/kg bdwt	100	61494
Trifluralin	Mus	musculus	House mouse	CEL	HIS	LESI	NOAEL		730 d	4500		ppm	100	110038
Trifluralin	Mus	musculus	House mouse	CEL	HIS	LESI	NOAEL		730 d	4500		ppm	100	110038
Trifluralin	Colinus	virginianus	northern bobwhite	CEL	HIS	XCPH	NOAEL		ht	19.7		AI ug/g org	100	62941
Trifluralin	Ovis	aries	Domestic Sheep	BCM	HRM	THYR	NOEL		36 d	17.5		mg/kg bdwt	100	61494
Trifluralin	Ovis	aries	Domestic Sheep	BCM	HRM	CRTS	LOEL		36 d	17.5		mg/kg bdwt	100	61494
Trifluralin	Ovis	aries	Domestic Sheep	BCM	HRM	INSL	LOEL		36 d	17.5		mg/kg bdwt	100	61494
Trifluralin	Ovis	aries	Domestic Sheep	BCM	HRM	ESDL	LOEL		36 d	17.5		mg/kg bdwt	100	61494
Trifluralin	Ovis	aries	Domestic Sheep	BCM	HRM	LUTH	LOEL		36 d	17.5		mg/kg bdwt	100	61494
Trifluralin	Ovis	aries	Domestic Sheep	BCM	HRM	LUTH	LOEL		36 d	17.5		mg/kg bdwt	100	61494
Trifluralin	Rattus	norvegicus	Norway rat	BCM	HRM	THYR	LOAEL		15 d	428.211		ppm	97.1	109665
Trifluralin	Gossypium	sp.	Cotton	PHY	IMM	IFCT	NOAEL		30 d	2		L/ha	100	81980
Trifluralin	Rattus	norvegicus	Norway rat	PHY	IMM	PHAG	NOAEL		28 d	17.5		mg/kg bdwt	100	93627
Trifluralin	Phaseolus	vulgaris	Bean	PHY	INJ	DAMG	NOAEL		64 d	0.9904		lb/acre	100	52039
Trifluralin	Mus	musculus	House mouse	PHY	INJ	ADNM	LOAEL		546 d	5200		ppm	90 to 99	99246

Trifluralin	Mus	musculus	House mouse	PHY	INJ	TUMR	NOAEL		546 d		3700		ppm	90 to 99	99246
Trifluralin	Rattus	norvegicus	Norway rat	PHY	INJ	TUMR	NOAEL		546 d		8000		ppm	90 to 99	99246
Trifluralin	Rattus	norvegicus	Norway rat	PHY	INJ	TUMR	NOAEL		546 d		7900		ppm	90 to 99	99246
Trifluralin	Cancer	magister	Dungeness or edible crab	PHY	ITX	IMBL	EC50		4 d		0.14		mg/L	44.5	6793
Trifluralin	Cancer	magister	Dungeness or edible crab	PHY	ITX	IMBL	EC50		4 d		0.06		mg/L	93	6793
Trifluralin	Americamys	bahia	Opossum shrimp	MOR	MOR	MORT	LOAEL		4 d		0.074		mg/L	100	90259
Trifluralin	Heterodera	glycines	Nematode	MOR	MOR	HTCH	NOAEL		24 d		10		ppm	100	72076
Trifluralin	Mus	musculus	House mouse	MOR	MOR	MORT	NR-ZERO		2 d		2288.5		mg/kg bdwt	99.5	100768
Trifluralin	Mus	musculus	House mouse	MOR	MOR	MORT	NR-ZERO		2 d		2089.5		mg/kg bdwt	99.5	100768
Trifluralin	Coturnix	japonica	Japanese quail	MOR	MOR	MORT	LC50		5 d		5000		ppm	45	50181
Trifluralin	Coturnix	japonica	Japanese quail	MOR	MOR	MORT	NR-ZERO		5 d		5000		ppm	45	50181
Trifluralin	Anas	platyrhynchos	Mallard duck	MOR	MOR	MORT	LD50		14 d		2000		mg/kg bdwt	96.7	50386
Trifluralin	Phasianus	colchicus	ring-necked pheasant	MOR	MOR	MORT	LD50		14 d		2000		mg/kg bdwt	96.7	50386
Trifluralin	Proisotoma	minuta	Collembolan	MOR	MOR	MORT	LD50		7 d		3.48		mg/L	100	81754
Trifluralin	Microtus	ochrogaster	Prairie vole	MOR	MOR	MORT	LC50		14 d		5000		mg/kg bdwt	100	70756
Trifluralin	Microtus	ochrogaster	Prairie vole	MOR	MOR	MORT	NR-ZERO		14 d		5000		mg/kg bdwt	100	70756
Trifluralin	Microtus	ochrogaster	Prairie vole	MOR	MOR	MORT	LD50		14 d		5000		mg/kg bdwt	100	70756
Trifluralin	Microtus	canicaudus	Gray-tailed vole	MOR	MOR	MORT	LD50		14 d		5000		mg/kg bdwt	100	70756
Trifluralin	Microtus	canicaudus	Gray-tailed vole	MOR	MOR	MORT	LD50		14 d		5000		mg/kg bdwt	100	70756
Trifluralin	Pseudocarcinus	gigas	Tasmanian Giant Crab	MOR	MOR	MORT	NOAEL	LOAEL	115 d		0.01	0.03	mg/L	100	68361

Trifluralin	Mus	musculus	House mouse	MOR	MOR	MORT	NR-ZERO		14 d	3		g/kg bdwt	100	109577
Trifluralin	Mus	musculus	House mouse	MOR	MOR	MORT	NR-ZERO		14 d	1.5		g/kg bdwt	100	109577
Trifluralin	Mus	musculus	House mouse	MOR	MOR	MORT	NR-ZERO		14 d	3		g/kg bdwt	100	109577
Trifluralin	Mus	musculus	House mouse	MOR	MOR	MORT	NR-ZERO		14 d	0.75		g/kg bdwt	100	109577
Trifluralin	Mus	musculus	House mouse	MOR	MOR	MORT	NR-LETH		14 d	7.5		g/kg bdwt	100	109577
Trifluralin	Mus	musculus	House mouse	MOR	MOR	MORT	NR-LETH		14 d	10		g/kg bdwt	100	109577
Trifluralin	Mus	musculus	House mouse	MOR	MOR	MORT	NR-ZERO		14 d	3		g/kg bdwt	100	109577
Trifluralin	Mus	musculus	House mouse	MOR	MOR	MORT	NR-LETH		14 d	7.5		g/kg bdwt	100	109577
Trifluralin	Porcellio	scaber	Common rough woodlouse	MOR	MOR	MORT	NOAEL		21 d	5		L/ha	100	106088
Trifluralin	Salmo	trutta	Brown trout	MOR	MOR	MORT	NR-ZERO		10 d	1.52		mg/L	100	109384
Trifluralin	Chironomus	riparius	Midge	MOR	MOR	MORT	LC50		2 d	2.7		mg/L	100	109655
Trifluralin	Medicago	truncatula	Barrelclover	MOR	MOR	MORT	NOAEL		56 d	0.49952		lb/acre	100	110037
Trifluralin	Mus	musculus	House mouse	MOR	MOR	MORT	NOAEL		16 d	1		g/kg bdwt	100	80990
Trifluralin	Mus	musculus	House mouse	MOR	MOR	SURV	NOAEL		730 d	4500		ppm	100	110038
Trifluralin	Mus	musculus	House mouse	MOR	MOR	MORT	LD50		14 d	4900		mg/kg bdwt	>98	73113
Trifluralin	Rattus	norvegicus	Norway rat	MOR	MOR	MORT	LD50		14 d	9800		mg/kg bdwt	>98	73113
Trifluralin	Mus	musculus	House mouse	MOR	MOR	SURV	NOAEL		730 d	4500		ppm	100	110038
Trifluralin	Rattus	norvegicus	Norway rat	MOR	MOR	MORT	LD50		14 d	4900		mg/kg bdwt	>98	73113
Trifluralin	Rattus	norvegicus	Norway rat	MOR	MOR	MORT	LD50		14 d	0.5586		g/kg	>98	73113
Trifluralin	Gallus	sp.	Chicken	MOR	MOR	MORT	LD50		14 d	1960		mg/kg bdwt	>98	73113
Trifluralin	Canis	familiaris	Domestic dog	MOR	MOR	MORT	LD50		14 d	1960		mg/kg bdwt	>98	73113
Trifluralin	Oryctolagus	cuniculus	European Rabbit	MOR	MOR	MORT	LD50		14 d	1960		mg/kg bdwt	>98	73113

Trifluralin	Colinus	virginianus	northern bobwhite	MOR	MOR	HTCH	NOAEL			ht		16		AI lb/acre	100	62941
Trifluralin	Colinus	virginianus	northern bobwhite	MOR	MOR	HTCH	NOAEL			ht		8		AI lb/acre	100	62941
Trifluralin	Colinus	virginianus	northern bobwhite	MOR	MOR	HTCH	LOAEL			ht		3.01		AI ug/g org	100	62941
Trifluralin	Tilapia	nilotica	Nile tilapia	MOR	MOR	MORT	LC50			4 d		54.4		mg/L	100	4651
Trifluralin	Carassius	carassius	Crucian carp	MOR	MOR	MORT	LC50			4 d		49.5		mg/L	100	4651
Trifluralin	Colinus	virginianus	northern bobwhite	MOR	MOR	MORT	LD50			ht		5.8		AI ug/g org	100	62941
Trifluralin	Rattus	norvegicus	Norway rat	MOR	MOR	MORT	NR-ZERO			15 d		1000		mg/kg bdwt	100	109382
Trifluralin	Rattus	norvegicus	Norway rat	MOR	MOR	MORT	NOAEL			15 d		1000		mg/kg bdwt	100	109382
Trifluralin	Oryctolagus	cuniculus	European Rabbit	MOR	MOR	MORT	NR-ZERO			22 d		225		mg/kg bdwt	100	109382
Trifluralin	Hydra	sp.	Hydra	MOR	MOR	MORT	NR-LETH			0.291667 d		0.0001		M	100	15834
Trifluralin	Leishmania	donovani	Protist	MOR	MOR	SURV	IC50			2 d		30		ppm	100	109940
Trifluralin	Pimephales	promelas	Fathead minnow	MOR	MOR	MORT	NR-LETH			60 d		0.0165		mg/L	100	632
Trifluralin	Cyprinodon	variegatus	Sheepshead minnow	MOR	MOR	MORT	NR-LETH			d		0.0341		mg/L	99	2080
Trifluralin	Cyprinodon	variegatus	Sheepshead minnow	MOR	MOR	MORT	LETC			10 d		0.084		mg/L	99	2080
Trifluralin	Cyprinodon	variegatus	Sheepshead minnow	MOR	MOR	MORT	NR-ZERO			4 d		0.054		mg/L	99	2080
Trifluralin	Cyprinodon	variegatus	Sheepshead minnow	MOR	MOR	MORT	LC50			4 d		0.19		mg/L	99	2080
Trifluralin	Bufo	woodhous ei	Fowler's toad	MOR	MOR	MORT	LC50			2 d		0.17		mg/L	100	2891
Trifluralin	Bufo	woodhous ei	Fowler's toad	MOR	MOR	MORT	LC50			4 d		0.1		mg/L	100	2891
Trifluralin	Cyprinus	carpio	common carp	MOR	MOR	MORT	LC50			2 d		0.017		ml/L	100	3352
Trifluralin	Penaeus	monodon	Jumbo tiger prawn	MOR	MOR	MORT	NR-LETH			4 d		10		mg/L	100	4581

Trifluralin	Penaeus	monodon	Jumbo tiger prawn	MOR	MOR	MORT	NR-LETH		3 d	10		mg/L	100	4581
Trifluralin	Penaeus	monodon	Jumbo tiger prawn	MOR	MOR	MORT	NR-LETH		4 d	0.01		mg/L	100	4581
Trifluralin	Penaeus	monodon	Jumbo tiger prawn	MOR	MOR	MORT	NR-LETH		4 d	10		mg/L	100	4581
Trifluralin	Penaeus	monodon	Jumbo tiger prawn	MOR	MOR	MORT	NR-LETH		2 d	10		mg/L	100	4581
Trifluralin	Americamys	bahia	Opossum shrimp	MOR	MOR	MORT	LC50		4 d	0.1364		mg/L	100	4891
Trifluralin	Lumbriculus	variegatus	Oligochaete, worm	MOR	MOR	MORT	LC50		4 d	0.3		mg/L	100	6502
Trifluralin	Lumbriculus	variegatus	Oligochaete, worm	MOR	MOR	MORT	LC50		2 d	0.3		mg/L	100	6502
Trifluralin	Cancer	magister	Dungeness or edible crab	MOR	MOR	MORT	LC50		4 d	9.3		mg/L	93	6793
Trifluralin	Cancer	magister	Dungeness or edible crab	MOR	MOR	HTCH	NOEC		1 d	0.33		mg/L	93	6793
Trifluralin	Cancer	magister	Dungeness or edible crab	MOR	MOR	MORT	LC50		4 d	1		mg/L	93	6793
Trifluralin	Cancer	magister	Dungeness or edible crab	MOR	MOR	MORT	LC50		4 d	0.25		mg/L	44.5	6793
Trifluralin	Cancer	magister	Dungeness or edible crab	MOR	MOR	MORT	NR-LETH		8 d	0.22		mg/L	93	6793
Trifluralin	Cancer	magister	Dungeness or edible crab	MOR	MOR	MORT	NOEC		69 d	0.59		mg/L	93	6793
Trifluralin	Cancer	magister	Dungeness or edible crab	MOR	MOR	MORT	NOEC		69 d	0.3		mg/L	93	6793

Trifluralin	Cancer	magister	Dungeness or edible crab	MOR	MOR	MORT	LC50				4d	0.11		mg/L	93	6793
Trifluralin	Lepomis	cyaneus	Green sunfish	MOR	MOR	MORT	NR-LETH				8d	0.1		mg/L	100	8181
Trifluralin	Gambusia	affinis	Western mosquitofish	MOR	MOR	MORT	LC50				1d	28		mg/L	100	10092
Trifluralin	Alonella	sp.	Water flea	MOR	MOR	MORT	LC50				2d	0.06		mg/L	100	11476
Trifluralin	Diaptomus	sp.	Calanoid copepod	MOR	MOR	MORT	LC50				2d	0.08		mg/L	100	11476
Trifluralin	Eucyclops	sp.	Cyclopoid copepod	MOR	MOR	MORT	LC50				2d	0.05		mg/L	100	11476
Trifluralin	Cypria	sp.	Ostracod	MOR	MOR	MORT	LC50				2d	0.06		mg/L	100	11476
Trifluralin	Cyprinus	carpio	common carp	MOR	MOR	MORT	LC50				4d	0.66		mg/L	100	11531
Trifluralin	Barbus	sharpeyi	Bunni fish	MOR	MOR	MORT	LC50				4d	0.25		mg/L	100	11531
Trifluralin	Chironomus	riparius	Midge	MOR	MOR	MORT	EC50				2d	1		mg/L	100	12280
Trifluralin	Dunaliella	bioculata	Green algae	MOR	MOR	MORT	NR-LETH				2d	100		uM	100	13100
Trifluralin	Cyprinus	carpio	common carp	MOR	MOR	MORT	NR-ZERO				14d	0.0198		mg/L	99	20430
Trifluralin	Anas	platyrhynchos	Mallard duck	MOR	MOR	MORT	LD50				18d	1.6		lb/acre	100	35249
Trifluralin	Eisenia	fetida	earthworm	MOR	MOR	MORT	LC50				2d	1000		AI ug/cm2	100	40531
Trifluralin	Leishmania	donovani	Protist	MOR	MOR	SURV	IC50				2d	30		ppm	100	109940
Trifluralin	Phomopsis	colicola	Fungus	MOR	MOR	MORT	LD50				1.0125d	3.29		L/ha	100	96666
Trifluralin	Phomopsis	colicola	Fungus	MOR	MOR	MORT	LD50				1.0125d	3.76		L/ha	100	96666
Trifluralin	Artemia	salina	Brine shrimp	MOR	MOR	HTCH	LOAEL				9d	5		mg/L	100	18810
Trifluralin	Penaeus	stylirostris	Shrimp	MOR	MOR	MORT	NR-LETH				1d	3		mg/L	100	18810
Trifluralin	Penaeus	stylirostris	Shrimp	MOR	MOR	MORT	NR-LETH				1d	0.375		mg/L	100	18810
Trifluralin	Penaeus	vannamei	Whiteleg shrimp	MOR	MOR	MORT	NR-LETH				1d	3		mg/L	100	18810
Trifluralin	Mus	musculus	House mouse	GRO	MPH	SMIX	NOAEL				3d	245		mg/kg/d	>98	77500

Trifluralin	Pseudocarci nus	gigas	Tasmanian Giant Crab	GRO	MPH	WDTH	LOAEL			115 d		0.001		mg/L	100	68361
Trifluralin	Salmo	trutta	Brown trout	GRO	MPH	SHPE	NOAEL	LOAEL		10 d		0.0076	0.16	mg/L	100	109384
Trifluralin	Salmo	trutta	Brown trout	GRO	MPH	SHPE	LOAEL			30 d		0.5		mg/L	100	109384
Trifluralin	Rattus	norvegicus	Norway rat	GRO	MPH	SMIX	LOAEL			15 d		428.211		ppm	97.1	109665
Trifluralin	Mus	musculus	House mouse	GRO	MPH	SMIX	NOAEL	LOAEL		730 d		563	2250	ppm	100	110038
Trifluralin	Mus	musculus	House mouse	GRO	MPH	SMIX	LOAEL			730 d		563		ppm	100	110038
Trifluralin	Fusarium	solani	Fungus	GRO	MPH	LGTH	NOAEL	LOAEL		0.333333 d		25	50	ppm	100	109664
Trifluralin	Rattus	norvegicus	Norway rat	GRO	MPH	SMIX	NOAEL			28 d		17.5		mg/kg bdwt	100	93627
Trifluralin	Mus	musculus	House mouse	GRO	MPH	SMIX	NOAEL			3 d		100		mg/kg bdwt	100	92612
Trifluralin	Fusarium	oxysporum	Fungi	GRO	MPH	LGTH	NOAEL	LOAEL		0.75 d		0.5	1	ppm	100	106174
Trifluralin	Fusarium	oxysporum	Fungi	GRO	MPH	LGTH	NOAEL	LOAEL		0.75 d		0.5	1	ppm	100	106174
Trifluralin	Fusarium	oxysporum	Fungi	GRO	MPH	LGTH	NOAEL			0.25 d		2		ppm	100	106174
Trifluralin	Fusarium	oxysporum	Fungi	GRO	MPH	LGTH	NOAEL	LOAEL		0.25 d		0.5	1	ppm	100	106174
Trifluralin	Fusarium	oxysporum	Fungi	GRO	MPH	LGTH	NOAEL	LOAEL		0.25 d		1	2	ppm	100	106174
Trifluralin	Fusarium	oxysporum	Fungi	GRO	MPH	LGTH	NOAEL	LOAEL		0.25 d		0.5	1	ppm	100	106174
Trifluralin	Fusarium	oxysporum	Fungi	GRO	MPH	LGTH	NOAEL	LOAEL		0.25 d		0.5		ppm	100	106174
Trifluralin	Fusarium	oxysporum	Fungi	GRO	MPH	LGTH	NOAEL	LOAEL		0.25 d		1	2	ppm	100	106174
Trifluralin	Fusarium	oxysporum	Fungi	GRO	MPH	LGTH	NOAEL	LOAEL		0.25 d		1960		ppm	>98	73113
Trifluralin	Rattus	norvegicus	Norway rat	NOC	NOC	NRNR	NOAEL			730 d		1960		ppm	>98	73113
Trifluralin	Canis	familiaris	Domestic dog	NOC	NOC	NRNR	NOAEL			1095 d		24.5		mg/kg bdwt	>98	73113
Trifluralin	Anabaena	oryzae	Blue-green algae	PHY	PHY	GLUP	NOAEL	LOAEL		7 d		5	10	mg/L	100	67667
Trifluralin	Nostoc	muscorum	Blue-green algae	PHY	PHY	GLUP	NOAEL			7 d		75		mg/L	100	67667

Trifluralin	Oncorhynchus	kisutch	Coho salmon, silver salmon	PHY	PHY	EPYR	NOAEL	LOAEL	2.08E-02 d		0.02985	0.2985	mg/L		99.5	89637
Trifluralin	Leishmania	infantum	Protist	PHY	PHY	H3UP	IC50		2 d		34.2		uM		100	104651
Trifluralin	Leishmania	infantum	Protist	PHY	PHY	H3UP	IC50		2 d		19.1		uM		100	104651
Trifluralin	Scenedesmus	quadricauda	Green algae	POP	POP	PGRT	EC50		4 d		36.912		mg/L		48	101396
Trifluralin	Sclerotinia	sclerotiorum	Fungus	POP	POP	PGRT	NOAEL		2 d		1000		ppm		100	98275
Trifluralin	Phaseolus	vulgaris	Bean	POP	POP	BMAS	NOAEL		64 d		0.99904		lb/acre		100	52039
Trifluralin	Fusarium	oxysporum	Fungi	POP	POP	ABND	NOAEL		4 d		6		ppm		>=95	106960
Trifluralin	NR	Fungi	Fungi Kingdom	POP	POP	ABND	EC80		10 d		112		ppm		100	90511
Trifluralin	NR	Fungi	Fungi Kingdom	POP	POP	ABND	EC80		10 d		192		ppm		100	90511
Trifluralin	NR	Fungi	Fungi Kingdom	POP	POP	ABND	NOAEL		480 d		0.49952		lb/acre		100	79970
Trifluralin	Glycine	max	Soybean	POP	POP	BMAS	NOAEL		480 d		0.49952		lb/acre		100	79970
Trifluralin	Aspergillus	parasiticus	Fungus	POP	POP	BMAS	NOAEL		6 d		20		ppm		100	89314
Trifluralin	Pseudokirchneriella	subcapitata	Green algae	POP	POP	ABND	EC50		3 d		9.953		mg/L		100	98204
Trifluralin	Pseudokirchneriella	subcapitata	Green algae	POP	POP	ABND	NOEC		3 d		3.125		mg/L		100	98204
Trifluralin	Chlorella	pyrenoidosa	Green algae	POP	POP	PGRT	EC50		4 d		0.870432		mg/L		48	61984
Trifluralin	Scenedesmus	acutus	Green Algae	POP	POP	PGRT	EC50		4 d		2.618544		mg/L		48	61984
Trifluralin	Anabaena	oryzae	Blue-green algae	POP	POP	BMAS	LOAEL		7 d		5		mg/L		100	67667
Trifluralin	Nostoc	muscorum	Blue-green algae	POP	POP	BMAS	NOAEL	LOAEL	7 d		5	10	mg/L		100	67667
Trifluralin	Pseudokirchneriella	subcapitata	Green algae	POP	POP	BMAS	EC10		4 d		0.6		mg/L		100	109657

Trifluralin	Fusarium	solani	Fungus	POP	POP	POP	BMAS	LOAEL		12 d		22.25	ppm	44.5	109664
Trifluralin	Glycine	max	Soybean	POP	POP	POP	BMAS	NOAEL			hv	0.9812	lb/acre	100	109658
Trifluralin	NR	Plantae	Plant kingdom	POP	POP	POP	CNTL	NOAEL			hv	0.9812	lb/acre	100	109658
Trifluralin	Septoria	glycines	Fungus	POP	POP	POP	ABND	NOAEL		49 d		0.9812	lb/acre	100	109658
Trifluralin	Alternaria	sp.	Fungus	POP	POP	POP	ABND	NOAEL		112 d		0.9812	lb/acre	100	109658
Trifluralin	Fusarium	sp.	Fungi	POP	POP	POP	ABND	NOAEL		84 d		0.9812	lb/acre	100	109658
Trifluralin	NR	Fungi	Fungi Kingdom	POP	POP	POP	ABND	NOAEL		84 d		0.9812	lb/acre	100	109658
Trifluralin	Phomopsis	sp.	Fungi	POP	POP	POP	ABND	NOAEL		112 d		0.9812	lb/acre	100	109658
Trifluralin	Fusarium	solani	Fungus	POP	POP	POP	ABND	NOAEL		4 d		2	ppm	44.5	109664
Trifluralin	NR	Fungi	Fungi Kingdom	POP	POP	POP	ABND	NOAEL		4 d		2	ppm	44.5	109664
Trifluralin	Macrophomina	phaseolina	Fungi	POP	POP	POP	DMTR	LOAEL		1 d		10	ppm	48	100606
Trifluralin	Cryptosporidi	parvum	Protozoan	POP	POP	POP	ABND	IC50		2 d		1.94	uM	100	104391
Trifluralin	Cryptosporidi	parvum	Protozoan	POP	POP	POP	ABND	IC90		2 d		3.68	uM	100	104391
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663
Trifluralin	Linum	usitatissim	Flax	POP	POP	POP	ABND	LOAEL		450 d		0.75	AI l/ha	100	109663

Trifluralin	Fusarium	oxysporum	Fungi	POP	POP	ABND	LOAEL			630 d	0.75		AI l/ha	100	109663
Trifluralin	Fusarium	oxysporum	Fungi	POP	POP	ABND	NOAEL			660 d	0.75		AI l/ha	100	109663
Trifluralin	Fusarium	oxysporum	Fungi	POP	POP	ABND	LOAEL			630 d	0.75		AI l/ha	100	109663
Trifluralin	Fusarium	oxysporum	Fungi	POP	POP	ABND	LOAEL			630 d	0.75		AI l/ha	100	109663
Trifluralin	Meloidogyne	incognita	Root-knot nematode	POP	POP	ABND	LOAEL			70 d	0.91		L/ha	26	84381
Trifluralin	Cryptosporidium	parvum	Protozoan	POP	POP	ABND	LOAEL			2 d	1		uM	100	110229
Trifluralin	Thanatephorus	cucumeris	Fungi	POP	POP	ABND	NOAEL			30 d	456		cm3/fed	48	95401
Trifluralin	Thanatephorus	cucumeris	Fungi	POP	POP	ABND	NOAEL			14 d	50		ppm	48	95401
Trifluralin	Metarhizium	anisopliae	Fungus	POP	POP	ABND	LOAEL			3 d	700		ppm	100	71212
Trifluralin	Beauveria	bassiana	Fungus	POP	POP	ABND	LOAEL			3 d	700		ppm	100	71212
Trifluralin	Paecilomyces	farinosus	Fungus	POP	POP	ABND	NOAEL			3 d	700		ppm	100	71212
Trifluralin	Paecilomyces	fumosus	Fungus	POP	POP	ABND	LOAEL			3 d	700		ppm	100	71212
Trifluralin	Oedogonium	sp.	Filamentous green algae	POP	POP	BMAS	ED50			42 d	0.1		mg/L	100	91692
Trifluralin	Lemna	minor	Duckweed	POP	POP	BMAS	NOEC			d	0.075		mg/L	100	18093
Trifluralin	Lemna	minor	Duckweed	POP	POP	GPOP	EC50			4 d	0.17		mg/L	100	18093
Trifluralin	Pseudokirchneriella	subcapitata	Green algae	POP	POP	BMAS	LOEC			d	0.3		mg/L	100	18093
Trifluralin	Lemna	minor	Duckweed	POP	POP	BMAS	LOEC			d	0.15		mg/L	100	18093
Trifluralin	Pseudokirchneriella	subcapitata	Green algae	POP	POP	BMAS	NOEC			d	0.15		mg/L	100	18093
Trifluralin	Pseudokirchneriella	subcapitata	Green algae	POP	POP	GPOP	EC50			4 d	0.673		mg/L	100	18093
Trifluralin	Chlorella	vulgaris	Green algae	POP	POP	PGRT	EC50			4 d	2.086512		mg/L	48	65938
Trifluralin	NR	Nemata	Nematode phylum	POP	POP	ABND	LOAEL			58 d	0.112		L/ha	4	109607

Trifluralin	NR	Nematode phylum	POP	POP	ABND	LOAEL			58 d		0.112		L/ha	4	109607
Trifluralin	Glycine	Soybean	POP	POP	BMAS	NOAEL			hv		0.112		L/ha	4	109607
Trifluralin	Glycine	Soybean	POP	POP	BMAS	NOAEL			hv		0.112		L/ha	4	109607
Trifluralin	NR	Fungi phylum	POP	POP	DMTR	NOAEL	LOAEL		15 d		10	100 ppm		100	70527
Trifluralin	Lagenidium	Fungus	POP	POP	PBMS	LC100			3 d		3		mg/L	100	18810
Trifluralin	Lagenidium	Fungus	POP	POP	PBMS	LC100			3 d		5		mg/L	100	18810
Trifluralin	Glomus	Mycorrhizae fungi	POP	POP	ABND	NOAEL			60 d		3.568		lb/acre	100	56262
Trifluralin	Glomus	Mycorrhizae fungi	POP	POP	ABND	NOAEL			60 d		3.568		lb/acre	100	56262
Trifluralin	Sclerotinia	Fungus	REP	REP	GERM	NOAEL			120 d		20		ppm	100	98275
Trifluralin	Sclerotinia	Fungus	REP	REP	GERM	NOAEL			120 d		20		ppm	100	98275
Trifluralin	Abutilon	Butter print	REP	REP	VIAB	NOAEL			4 d		6		ppm	>=95	106960
Trifluralin	Mus	House mouse	REP	REP	MIDX	LOAEL			16 d		1		g/kg bdwt	100	80990
Trifluralin	Rattus	Norway rat	REP	REP	GREP	NOAEL			730 d		196		ppm	>98	73113
Trifluralin	Canis	Domestic dog	REP	REP	GREP	NOAEL			1095 d		24.5		mg/kg bdwt	>98	73113
Trifluralin	Fusarium	Fungi	REP	REP	GERM	NOAEL			7 d		2		ppm	100	109383
Trifluralin	Fusarium	Fungi	REP	REP	GERM	LOAEL			0.333333 d		500		ppm	100	109664
Trifluralin	Fusarium	Fungi	REP	REP	GERM	NOAEL	LOAEL		0.75 d		0.5		1 ppm	100	106174
Trifluralin	Fusarium	Fungi	REP	REP	GERM	NOAEL	LOAEL		0.75 d		0.5		1 ppm	100	106174
Trifluralin	Fusarium	Fungi	REP	REP	GERM	NOAEL			0.25 d		2		ppm	100	106174
Trifluralin	Fusarium	Fungi	REP	REP	GERM	NOAEL			0.25 d		2		ppm	100	106174
Trifluralin	Meloidogyne	Root-knot nematode	REP	REP	PROG	NOAEL			70 d		0.91		L/ha	26	84381
Trifluralin	Fusarium	Fungi	REP	REP	GERM	NOAEL	LOAEL		0.25 d		1	2 ppm		100	106174
Trifluralin	Fusarium	Fungi	REP	REP	GERM	NOAEL	LOAEL		0.25 d		1	2 ppm		100	106174
Trifluralin	Fusarium	Fungi	REP	REP	GERM	NOAEL	LOAEL		0.25 d		1	2 ppm		100	106174

Trifluralin	Fusarium	oxysporu m	Fungi	REP	REP	GERM	NOAEL		0.25 d	2		ppm	100	106174
Trifluralin	Fusarium	oxysporu m	Fungi	REP	REP	GERM	LOAEL		14 d	0.5		ppm	100	106174
Trifluralin	Leptosphaeri a	maculans	Blackleg	REP	REP	SPRD	LOAEL		120 d	10000		ppm	100	96995
Trifluralin	Beauveria	bassiana	Fungus	REP	REP	GERM	NOAEL	LOAEL	1 d	18000	24000	ppm	100	70790
Trifluralin	Rattus	norvegicu s	Norway rat	REP	REP	PREG	NOAEL		15 d	1000		mg/kg bdwt	100	109382
Trifluralin	Oryctolagus	cuniculus	European Rabbit	REP	REP	NCLU	NOAEL		23 d	500		mg/kg bdwt	100	109382
Trifluralin	Glycine	max	Soybean	REP	REP	NPOD	NOAEL		58 d	0.112		L/ha	4	109607
Trifluralin	Glycine	max	Soybean	REP	REP	NPOD	LOAEL		58 d	0.112		L/ha	4	109607

Open Literature Review Summary

Chemical Name: Trifluralin

CAS No: 1582-09-8

MRID Record Number and Citation:

Mayer, F. L. Jr. and Ellersieck, M. R. (1986). Manual of Acute Toxicity: Interpretation and Data Base for 410 Chemicals and 66 Species of Freshwater Animals. *Resour.Publ.No.160*, U.S.Dep.Interior, Fish Wildl.Serv., Washington, DC 505 p. (USGS Data File).

EcoReference No.: 6797

MRID 400980-01.

Purpose of Review: Litigation/Endangered Species

Date of Review: 6/04/09

Summary of Study Findings:

The “Manual of Acute Toxicity: Interpretation and Data Base for 410 Chemicals and 66 Species of Freshwater Animals” summarizes and interpret results from multiple acute toxicity tests conducted at the Columbia National Fisheries Research Laboratory. The purpose of this DER is to summarize the effects of Trifluralin on acute freshwater fish, invertebrates, and amphibians (Fowler’s toads). All toxicity tests for freshwater fish, invertebrates, and amphibians (Fowler’s toads) for trifluralin are reported as static tests in the Mayer and Ellersieck data summary sheet.

Results summarized below are for those studies which can be used quantitatively in a risk assessment:

1. A 96-hour acute test was conducted on rainbow trout (*Oncorhynchus mykiss*) with technical trifluralin at a temperature of 12.0°C and a water hardness of 40 mg/L. The LC₅₀ value (and 95% C.I.) for *Oncorhynchus mykiss* was 43.6 (32.7-58.1) µg/L.
2. One 96-hour acute test was conducted on bluegill sunfish (*Lepomis macrochirus*) with technical trifluralin at a temperature of 23.9°C and a water hardness of 44 mg/L. The LC₅₀ value (with 95% C.I.) for *Lepomis macrochirus* was 18.5 (16.0-19.7) µg/L.
3. Two 96-hour acute tests were conducted with Fowler’s toad tadpoles (*Bufo w. fouileri*) at a temperature of 60.0°F and a water hardness of 44 mg/L. The resulting LC₅₀ values (with 95% C.I.) for Fowler’s toad tadpoles were 116.15 (CI not defined, only one partial mortality) µg/L and 115.04 (62.0-151.0) µg/L.

Results summarized below are for the study that can be used qualitatively in a risk assessment:

1. A 96-hour acute test was conducted on rainbow trout (*Oncorhynchus mykiss*) using formulated trifluralin (Treflan E.C. 46% ai) at a temperature of 12.7°C and a water hardness of 44 mg/L. The LC₅₀ value (and 95% C.I.) for *Oncorhynchus mykiss* was 10 (0-18) µg/L.

Tests that are categorized as Invalid are listed in Table 1. These tests were conducted with temperatures that exceed EPA guidance for the specific aquatic species; illegible or had no submitted raw data.

Table 1. Freshwater fish and aquatic invertebrate toxicity studies classified as Invalid			
Species	% ai	LC 50 µg/L	Reason(s) for Invalid classification
Rainbow trout	95.9	22	study temperature exceeds recommended 12.0°C+2 @(17°C)
Rainbow trout	95.9	25	study temperature exceeds recommended 12.0°C+2 @(17°C) and solvent control data is illegible
Rainbow trout	N/A	28	illegible % ai purity from raw data and uncertain if reported value in raw data is 96 hr or 48 hr exposure
Rainbow trout	95.9	33	illegible solvent control data
Bluegill sunfish	95.9	8.4	study temperature exceeds recommended 22.0°C+2 @(29°C)
Daphnia magna	95.9	560	No raw data
Palaemonettes kadiakensis	95.9	37	No raw data

Methods:

All toxicity tests were conducted at the Columbia National Fisheries Research Laboratory between 1965 and 1984. Specific bioassay methodologies (e.g., test vessel size, water treatment, culturing practices, etc.) were not outlined in the study report. Tests were conducted using the technical material (purity of 95.9%) of trifluralin are reported in this DER with the most sensitive endpoints (LC 50's) and reported raw data.

Statistical analyses using the Toxanal 2009 statistical program to determine toxicity of freshwater fish and Fowler's toads indicated that freshwater fish were, in general, more sensitive than Fowler's toads (Table 2).

Table 2. 96 hr acute toxicity values for freshwater fish and Fowler's toads.

Species	% ai	LC 50 µg/L reviewer calculated* (reported value from Mayer and Ellersieck)	95% CI µg/L	Slope(95%CI)	Classification of Study
Rainbow trout	95.9	43.6 (41)	32.7-58.1	4.16(2.37-5.96)	quantitative
Rainbow trout	46	10 (10)	0-18	N/A	qualitative
Bluegill sunfish	95.9	18.5 (18.5)	16.0-19.7	23.94 (6.46-41.43)	Quantitative
Fowler's Toad	95.9	116.2 (110)	(NA, only one partial mortality)	N/A	Quantitative
Fowler's Toad	95.9	115.0 (115)	62.0-151.0	5.05 (1.50-8.60)	Quantitative
* Statistics were derived from the Toxanal 2009 statistical program					

Results

Rainbow trout

After 96-hours of exposure to technical trfluralin in 12.0°C water with a pH and hardness of 7.4 and 40 mg/L, respectively, immature *Oncorhynchus mykiss* exhibited an LC₅₀ (with 95% C.I.) of 43.6 (32.70816-58.1343) µg/L.

After 96-hours of exposure to formulated trifluralin (Treflan E.C. 46% ai) in 12.7°C water with a pH and hardness of 7.4 and 44 mg/L, respectively, immature *Oncorhynchus mykiss* exhibited an LC₅₀ (with 95% C.I.) of 10 (0-18) µg/L.

Bluegill sunfish

After 96-hours of exposure to the test material in 23.9°C water with a pH and hardness of 7.4 and 44 mg/L. Immature *Lepomis macrochirus* exhibited an LC₅₀ (with 95% C.I.) of 18.5 (16.0-19.7) µg/L. Five concentrations (0.32, 0.028, 0.024, 0.021 and 0.018 mg/l) of trifluralin were conducted on 10 bluegill sunfish at all levels. All ten bluegill sunfish died at the highest three concentration levels, 9 died at the 0.021mg/l concentration level and 4 died at the 0.018 mg/l concentration level.

Fowler's Toad

After 96-hours of exposure to technical trifluralin in 60.0°F water with a pH and hardness of 7.4 and 44 mg/L, Fowler's Toad tadpoles (*Bufo w. fouileri*) exhibited an LC₅₀ (with 95% C.I.) of 116.2 µg/L (NA, only one partial mortality).

After 96-hours of exposure to technical trifluralin in 60.0°F water with a pH and hardness of 7.4 and 44 mg/L, Fowler's Toad tadpoles (*Bufo w. fouileri*) exhibited an LC₅₀ (with 95% C.I.) of 115.0 µg/L (62.0-151.0).

Description of Use in Document (QUAL, QUAN, INV):

Studies in Table 1 are invalid with reasoning listed in table. Rainbow trout, bluegill sunfish, and Fowler's toad studies in Table 2 exposed to technical trifluralin are used quantitatively. Rainbow trout exposed to Treflan E.C is used qualitatively in the document.

Rationale for Use: Freshwater fish studies provided the most sensitive endpoints, and the amphibian studies covered a taxonomic group of interest. Raw data were provided.

Limitations of Study:

It is uncertain that the 96-hour rainbow trout study with Treflan E.C. 46% ai (Table 2) LC₅₀ 10 ppb value was ai corrected.

For all studies, no details were provided pertaining to the sub-lethal effects observed during the course of the 96-hour acute toxicity tests. Analytical verification of test material concentrations was not conducted. The dissolved oxygen levels throughout the tests were not specified. Some studies did not have the hardness or pH values reported in the raw data but were reported in the Mayer and Ellersieck data summary sheet.

Primary Reviewer: Marie Janson, Environmental Scientist, EPA/ EFED/ERB1

Secondary Reviewer: Christine Hartless, Ph.D, Wildlife Biologist, EPA/ EFED/ERB1

96 hr 18.5 acute fish Blue gill M&E... reported in mg/L

Input Values..

Control no effects # of organisms unknown

10 organisms per vessel for all vessels

Note to the reviewer: this data set does not meet the criteria established by the committee on the methods for the toxicity test with aquatic organisms because no percent dead is less than 35%

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS
1	.7206815	1.851283E-02	1.344295E-02
1.980049E-02			

RESULTS CALCULATED USING THE PROBIT METHOD ITERATIONS

G	H	GOODNESS OF FIT PROBABILITY
7	.533354	1 .9974774

SLOPE = 23.9436

95 PERCENT CONFIDENCE LIMITS = 6.457331 AND 41.42987

LC50 = 1.846807E-02

95 PERCENT CONFIDENCE LIMITS = 1.601035E-02 AND 1.969287E-02

LC10 = 1.634482E-02

95 PERCENT CONFIDENCE LIMITS = 1.053394E-02 AND 1.773328E-02

Rainbow trout LC 50 0.043 mg/l or 43 ppb.M&E is 41

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS
6	.1055615	4.500135E-02	3.100061E-02
6.201248E-02			

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
6	.1854815	1	.4405393

SLOPE = 4.162803

95 PERCENT CONFIDENCE LIMITS = 2.369986 AND 5.955621

LC50 = 4.360847E-02

95 PERCENT CONFIDENCE LIMITS = 3.270816E-02 AND .0581343

LC10 = .0216017

95 PERCENT CONFIDENCE LIMITS = 1.150622E-02 AND 2.944717E-02

DO YOU WISH TO RUN ANOTHER DATA SET?

ENTER Y OR N.

?

Toad 115.04 no percent dead is less than 35%

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 115.1649 ppb

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD					SPAN
G		LC50		95 PERCENT CONFIDENCE LIMITS	
1	1.252149	115.1649	0	206.5632	

RESULTS CALCULATED USING THE PROBIT METHOD ITERATIONS			
G	H	GOODNESS OF FIT PROBABILITY	
5	.4931669	1	.8837166

SLOPE = 5.054358
95 PERCENT CONFIDENCE LIMITS = 1.504892 AND 8.603824

LC50 = 115.04
95 PERCENT CONFIDENCE LIMITS = 61.97452 AND 150.9503

LC10 = 64.50313
95 PERCENT CONFIDENCE LIMITS = 10.15747 AND 93.91574

Toad 116.15 ppb....reported M&E value was 110 ppb... 96 hr 60 degree temp 4 L
volumn

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
320	5	5	100	3.125
100	5	2	40	50
32	5	0	0	3.125

THE BINOMIAL TEST SHOWS THAT 0 AND +INFINITY CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 116.1494

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE
PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE
PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

Treflan EC LC 50 10 ppb

EXPOSED	DEAD	DEAD	PROB. (PERCENT)
100	10	10	100 9.765625E-02
56	10	10	100 9.765625E-02
32	10	10	100 9.765625E-02
18	10	10	100 9.765625E-02
10	10	5	50 62.30469

THE BINOMIAL TEST SHOWS THAT 0 AND 18 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 10

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

DO YOU WISH TO RUN ANOTHER DATA SET?

ENTER Y OR N.

?

Open Literature Review Summary

Chemical Name: Trifluralin

CAS No: 1582-09-8

ECOTOX Record Number and Citation: Ecotox Number 2891

Sanders, H. O. 1970. Pesticide toxicity to tadpoles of the western chorus frog *Pseudacris triseriata* and Fowler's toad *Bufo woodhousii fowleri*. *Copeia* 2, 246-251.

Purpose of Review: Litigation/Endangered Species

Date of Review: 08/20/2009

Summary of Study Findings:

Trifluralin and 17 other pesticides were tested under acute toxicity conditions with 4 to 5-week old Fowler's toads (*Bufo woodhousii fowleri*). The 96-hour LC₅₀ value was 0.10 (0.08-0.49) mg/L. Prior to death, tadpoles exhibited irritability and a loss of equilibrium.

Table 1. Median lethal concentrations and 95% C.I.

Exposure Period	LC ₅₀ (95% C.I.) (mg/L)
24	0.18 (0.10-0.30)
48	0.17 (0.10-0.31)
96	0.10 (0.08-0.49)

Methods

Toad (*Bufo woodhousii fowleri*) egg masses were collected from ponds located near the Fish-Pesticide Research Laboratory, Columbia, Missouri and placed in aquaria containing reconstituted water maintained at 15.5°C. The final reconstituted water had 30 ppm methyl orange alkalinity, 88 ppm total dissolved solids, 7.1 ppm calcium, 3.1 ppm magnesium and a pH of 7.1.

The test was conducted for 96-hours under static conditions with no aeration. Test vessels were 5.7 liter glass aquaria containing 4 liters of test solution. Aquaria were held in a water bath at 15.5±0.5°C. Two hours prior to the addition of the test material, ten tadpoles were added to each vessel; one test vessel was used per concentration and 4 or 5 concentrations were used. The

published report contains information about 18 different pesticides and two species; therefore, nominal concentrations for each test were not specified. The study author reported that nominal concentrations were selected based on preliminary range-finding tests.

The test material was dissolved in ethanol and a solvent control was tested matching the highest concentration of ethanol to which tadpoles in the treated levels were exposed. Observations for mortality were made 24, 48 and 96 hours after test initiation and dead tadpoles were removed at each exposure interval. The LC₅₀ values were determined using a modification to the Litchfield and Wilcoxon (1949) method. Instead of visually fitting a line to data plotted on log-probability paper, concentrations and corresponding mortality were converted to logs and probits, respectively, and a linear regression equation was calculated.

Results

The LC₅₀ values at 24, 48 and 96 hours were 0.18, 0.17 and 0.10 mg/L, respectively. All control animals survived. Mortalities were often preceded by irritability and loss of equilibrium.

The study author reported that the toxicity values determined in these tests may be higher than those occurring in nature due to the tendency of trifluralin to absorb to soil and the low water solubility. Additionally, other laboratory assays indicated that soil-water exposure yielded lower toxicity values than static, water-only tests (such as the definitive one).

Description of Use in Document (QUAL, QUAN, INV):

Qualitative

Rationale for Use:

Provides the most sensitive herptile toxicity data for trifluralin.

Limitations of Study:

Raw data were not provided, thereby precluding the reviewer from verifying the reported toxicity values. Furthermore, the purity of the test material was not reported, it was not stated if nominal concentrations were corrected for the purity, and no analytical verification was performed to determine the actual concentrations that tadpoles were exposed to.

Primary Reviewer: John Marton, Cambridge Environmental, Inc.

Secondary Reviewer: Christine Hartless, EFED/ERB1

Open Literature Review Summary

Chemical Name: Trifluralin

CAS No: 1582-09-8

ECOTOX and MRID Record Number and Citation: Ecotox Number 4891 and MRID 436620-01

Nimmo, D. R., Hamaker, T. L., Matthews, E., and Moore, J. C. (1981). An Overview of the Acute and Chronic Effects of First and Second Generation Pesticides on an Estuarine Mysid. *In: F.J.Vernberg, A.Calabrese, F.P.Thurberg, and W.B.Vernberg (Eds.), Biological Monitoring of Marine Pollutants, Academic Press, Inc., NY* 3-19.

Purpose of Review: Litigation/Endangered Species (036101)

Date of Review: 09/17/2009

Summary of Study Findings:

The purpose of this paper is to briefly summarize data from eleven studies in which pesticides were used as test toxicants. Additional purposes of this paper are to summarize criteria for determining chronic effects, where possible, to compare the sensitivity of mysids with other species exposed to the same chemicals and to discuss acute versus chronic test results with regard to estimated “safe” concentrations of a chemical throughout an entire life cycle. No chronic values for mysids were reported for trifluralin. The purpose of this DER is to summarize the effects of Trifluralin on acute toxicity to estuarine marine invertebrates *Mysidopsis bahia* and *Penaeus aztecus*.

Method

Detailed procedures for culturing the mysids and testing protocols for acute toxicity tests have been published in (Nimmo 1978b). Specific bioassay methodologies for trifluralin only (e.g., test vessel size and water treatment etc.) were not outlined in the study report. In all culture devices for all test chemicals, larval brine shrimp, *artimia salina*, were fed to the mysids *ad libitum*, mysids were exposed to flowing saltwater, and the solvent used was triethylene glycol.

Tests were conducted using Treflan (% purity not specified) are reported in this DER with endpoints (LC 50's) for *Mysidopsis bahia* and *Penaeus aztecus*.

Statistical analyses using linear regression analysis after probit transformation was used to determine LC50s and confidence intervals. The Abbot's correction factor for adjusting control mortality was also used in the statistical program.

Results

The 96- hour acute toxicity test for *Mysidopsis bahia* had a LC₅₀ value greater than 136.4 µg/l. Greater test concentrations were not possible due to low solubility in water. Juveniles 48 hours old and younger, released from adult females, were used to begin each acute test. The comparative 96 –hour acute toxicity the marine decapod (*Penaeus aztecus*) exposed to trifluralin had an LC₅₀ value of >210 µg/l.

Description of Use in Document (QUAL, QUAN, INV):

Data can be used qualitatively to evaluate risk to estuarine/marine invertebrates for Trifluralin.

Rationale for Use:

The estuarine marine invertebrate *Mysidopsis bahia* and marine decapod (*Penaeus aztecus*) exposed to Treflan are classified as invalid because no raw data was provided and study authors did not specify if the reported toxicity values were based on the nominal or measured concentrations. The lack of sufficient data to determine actual concentrations in the estuarine marine toxicity tests precludes quantitative use of the LC₅₀ in the assessment.

Limitations of Study:

- 1) It is uncertain if reported toxicity values are nominal or measured concentrations. The purity of Treflan (trifluralin) was not reported.
- 2) No raw data was provided and concentrations used are not specified, it is unknown if any mortality occurred during the test.
- 3) No details were provided pertaining to the sub-lethal effects observed during the course of the 96-hour acute toxicity tests.
- 4) It was not specified if the reported LC₅₀ values were obtained by comparing treatment data to negative control, the solvent control or the pooled control.

Primary Reviewer: Marie Janson, Environmental Scientist, ERB1/EPA

Secondary Reviewer: Christine Hartless, Wildlife Biologist, ERB1/EPA

References:

Nimmo, D. R., T.L. Hamaker, and C.A. Sommers. 1978b. Culturing the mysid (*Mysidopsis bahia*) in flowing seawater or a static system. In: Bioassay Procedures for the Ocean Disposal Permit Program. ERL USEPA, Gulf Breeze, Florida 32561, EPA-600/9-78-010 59-60

Open Literature Review Summary

Chemical Name: Treflan (Trifluralin)

CAS No: 1582-09-8

ECOTOX Record Number and Citation: Ecotox Number 6502

Bailey, H.C. and D.H.W. Liu. 1980. *Lumbriculus variegates*, a Benthic Oligochaete, as a Bioassay Organism. In: J.C.Eaton, P.R.Parrish, and A.C.Hendricks (Eds.), *Aquatic Toxicology and Hazard Assessment, 3rd Symposium, ASTM STP 707, Philadelphia, PA* 205-215.

Purpose of Review: Litigation/Endangered Species (036101)

Date of Review: 09/14/2009

Summary of Study Findings:

This study was conducted to assess the potential of the freshwater oligochaete, *Lumbriculus variegates*, to serve as a bioassay organism by conducting acute toxicity tests with various toxic metals and pesticides, including Treflan (reagent-grade), the formulated product containing the active ingredient Trifluralin. After 96-hours of exposure, no significant mortality or significant sub-lethal effects were observed up to, and including, a concentration of 0.3 mg/L.

Results:

48-hr LC₅₀: >0.3 mg/L

96-hr LC₅₀: >0.3 mg/L

Methods

The original supply of *L. variegatus* was obtained from the settling ponds of the California State Fish Hatchery located in Friant, California. Oligochaetes were cultured in 19 L glass aquaria under flow-through conditions with a rate of approximately 4 volume additions every 24 hours. Culture water was de-chlorinated tap water with an average hardness of 30 mg/L as CaCO₃, pH of 7.8, and conductivity of 80µmhos/cm. Water was maintained at 20°C under a 16L:8D photoperiod. Commercial trout food was provided; the rate and amount of feeding were based on the rate at which the worms consumed the material that had settled on the bottom.

The 96-hour static acute toxicity test was conducted using reagent-grade Treflan dissolved in reagent-grade acetone to a concentration of 200µL/L. The highest concentration was prepared

and serially diluted to obtain the remaining nominal concentrations. All stock solutions were filtered through Whatman No. 30 filter paper. The actual concentrations used were not reported; however, it was reported that negative and solvent controls were included in the test. Tests were conducted in 250 mL beakers containing 200 mL of test solution and ten worms each. It was not specified if treatment levels were replicated. Solutions were analyzed for the presence of the test material using HPLC; however, the frequency of analysis was not specified. Temperature, pH and DO were measured at 0, 48 and 96 hours. The LC₅₀ value was estimated using the method of Litchfield and Wilcoxon (1949).

Results

At test initiation, pH ranged from 7.0 and 8.2 and ranged from 6.8 to 8.0 at test termination. Temperature was maintained at 20±1°C throughout the test and DO levels did not drop below 40% saturation.

Mortality and sub-lethal effects were not specified by treatment level, with the exception that it was reported that all control animals survived. The LC₅₀ value was reported to be >0.3 mg/L. It was reported that sub-lethal effects often occurred at levels below the LC₅₀, but no effects were reported for trifluralin. This study was conducted with numerous test materials, so the reviewer is unsure if sub-lethal effects were absent during the test with Treflan, or if effects were observed but were not considered to be biologically or statistically significant.

No further results pertaining to the assay with Treflan were reported.

Description of Use in Document (QUAL, QUAN, INV):

Invalid

Rationale for Use:

The benthic freshwater oligochaete, *Lumriculus variegates* exposed to Treflan (reagent-grade) is classified as invalid because no raw data was provided and study authors did not specify if the reported toxicity values were based on the nominal or measured concentrations. It could not be determine if any mortality occurred during the trifluralin study.

Limitations of Study:

Raw data were not provided, thereby precluding the reviewer from verifying the reported toxicity values. The study authors did not specify if the reported toxicity values were based on the nominal or measured concentrations. No details were provided to determine the sub-lethal effects during the course of the study. It was not specified if negative or solvent controls were used. It was not stated if replicates for each test group were used.

Primary Reviewer: John Marton, Staff Scientist, Cambridge Environmental, Inc.

Secondary Reviewer: Marie Janson, Environmental Scientist, ERB1, EPA

Open Literature Review Summary

Chemical Name: Trifluralin

CAS No: 1582-09-8

ECOTOX Record Number and Citation: Ecotox Number 6796.

Caldwell, R. S. 1977. Biological Effects of Pesticides to the Dungeness Crab. Study conducted by the Department of Fisheries and Wildlife, Marine Science Center, Oregon State University, Newport, Oregon. Study sponsored by the U. S. EPA Environmental Research Laboratory, Office of Research and Development, Gulf Breeze, Florida. EPA-600/3-77-131.

Purpose of Review: Endangered Species/Litigation Support

Date of Review: 07/23/2009

Summary of Study Findings:

Multiple life-history stages of the Dungeness crab (*Cancer magister*) were exposed to nine different pesticides, including trifluralin and its formulated product Treflan E.C. Zoeal, juvenile and adult Dungeness crabs were exposed to the test material in acute and chronic bioassays. In acute assays, trifluralin was found to be toxic only to zoeae crabs with EC₅₀ and LC₅₀ values of 60 and >110 µg/L, respectively; Treflan E.C. yielded EC₅₀ and LC₅₀ values of 140 and 250 µg/L, respectively, to zoeae crabs. Juvenile and adult crabs exhibited no toxicity to Trifluralin and Treflan E.C. was not tested with these life-history stages.

Results from the chronic tests showed that larval death occurred quickly at 150 µg/L, with 50% mortality occurring within 5 days; survival and molting were unaffected at the 15 µg/L treatment level for up to 69 days. Survival was not significantly inhibited at the 150 and 100 µg/L treatment levels for juvenile and adult crabs, respectively. Additionally, no effects were observed on egg hatching or prezoal development at 330 µg/L, the highest concentration tested.

The study author reported that the overall NOAEC value for both acute and chronic tests and for all life-history stages was 15 µg/L. However, the study author points out that this value does not relate to continuous exposure through all life-history stages and, therefore, may not represent a “safe” concentration at which development and reproduction will proceed unaffected.

Table 1. Acute toxicity of Trifluralin and Treflan E.C. (formulated product) to different life-history stages in 96-hour tests. Concentrations are in µg/L.

Pesticide	Zoeae		Juvenile		Adult	
	EC ₅₀	LC ₅₀	EC ₅₀	LC ₅₀	EC ₅₀	LC ₅₀
Trifluralin	60	>110	>1,000	>1,000	--	>9,300
Treflan E.C.	140	250	--	--	--	--

Methods

The technical and formulated test materials, Trifluralin (Lot No. 5GB70) and Treflan E.C. (Lot No. 8759B), were obtained from Eli Lilly and Company and had reported purities of 93 and 44.5%, respectively.

The test organism was the Dungeness Crab (*Cancer magister*) and the developmental stages tested in the acute and chronic tests were the egg hatching/prezoeal stage, the zoeal stage, juvenile stage and the adult stage. Ovigerous females were collected as the source of eggs and zoeae by commercial fishermen offshore of Newport, OR during winter and early spring. Upon capture, crabs were returned live to the laboratory where they were maintained in flow-through tanks of seawater for variable time periods depending on the stage of ova development. During holding, crabs were fed frozen fillets of starry flounder (*Platichthys stellatus*). Unhatched eggs still attached to females from which hatching had been previously observed were randomly selected and gently removed and placed directly into bioassay containers. For the zoeal experiments, females were transferred to standing, UV light-sterilized seawater at the onset of hatching. Within 24 hours, swimming first-instar zoeae were collected in beakers and used immediately in bioassays.

Juveniles were obtained by collecting megalopae swarming in the bays or near-shore oceans. Megalopae were held in flow-through tanks of seawater where most metamorphosed into 1st instar crabs within 3 to 4 days. In the acute 96-hour tests and the first chronic toxicity tests, juvenile crabs were used within 4 days of metamorphosis; crabs were approximately 2 months post-metamorphosis in the second chronic test. These crabs were maintained in a tray with a sand substrate and were fed cockle clams and rockfish at least weekly.

Adults were obtained by trawl from Yaquina Bay, Oregon and ranged in size from 80 to 100 mm in carapace width and were assumed to be approximately 2 years old.

The 24-hour prezoeal assay was conducted using nominal concentrations of 0 (negative and solvent controls), 0.0033, 0.010, 0.033, 0.10 and 0.33 µg/L; test material was dissolved in acetone and it was not reported if the concentrations were corrected for the purity of the test material. Each treatment level was replicated twice and the control was replicated 4 times with approximately 30 eggs in each replicate. Test vessels were 250 mL beakers containing 200 mL of test solution. After 24 hours of exposure, the numbers of unhatched eggs, prezoeae and first instar zoeae in the test vessels and the percentage of first stage zoeae which were motile, were

recorded. During the test, DO remained at saturation, salinity was 30‰ and temperature ranged from 12 to 13°C.

All toxicity tests conducted with zoeae, juvenile and adult crabs were conducted under static (zoeae and juvenile) and static-renewal (adult) conditions for 96 hours. Test vessels in the zoeae and juvenile tests were 250 mL beakers with 200 mL of test solution and test vessels for the adult tests were 12 L glass jars with 10 L of test solution. In the zoeae tests, nominal trifluralin concentrations were 0 (solvent control), 0.35, 1.1, 3.5, 11, 35 and 110 µg/L and nominal Treflan E.C. concentrations were 0 (solvent control), 1.0, 3.3, 10, 33, 100 and 330 µg/L. In the first instar juvenile test, nominal trifluralin concentrations were 0 (solvent control), 3.3, 10, 33, 100, 330 and 1,000 µg/L. In the adult test, nominal trifluralin concentrations were 0 (solvent control), 30, 93, 300, 930, 3,000 and 9,300 µg/L. Test materials were dissolved in acetone but a solvent control was not included and it was not specified if the nominal concentrations were corrected for the purity of the test materials. Treatment levels were not replicated and the number of test organisms was 20, 10 and 10 for zoeae, juvenile and adult tests, respectively. In the adult tests, solutions were renewed daily after first determining the DO and pH values of the 24-hr old water. Additionally, test vessels were aerated. DO levels always exceeded 7.0 and 5.5 mg/L in the zoeal and juvenile tests, respectively, and averaged 6.0 mg/L in the adult tests. The pH averaged 7.8, 7.8 and 7.5 in the zoeal, juvenile and adult tests, respectively. The photoperiod was 9L:15D in the zoeal test, 15L:9D in the juvenile test and 12L:12D in the adult test.

Straight line graphical interpolation was used to analyze the results to determine the EC/LC₅₀ values for the acute toxicity tests.

Chronic toxicity tests for zoeae, juvenile and adult crabs were conducted under flow-through conditions. In the zoeal experiments, test vessels were 250 mL glass beakers suspended in a 28 x 28 x 10 cm aquarium. Each beaker was modified with a mesh-covered opening on the bottom. Up to eight beakers were suspended in each aquarium. Two chronic tests were conducted with zoeae. The first was conducted using progeny from a single female collected on April 12, 1973. Approximately 5 to 10 hours post-hatch, first instar zoeae were placed into the 250 mL culture beakers such that 80 zoeae were exposed to each concentration. Nominal trifluralin concentrations during the first exposure were 0 (solvent control), 0.15, 1.5, 15 and 150 µg/L; no test material was detected at the lowest treatment level and the measured concentrations from the remaining levels were 4.1, 53 and 480 µg/L. Twice weekly, zoeae were transferred to clean culture beakers and were fed 700 to 1,000 newly hatched San Francisco brine shrimp (*Artemia nauplii*) per beaker. Salinity was 25‰ during the first 15 days of exposure and >15‰ for the duration of the test. Temperature was maintained at 13±1°C, DO levels always exceeded 8.0 mg/L and pH ranged from 7.6 to 7.9. The photoperiod was 12.5L:10.5D.

The second chronic zoeal test was conducted with progeny from a single female collected by a commercial fisherman on March 10, 1974. Test vessels were identical to those in the first chronic test, and 10 zoeae were placed in each of the 250 mL beakers totaling 40 larvae per concentration. Nominal trifluralin concentrations were 0 (solvent control), 1.5, 15 and 150 µg/L;

measured concentrations were 3.1, 26 and 2260 µg/L. Zoeae were transferred to clean beakers three times each week and each beaker received 700 brine shrimp nauplii three times per week. The photoperiod range from 11 to 15 hours of light and temperature averaged 12.3°C. Salinity averaged 28.8‰, DO averaged 8.7 mg/L and pH averaged 8.1. Mortality and molt data were recorded daily.

Two flow-through chronic juvenile tests were conducted, with the first lasting 36 days and the second lasting 80 days. Wild caught megalopae were collected in Yaquina Bay, Oregon and were held in the lab in flowing seawater at 15±2°C and variable salinities exceeding 25‰ until they molted into first instar crabs. Some crabs were used immediately in the first exposure while the remaining crabs were held for approximately 2 months for use in the second exposure. During the first exposure, test vessels were constructed identical to the ones used in the zoeal trials with the exception that culture beakers were portioned into two sections with one crab in each partition. However, difficulty in molt completion was noted and on Day 15, all crabs were removed from the glass beakers and intermixed in the rearing troughs. Nominal concentrations in the first juvenile trifluralin trial were 0 (solvent control), 0.15, 1.5, 15 and 150 µg/L; analyses of the test solution failed to detect test material at the lowest treatment level and the measured concentrations from the remaining levels were 2.6, 19 and 190 µg/L. Temperature was maintained at 13±2°C, salinity ranged from 31 to 34‰, pH ranged from 7.3 to 8.1 mg/L, DO ranged from 8.0 to 8.7 mg/L and the photoperiod was 14L:10D. The second chronic juvenile experiment was conducted with third instar juvenile crabs. Nominal trifluralin concentrations in the second chronic juvenile test were 0 (solvent control), 15 and 150 µg/L; measured concentrations were 47 and 590 µg/L. DO levels ranged from 8.0 to 8.7 mg/L, pH ranged from 7.3 to 8.1, salinity ranged from 32 to 34.5‰, temperature averaged 13±1°C and the photoperiod was 14L:10D.

One 85-day adult chronic assay was conducted with nominal trifluralin concentrations of 0 (negative and solvent controls), 1, 10 and 100 µg/L; measured concentrations were 2.6, 33 and 300 µg/L. Ten adult crabs (5 male and 5 female) were exposed to each treatment group and 30 crabs (15 male and 15 female) were exposed to each control. The test was conducted under flow-through conditions in aquaria measuring 30 x 21 x 15 cm, with each aquarium containing one crab. Salinity ranged from 22.9 to 34.0‰, temperature ranged from 11.0 to 15.0°C, DO ranged from 6.8 to 8.5 mg/L, pH ranged from 7.0 to 8.3 and the photoperiod was 11L:13D.

Results

Acute Toxicity

In the pre-zoeal trials with trifluralin, egg hatch success was increased at all treatment levels relative to the control. Additionally, ≥80% of the hatched prezoae successfully molted into the first zoeal stage and motility was not affected.

At the other life-history stages, only zoeal crabs exhibited sensitivity to trifluralin with an EC₅₀ value of 60 µg/L and to Treflan E.C. with EC₅₀ and LC₅₀ values of 140 and 250 µg/L,

respectively. No sub-lethal or lethal effects were noted in juveniles or adults exposed to trifluralin with EC/LC₅₀ values of >1,000 and >9,300 µg/L, respectively.

Chronic Toxicity

The first chronic test with zoeae was terminated on day 18 due to widespread infection of the fungus *Lagenidium*, coinciding roughly with the molt to the second instar between days 10 and 15. However, the highest trifluralin concentration (150 µg/L) clearly resulted in reduced survival relative to the control and survival at the two remaining concentrations appeared similar to control survival. During the second chronic toxicity test, control survival exceeded 85% until Day 50, at which point increasing mortality was observed until test termination on Day 69. Similar to the first test, larvae rapidly died at the 150 µg/L treatment level and no larvae survived beyond Day 8. Larvae survival in the 1.5 and 15 µg/L treatment groups were similar to the controls throughout the duration of the study and molting times in these two groups were also similar to molting patterns observed in the negative and solvent controls.

Chronic tests with first and third instar juveniles did not result in decreased survival at the highest treatment level, 150 µg/L, relative to the controls. In the test with first instar juveniles, survival was inhibited at the lowest treatment level, but was not considered to be treatment-related due to unaffected survival at the three higher concentrations. Additionally, success of first molt in the test with first instars was not inhibited by any treatment level.

No inhibitions in survival were observed in the adult chronic toxicity tests at any of the concentrations (up to 100 µg/L) during 85 days of continuous exposure.

Description of Use in Document (QUAL, QUAN, INV):

Invalid

Rationale for Use:

Cannot be used, see limitations below.

Limitations of Study:

Negative controls were not included in the all trials and the results from those tests were compared to a solvent control. Furthermore, analytical determination of the test material in the test solutions was only conducted during the chronic tests. Therefore, toxicity values from the acute tests are based on nominal concentrations and the study author did not specify if the nominal concentrations were corrected for the purity of the test material.

Control hatching rates and/or survival rates were low in some of the individual studies.

Salinity during the chronic zoeal test was highly variable with measurements >25‰ during the first 15 days of testing and >15‰ for the remainder of the test.

Raw data were not provided; therefore, the reviewer was unable to statistically verify the reported results.

Primary Reviewer: John Marton, Cambridge Environmental, Inc.

Secondary Reviewer: Christine Hartless, EFED/ERB1

Open Literature Review Summary

Chemical Name: Treflan (Trifluralin)

CAS No: 1582-09-8

ECOTOX Record Number and Citation: Ecotox Number 8127

Liu, D.H.W. and J.M. Lee. 1975. Toxicity of Selected Pesticides to the Bay Mussel (*Mytilus edulis*). Unpublished study performed at the Stanford Research Institute, Menlo Park, CA. Study sponsored by National Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency, Corvallis, Oregon. EPA-660/3-75-016. May 1975.

Purpose of Review: Endangered Species/Litigation Support

Date of Review: 07/24/2009

Summary of Study Findings:

Analyses were conducted with Treflan (Trifluralin, 99%) to determine the effects on adult survival, larval shell development and larval shell growth and metamorphosis of the bay mussel *Mytilus edulis*. Tolerance to the test material appeared to increase with age of the test organism. Because the measured concentrations differed between the tests, it cannot be definitively stated which life-history stage was the most sensitive. The NOAEC value for tests with juveniles (30 days post-fertilization) were <0.020 mg/L, while the NOAEC value for larvae tests were 0.018 to <0.024 mg/L.

Endpoint	NOAEC (mg/L)	LOAEC (mg/L)
Adult Survival	0.1	0.24
Larval Shell Development	0.018	0.036
Larval Growth and Metamorphosis (52 h post-fertilization)	<0.024	0.024
% Metamorphosis (30 d post-fertilization)	0.040	0.080
% Survival (30 d post-fertilization)	<0.020	0.020
Days to Metamorphosis (30 d post-fertilization)	<0.020	0.020
Shell length (30 d post-fertilization)	<0.020	0.020

Methods

Mussels used in the adult survival tests were obtained from floating docks located on Treasure Island, located in the central region of San Francisco Bay. Gametes used in the 48-hour embryo shell formation study were acquired from mussels collected at Treasure Island and Marconi's Cove, located along the southeastern shore of Tomales Bay. Larvae collected from mussels obtained at Marconi's Cove were used in the larval shell growth and metamorphosis and metamorphosis only tests. Adult mussels were used within 2 days of collection and extraneous material was scraped from the shell upon arrival to the laboratory.

Dilution water was natural seawater obtained from the Steinhart Aquarium in San Francisco, California, which obtains the water from a point approximately one-half mile offshore in the Pacific Ocean. Prior to use, water was passed through a UV irradiator and, when necessary, the salinity was reduced to 25‰ and pH was adjusted to 8 ± 0.2 .

96-Hour Adult Survival

Three trials were conducted with adult mussels. The first test consisted of a negative control and 0.2 mg/L; the second test consisted of negative control, a solvent control and 0.2 mg/L; and the third test was conducted with nominal concentrations of 0 (negative and solvent controls), 0.2 and 0.24. Mean-measured concentrations in the third test were 0.1 and 0.24 mg/L. Tests were conducted in 5 gallon wide-mouth glass jars, containing two mussels each. Each control and treatment level consisted of 10 mussels. Mortality was assessed daily and the criterion for death was the lack of valvular or body movement of those mussels with gaping valves following gentle prodding with a glass rod.

Larval Shell Development

Methods to determine the effects of Treflan on larval shell development followed those described by Dimick and Breese (1965). Gametes were obtained from mussels collected from Tomales Bay. Measured test concentrations were 0 (negative and solvent controls), 0.018, 0.036, 0.070 and 0.120 mg/L. It should be noted that only the highest treatment level was continuously analyzed for the presence of the test material, and the lower concentrations were estimated based on a dilution factor of 0.5. The study authors reported the a few analyses of the lower levels were conducted and the estimated concentrations were fairly consistent with the measured values.

Tests were conducted for 48 hours in 250 mL Pyrex beakers, 200 mL of test solution and approximately 6000 eggs with each control and treatment level consisting of two replicate beakers. Larvae were cultured for 48 hours post-fertilization, killed and then observed for normal larvae (straight-hinged shells) in a group of 200 consecutive larvae.

Larval Growth and Metamorphosis

Larval growth and metamorphosis exposures lasted up to 40 days, during which the shell length of the larvae was measured every other day and the number of larvae undergoing metamorphosis was recorded. Measured concentrations were 0 (negative and solvent controls), 0.024, 0.048, 0.096 and 0.192 mg/L. Similar to the larval shell development test, only the highest treatment level was continuously analyzed for the presence of the test material, and the lower concentrations were estimated based on a dilution factor of 0.5. The study authors reported that a few analyses of the lower levels were conducted and the estimated concentrations were fairly consistent with the measured values.

Gametes used in the test were collected from mussels obtained at Tomales Bay. Pesticide exposure was initiated approximately 52 hours post-fertilization in 1.25 gallon Pyrex animal jars containing 3 L of solution and approximately 3000 normal-shelled larvae. Each test was conducted twice and each treatment level was run in duplicate. Test solutions were renewed every other day and pesticide solutions were prepared from freshly mixed stock solutions. During renewal of the test solutions, 20 to 40 larvae were removed and inspected for metamorphosis. All larvae with a dissoconch shell were counted, measured and discarded. Metamorphosed larvae were processed in addition to those removed for growth measurements and each test was terminated when none of the jars contained enough larvae to proceed further.

Metamorphosis

Metamorphosis tests were conducted for 40 days using 29 to 30 day old larvae with measured concentrations of 0 (negative and solvent controls), 0.02, 0.040, 0.080 and 0.160 mg/L; only the highest concentration was measured and the lower concentrations were estimated based on a dilution factor of 0.5. Tests were conducted in 75 x 100 mm Pyrex crystallizing dishes containing 600 mL of test solution and an initial 100 larvae. Test solutions were renewed every other day. Dishes were observed every other day, and those larvae with a dissoconch shell were measured, counted and discarded and those with no new shell growth were placed back in the dish. Dead larvae, and those that were accidentally crushed during renewal, were counted and discarded.

Results

96-Hour Adult Survival

In the first two tests with nominal concentrations of 0 (negative and solvent controls) and 0.2 mg/L, survival was 100% in all treatment groups. In the third test, survival was 100% in the negative control, 90% in the solvent control and 100 and 50% in the measured 0.1 and 0.24 mg/L treatment groups, respectively.

Larval Shell Development

Three separate trials were conducted to assess larval shell development at measured concentrations of 0.018, 0.036, 0.070 and 0.120 mg/L. In the first two trials, no significant inhibitions were noted relative to the negative control, however, the reviewer detected

statistically significant % normal shell development inhibitions at the 0.036-0.120 mg/L treatment levels relative to the negative control. No inhibitions exceeded 50%.

Table 1. Percentage of normally larvae developed in 48 hours from mussel eggs exposed to Treflan

Test concentration, mg/liter	Test number					
	Experiment 1		Experiment 2		Experiment 3	
	(1)	(2)	(1)	(2)	(1)	(2)
0	82.0	75.0	91.2	94.5	95.5	93.5
0 (acetone)	84.5	85.0	93.3	91.5	--	93.5
0.018	85.5	86.5	--	77.8	90.0	93.8
0.036	75.5	88.5	79.2	90.5	90.5	90.0
0.070	88.0	83.5	83.5	90.5	89.0	91.5
0.120	81.5	79.5	87.5	75.3	83.5	84.5
48-Hour EC ₅₀ , mg/liter	0.12		0.12		0.12	

Larval Growth and Metamorphosis

During the first 10 days of both larval growth and metamorphosis tests, the measured Treflan concentrations of 0.024, 0.048, 0.096 and 0.192 mg/L did not significantly inhibit new shell growth; however, notable differences were observed between the two tests. In experiment 1, all treatment levels had a higher mean shell length than the negative control and in experiment 2, the solvent control was the only group with new shell growth less than the negative control. After 20 days of exposure, mean shell length at the 0.096 and 0.192 mg/L treatment levels were less than the controls in both experiments.

The reviewer's analyses found that the mean shell length on Day 20 in the first experiment was significantly inhibited at all treatment levels, relative to the negative control, yielding a NOAEC value of <0.024 mg/L. The reviewer's analysis of the second experiment failed to detect any significant inhibitions in mean shell length after 10 days of exposure. However, after 20 days of exposure in the second experiment, mean shell length was significantly inhibited at the highest treatment level, yielding a NOAEC value of 0.096 mg/L.

Table 2. Mean shell length of mussel larvae after 10 and 20 days of exposure to Treflan.

Test concentration, mg/liter	No. of larvae measured/test	No. of tests/experiment	Mean shell length, μ			
			Day 10		Day 20	
			Experiment 1	Experiment 2	Experiment 1	Experiment 2
0	20	2	146	182	270	288
0 (acetone)	20	2	154	179	252	302
0.024	20	2	178	200	222	320
0.048	20	2	176	218	255	262
0.096	20	2	168	188	200	254
0.192	20	2	160	196	190	207

In both experiments, larvae at the 0.192 mg/L treatment level did not undergo metamorphosis; none of the larvae at this level survived past 26 days. Similarly, larvae in the 0.096 mg/L treatment level in experiment 1 did not survive past 26 days. Those larvae that did complete metamorphosis in experiment 1 appeared normal and the onset of metamorphosis was only delayed by two to four days in the treatment levels relative to the negative control. Metamorphosis at the 0.048 mg/L treatment level were smaller than negative and solvent control metamorphosis. No raw data were provided for the reviewer to statistically verify the study authors' results.

In experiment 2, metamorphosis was inhibited by 76% at the 0.096 mg/L treatment level relative to the negative control and by 50% relative to the solvent control. Additionally, metamorphosis was delayed by six days relative to the controls.

Table 3. Number, age and size of juvenile mussels developing in larval cultures

Test concentration, mg/liter	Experiment 1				Experiment 2			
	No. of juveniles	Age, ^a days	Length, μ		No. of juveniles	Age, ^a days	Length, μ	
			Mean	SD			Mean	SD
0	54	24	425	77.0	178	26	456	78.7
0 (acetone)	87	27	402	54.3	81	26	410	61.0
0.024	84	28	439	84.0	146	26	444	72.6
0.048	167	26	379	50.7	150	26	431	80.1
0.096	0	--	--	--	43	32	360	34.4
0.192	0	--	--	--	0	--	--	--

^a Number of days required by treatment group to begin metamorphosing.

Metamorphosis

In the metamorphosis experiment, 30-day-old larvae were exposed to the test material for 40 days. The percentage of surviving juveniles that metamorphosed was significantly inhibited at the 0.080 and 0.160 mg/L treatment levels relative to the negative control. Mortality in the solvent control was significantly greater than the negative control, and mortality at all treatment levels was significantly greater than the negative control, thereby making it difficult to determine if the noted effects were due to the test material, the solvent, or a combination of the two. Time to metamorphosis was inhibited by 5 to 10 days at the treatment levels relative to the negative control, but the reviewer's analysis did not detect a statistically-significant difference ($p < 0.05$) for this endpoint. The failure to detect a difference could be the result of a true absence of effect, or to the lower statistical power of the nonparametric test used to analyze the data. Similarly, shell length was significantly reduced at all treatment levels relative to the negative control; however, shell length did not differ statistically between the negative and solvent controls.

Table 4. Effects of Treflan on mussel larvae metamorphosis after a 40-day exposure initiated 30 days post-fertilization.

	Test concentration, mg/liter											
	Seawater control		Solvent control		0.02		0.040		0.080		0.160	
	1	2	1	2	1	2	1	2	1	2	1	2
Number of larvae												
Initial	100	100	100	100	100	100	100	100	100	100	100	100
Lost or crushed	24	16	22	31	27	29	6	16	23	12	20	2
Experimental	76	84	78	69	73	71	94	84	77	88	80	98
Metamorphosing, percent	89.5%	92.8%	89.7%	87.0%	84.9%	78.9%	85.1%	86.9%	79.2%	81.8%	87.5%	75.5%
Nonmetamorphosing, percent	7.9%	4.8%	0	0	0	0	1.1%	0	1.3%	2.3%	0	1.0%
Dead, percent	2.6%	2.4%	10.3%	13.0%	15.1%	21.1%	13.8%	13.1%	19.5%	15.9%	12.5%	23.5%
Days to metamorphosis of 50% test larvae	21	21	16	12	12	14	12	11	16	16	16	17
Shell length of juvenile mussels, μ	449 μ	427 μ	424 μ	387 μ	383 μ	403 μ	412 μ	424 μ	397 μ	383 μ	402 μ	406 μ

Description of Use in Document (QUAL, QUAN, INV):

Invalid

Rationale for Use:

See below for limitations

Limitations of Study:

Mortality of juveniles was significantly greater in the solvent control relative to the negative control, thereby preventing the reviewer from determining if the noted effects in the metamorphosis test were due to the test material, the solvent (acetone) or a combination of the two chemicals. In addition, fungal infection was observed in one experiment, and some experiments had very low control survival (<50%).

Primary Reviewer: John Marton, Cambridge Environmental, Inc.

Secondary Reviewer: Christine Hartless, EFED/ERB1

APPENDIX I. OUTPUT OF REVIEWER'S STATISTICAL VERIFICATION:

LARVAL SHELL DEVELOPMENT

% normal development, 48hrs; mg/L (expt 1)

File: lde1 Transform: NO TRANSFORM

t-test of Solvent and Blank Controls

Ho:GRP1 MEAN = GRP2 MEAN

```
-----
GRP1 (SOLVENT CRTL) MEAN = 78.5000    CALCULATED t VALUE = -1.7812
GRP2 (BLANK CRTL) MEAN  = 84.7500    DEGREES OF FREEDOM = 2
DIFFERENCE IN MEANS     = -6.2500
-----
TABLE t VALUE (0.05 (2), 2) = 4.303    NO significant difference at alpha=0.05
TABLE t VALUE (0.01 (2), 2) = 9.925    NO significant difference at alpha=0.01
```

% normal development, 48hrs; mg/L (expt 1)

File: lde1 Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

```
-----
INTERVAL    <-1.5    -1.5 to <-0.5    -0.5 to 0.5    >0.5 to 1.5    >1.5
-----
EXPECTED    0.670      2.420      3.820      2.420      0.670
OBSERVED     0         5         0         5         0
-----
```

Calculated Chi-Square goodness of fit test statistic = 10.6612

Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

% normal development, 48hrs; mg/L (expt 1)

File: lde1 Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 121.625

W = 0.997

Critical W (P = 0.05) (n = 10) = 0.842

Critical W (P = 0.01) (n = 10) = 0.781

Data PASS normality test at P=0.01 level. Continue analysis.

% normal development, 48hrs; mg/L (expt 1)

File: lde1 Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

```
-----
Calculated B statistic = 4.29
Table Chi-square value = 13.28 (alpha = 0.01)
Table Chi-square value = 9.49 (alpha = 0.05)
-----
```

Average df used in calculation ==> df (avg n - 1) = 1.00
 Used for Chi-square table value ==> df (#groups-1) = 4

 Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

% normal development, 48hrs; mg/L (expt 1)
 File: lde1 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	86.100	21.525	0.885
Within (Error)	5	121.625	24.325	
Total	9	207.725		

Critical F value = 5.19 (0.05,4,5)
 Since F < Critical F FAIL TO REJECT Ho:All groups equal

% normal development, 48hrs; mg/L (expt 1)
 File: lde1 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	78.500	78.500		
2	0.018	86.000	86.000	-1.521	
3	0.036	82.000	82.000	-0.710	
4	0.070	85.750	85.750	-1.470	
5	0.120	80.500	80.500	-0.406	

Dunnett table value = 2.85 (1 Tailed Value, P=0.05, df=5,4)

% normal development, 48hrs; mg/L (expt 1)
 File: lde1 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	neg control	2			
2	0.018	2	14.056	17.9	-7.500
3	0.036	2	14.056	17.9	-3.500
4	0.070	2	14.056	17.9	-7.250
5	0.120	2	14.056	17.9	-2.000

% normal development, 48hrs; mg/L (expt 1)
 File: lde1 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2					
GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	2	78.500	78.500	78.500
2	0.018	2	86.000	86.000	83.563
3	0.036	2	82.000	82.000	83.563
4	0.070	2	85.750	85.750	83.563
5	0.120	2	80.500	80.500	83.563

% normal development, 48hrs; mg/L (expt 1)
 File: lde1 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2					
IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
neg control	78.500				
0.018	83.563	1.026		2.02	k= 1, v= 5
0.036	83.563	1.026		2.14	k= 2, v= 5
0.070	83.563	1.026		2.19	k= 3, v= 5
0.120	83.563	1.026		2.21	k= 4, v= 5

s = 4.932

Note: df used for table values are approximate when v > 20.

% normal developed, 48hrs; mg/L (expt2)
 File: lde2 Transform: NO TRANSFORM

t-test of Solvent and Blank Controls			Ho:GRP1 MEAN = GRP2 MEAN	
GRP1 (SOLVENT CRTL) MEAN =	92.8500	CALCULATED t VALUE =	0.2394	
GRP2 (BLANK CRTL) MEAN =	92.4000	DEGREES OF FREEDOM =	2	
DIFFERENCE IN MEANS =	0.4500			
TABLE t VALUE (0.05 (2), 2) = 4.303		NO significant difference at alpha=0.05		
TABLE t VALUE (0.01 (2), 2) = 9.925		NO significant difference at alpha=0.01		

% normal developed, 48hrs; mg/L (expt2)
 File: lde2 Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	0.536	1.936	3.056	1.936	0.536
OBSERVED	0	4	0	4	0

Calculated Chi-Square goodness of fit test statistic = 8.5289
 Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

% normal developed, 48hrs; mg/L (expt2)
File: lde2 Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 168.210

W = 0.909

Critical W (P = 0.05) (n = 8) = 0.818

Critical W (P = 0.01) (n = 8) = 0.749

Data PASS normality test at P=0.01 level. Continue analysis.

% normal developed, 48hrs; mg/L (expt2)
File: lde2 Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

Calculated B statistic = 1.13

Table Chi-square value = 11.34 (alpha = 0.01)

Table Chi-square value = 7.81 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 1.00

Used for Chi-square table value ==> df (#groups-1) = 3

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is
used to calculate the B statistic (see above).

% normal developed, 48hrs; mg/L (expt2)
File: lde2 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE DF SS MS F

Between 3 138.605 46.202 1.099
Within (Error) 4 168.210 42.052

Total 7 306.815

Critical F value = 6.59 (0.05,3,4)

Since F < Critical F FAIL TO REJECT Ho: All groups equal

% normal developed, 48hrs; mg/L (expt2)
File: lde2 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2		Ho:Control<Treatment			
GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	92.850	92.850		
2	0.036	84.850	84.850	1.234	
3	0.070	87.000	87.000	0.902	
4	0.12	81.400	81.400	1.766	

Dunnett table value = 88.38 (1 Tailed Value, P=0.05, df=4,3)

% normal developed, 48hrs; mg/L (expt2)
File: lde2 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2		Ho:Control<Treatment			
GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	neg control	2			
2	0.036	2	573.122	617.3	8.000
3	0.070	2	573.122	617.3	5.850
4	0.12	2	573.122	617.3	11.450

% normal developed, 48hrs; mg/L (expt 3)
File: lde3 Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	0.670	2.420	3.820	2.420	0.670
OBSERVED	0	5	0	5	0

Calculated Chi-Square goodness of fit test statistic = 10.6612
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

% normal developed, 48hrs; mg/L (expt 3)
File: lde3 Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 12.970

W = 0.985

Critical W (P = 0.05) (n = 10) = 0.842
Critical W (P = 0.01) (n = 10) = 0.781

Data PASS normality test at P=0.01 level. Continue analysis.

% normal developed, 48hrs; mg/L (expt 3)
File: lde3 Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

Calculated B statistic = 2.66
Table Chi-square value = 13.28 (alpha = 0.01)
Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 1.00
Used for Chi-square table value ==> df (#groups-1) = 4

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

% normal developed, 48hrs; mg/L (expt 3)
File: lde3 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	119.646	29.911	11.531
Within (Error)	5	12.970	2.594	
Total	9	132.616		

Critical F value = 5.19 (0.05,4,5)
Since F > Critical F REJECT Ho:All groups equal

% normal developed, 48hrs; mg/L (expt 3)
File: lde3 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	94.500	94.500		
2	0.018	91.900	91.900	1.614	
3	0.036	90.250	90.250	2.639	
4	0.070	90.250	90.250	2.639	
5	0.120	84.000	84.000	6.519	*

Dunnett table value = 2.85 (1 Tailed Value, P=0.05, df=5,4)

% normal developed, 48hrs; mg/L (expt 3)

File: lde3 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2		Ho:Control<Treatment			
GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	neg control	2			
2	0.018	2	4.590	4.9	2.600
3	0.036	2	4.590	4.9	4.250
4	0.070	2	4.590	4.9	4.250
5	0.120	2	4.590	4.9	10.500

% normal developed, 48hrs; mg/L (expt 3)

File: lde3 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2					
GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	2	94.500	94.500	94.500
2	0.018	2	91.900	91.900	91.900
3	0.036	2	90.250	90.250	90.250
4	0.070	2	90.250	90.250	90.250
5	0.120	2	84.000	84.000	84.000

% normal developed, 48hrs; mg/L (expt 3)

File: lde3 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2					
IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
neg control	94.500				
0.018	91.900	1.614		2.02	k= 1, v= 5
0.036	90.250	2.639	*	2.14	k= 2, v= 5
0.070	90.250	2.639	*	2.19	k= 3, v= 5
0.120	84.000	6.519	*	2.21	k= 4, v= 5

s = 1.611

Note: df used for table values are approximate when v > 20.

LARVAL GROWTH AND METAMORPHOSIS

Larvae length (um), Day 10; mg/L (expt1)

File: lle1 Transform: NO TRANSFORM

t-test of Solvent and Blank Controls		Ho:GRP1 MEAN = GRP2 MEAN	
GRP1 (SOLVENT CRTL) MEAN =	146.0000	CALCULATED t VALUE =	-1.7889
GRP2 (BLANK CRTL) MEAN =	154.0000	DEGREES OF FREEDOM =	2
DIFFERENCE IN MEANS =	-8.0000		
TABLE t VALUE (0.05 (2), 2) =	4.303	NO significant difference at alpha=0.05	
TABLE t VALUE (0.01 (2), 2) =	9.925	NO significant difference at alpha=0.01	

Larvae length (um), Day 10; mg/L (expt1)
File: lle1 Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	0.670	2.420	3.820	2.420	0.670
OBSERVED	0	5	0	5	0

Calculated Chi-Square goodness of fit test statistic = 10.6612
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

Larvae length (um), Day 10; mg/L (expt1)
File: lle1 Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 470.500

W = 0.947

Critical W (P = 0.05) (n = 10) = 0.842
Critical W (P = 0.01) (n = 10) = 0.781

Data PASS normality test at P=0.01 level. Continue analysis.

Larvae length (um), Day 10; mg/L (expt1)
File: lle1 Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

Calculated B statistic = 1.32
Table Chi-square value = 13.28 (alpha = 0.01)
Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 1.00
Used for Chi-square table value ==> df (#groups-1) = 4

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

Larvae length (um), Day 10; mg/L (expt1)
File: lle1 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	1391.600	347.900	3.697
Within (Error)	5	470.500	94.100	
Total	9	1862.100		

Critical F value = 5.19 (0.05,4,5)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

Larvae length (um), Day 10; mg/L (expt1)
File: lle1 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2		Ho:Control<Treatment			
GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	146.000	146.000		
2	0.024	178.500	178.500	-3.350	
3	0.048	176.000	176.000	-3.093	
4	0.096	168.000	168.000	-2.268	
5	0.192	160.000	160.000	-1.443	

Dunnett table value = 2.85 (1 Tailed Value, P=0.05, df=5,4)

Larvae length (um), Day 10; mg/L (expt1)
File: lle1 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2		Ho:Control<Treatment			
GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	neg control	2			
2	0.024	2	27.646	18.9	-32.500
3	0.048	2	27.646	18.9	-30.000
4	0.096	2	27.646	18.9	-22.000
5	0.192	2	27.646	18.9	-14.000

Larvae length (um), Day 10; mg/L (expt1)
File: lle1 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)		TABLE 1 OF 2			
GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	2	146.000	146.000	146.000
2	0.024	2	178.500	178.500	170.625
3	0.048	2	176.000	176.000	170.625
4	0.096	2	168.000	168.000	170.625
5	0.192	2	160.000	160.000	170.625

Larvae length (um), Day 10; mg/L (expt1)
 File: lle1 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)				TABLE 2 OF 2	
IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
neg control	146.000				
0.024	170.625	2.539	*	2.02	k= 1, v= 5
0.048	170.625	2.539	*	2.14	k= 2, v= 5
0.096	170.625	2.539	*	2.19	k= 3, v= 5
0.192	170.625	2.539	*	2.21	k= 4, v= 5

s = 9.701

Note: df used for table values are approximate when v > 20.

Larvae length (um), mg/L; Day 20 (expt1)
 File: le12 Transform: NO TRANSFORM

t-test of Solvent and Blank Controls		Ho:GRP1 MEAN = GRP2 MEAN	
GRP1 (SOLVENT CRTL) MEAN =	270.0000	CALCULATED t VALUE =	3.2925
GRP2 (BLANK CRTL) MEAN =	252.5000	DEGREES OF FREEDOM =	2
DIFFERENCE IN MEANS =	17.5000		

TABLE t VALUE (0.05 (2), 2) = 4.303 NO significant difference at alpha=0.05
 TABLE t VALUE (0.01 (2), 2) = 9.925 NO significant difference at alpha=0.01

Larvae length (um), mg/L; Day 20 (expt1)
 File: le12 Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	0.670	2.420	3.820	2.420	0.670
OBSERVED	0	5	0	5	0

Calculated Chi-Square goodness of fit test statistic = 10.6612
 Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

Larvae length (um), mg/L; Day 20 (expt1)
 File: le12 Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 1001.500

W = 0.962

Critical W (P = 0.05) (n = 10) = 0.842

Critical W (P = 0.01) (n = 10) = 0.781

Data PASS normality test at P=0.01 level. Continue analysis.

Larvae length (um), mg/L; Day 20 (expt1)
File: le12 Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

Calculated B statistic = 1.79
Table Chi-square value = 13.28 (alpha = 0.01)
Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 1.00
Used for Chi-square table value ==> df (#groups-1) = 4

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is
used to calculate the B statistic (see above).

Larvae length (um), mg/L; Day 20 (expt1)
File: le12 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE DF SS MS F

Between 4 9542.600 2385.650 11.910
Within (Error) 5 1001.500 200.300

Total 9 10544.100

Critical F value = 5.19 (0.05,4,5)
Since F > Critical F REJECT Ho:All groups equal

Larvae length (um), mg/L; Day 20 (expt1)
File: le12 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP IDENTIFICATION TRANSFORMED MEAN MEAN CALCULATED IN ORIGINAL UNITS T STAT SIG

1 neg control 270.000 270.000
2 0.024 221.500 221.500 3.427 *
3 0.048 255.000 255.000 1.060
4 0.096 200.500 200.500 4.911 *
5 0.192 189.500 189.500 5.688 *

Dunnett table value = 2.85 (1 Tailed Value, P=0.05, df=5,4)

Larvae length (um), mg/L; Day 20 (expt1)
File: le12 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2		Ho:Control<Treatment			
GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	neg control	2			
2	0.024	2	40.335	14.9	48.500
3	0.048	2	40.335	14.9	15.000
4	0.096	2	40.335	14.9	69.500
5	0.192	2	40.335	14.9	80.500

Larvae length (um), mg/L; Day 20 (expt1)
File: le12 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)		TABLE 1 OF 2			
GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	2	270.000	270.000	270.000
2	0.024	2	221.500	221.500	238.250
3	0.048	2	255.000	255.000	238.250
4	0.096	2	200.500	200.500	200.500
5	0.192	2	189.500	189.500	189.500

Larvae length (um), mg/L; Day 20 (expt1)
File: le12 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)		TABLE 2 OF 2			
IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
neg control	270.000				
0.024	238.250	2.243	*	2.02	k= 1, v= 5
0.048	238.250	2.243	*	2.14	k= 2, v= 5
0.096	200.500	4.911	*	2.19	k= 3, v= 5
0.192	189.500	5.688	*	2.21	k= 4, v= 5

s = 14.153

Note: df used for table values are approximate when v > 20.

Larvae length (um), Day 10; mg/L (expt2)
File: le21 Transform: NO TRANSFORM

t-test of Solvent and Blank Controls		Ho:GRP1 MEAN = GRP2 MEAN	
GRP1 (SOLVENT CRTL) MEAN =	182.5000	CALCULATED t VALUE =	0.2531
GRP2 (BLANK CRTL) MEAN =	179.0000	DEGREES OF FREEDOM =	2
DIFFERENCE IN MEANS =	3.5000		
TABLE t VALUE (0.05 (2), 2) = 4.303		NO significant difference at alpha=0.05	
TABLE t VALUE (0.01 (2), 2) = 9.925		NO significant difference at alpha=0.01	

Larvae length (um), Day 10; mg/L (expt2)
File: le21 Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	0.670	2.420	3.820	2.420	0.670
OBSERVED	0	5	0	5	0

Calculated Chi-Square goodness of fit test statistic = 10.6612
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

Larvae length (um), Day 10; mg/L (expt2)
File: le21 Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 838.000

W = 0.940

Critical W (P = 0.05) (n = 10) = 0.842
Critical W (P = 0.01) (n = 10) = 0.781

Data PASS normality test at P=0.01 level. Continue analysis.

Larvae length (um), Day 10; mg/L (expt2)
File: le21 Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

Calculated B statistic = 3.92
Table Chi-square value = 13.28 (alpha = 0.01)
Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 1.00
Used for Chi-square table value ==> df (#groups-1) = 4

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

Larvae length (um), Day 10; mg/L (expt2)
File: le21 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	1523.600	380.900	2.273
Within (Error)	5	838.000	167.600	
Total	9	2361.600		

Critical F value = 5.19 (0.05,4,5)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

Larvae length (um), Day 10; mg/L (expt2)
File: le21 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2		Ho:Control<Treatment			
GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	182.500	182.500		
2	0.024	199.500	199.500	-1.313	
3	0.048	218.500	218.500	-2.781	
4	0.096	188.000	188.000	-0.425	
5	0.192	195.500	195.500	-1.004	

Dunnett table value = 2.85 (1 Tailed Value, P=0.05, df=5,4)

Larvae length (um), Day 10; mg/L (expt2)
File: le21 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2		Ho:Control<Treatment			
GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	neg control	2			
2	0.024	2	36.896	20.2	-17.000
3	0.048	2	36.896	20.2	-36.000
4	0.096	2	36.896	20.2	-5.500
5	0.192	2	36.896	20.2	-13.000

Larvae length (um), Day 10; mg/L (expt2)
File: le21 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)		TABLE 1 OF 2			
GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	2	182.500	182.500	182.500
2	0.024	2	199.500	199.500	199.500
3	0.048	2	218.500	218.500	200.667
4	0.096	2	188.000	188.000	200.667
5	0.192	2	195.500	195.500	200.667

Larvae length (um), Day 10; mg/L (expt2)
 File: le21 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)			TABLE 2 OF 2		
IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
neg control	182.500				
0.024	199.500	1.313		2.02	k= 1, v= 5
0.048	200.667	1.403		2.14	k= 2, v= 5
0.096	200.667	1.403		2.19	k= 3, v= 5
0.192	200.667	1.403		2.21	k= 4, v= 5

s = 12.946

Note: df used for table values are approximate when v > 20.

Larvae length (um), Day 20; mg/L (expt 2)
 File: le22 Transform: NO TRANSFORM

t-test of Solvent and Blank Controls		Ho:GRP1 MEAN = GRP2 MEAN	
GRP1 (SOLVENT CRTL) MEAN =	287.5000	CALCULATED t VALUE =	-0.9793
GRP2 (BLANK CRTL) MEAN =	302.0000	DEGREES OF FREEDOM =	2
DIFFERENCE IN MEANS =	-14.5000		

TABLE t VALUE (0.05 (2), 2) = 4.303 NO significant difference at alpha=0.05
 TABLE t VALUE (0.01 (2), 2) = 9.925 NO significant difference at alpha=0.01

Larvae length (um), Day 20; mg/L (expt 2)
 File: le22 Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	0.670	2.420	3.820	2.420	0.670
OBSERVED	0	5	0	5	0

Calculated Chi-Square goodness of fit test statistic = 10.6612
 Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

Larvae length (um), Day 20; mg/L (expt 2)
 File: le22 Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 1869.000

W = 0.972

Critical W (P = 0.05) (n = 10) = 0.842

Critical W (P = 0.01) (n = 10) = 0.781

Data PASS normality test at P=0.01 level. Continue analysis.

Larvae length (um), Day 20; mg/L (expt 2)
File: le22 Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

Calculated B statistic = 1.78
Table Chi-square value = 13.28 (alpha = 0.01)
Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 1.00
Used for Chi-square table value ==> df (#groups-1) = 4

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is
used to calculate the B statistic (see above).

Larvae length (um), Day 20; mg/L (expt 2)
File: le22 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE DF SS MS F

Between 4 14014.600 3503.650 9.373
Within (Error) 5 1869.000 373.800

Total 9 15883.600

Critical F value = 5.19 (0.05,4,5)
Since F > Critical F REJECT Ho:All groups equal

Larvae length (um), Day 20; mg/L (expt 2)
File: le22 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP IDENTIFICATION TRANSFORMED MEAN CALCULATED IN ORIGINAL UNITS T STAT SIG

1 neg control 287.500 287.500
2 0.024 320.000 320.000 -1.681
3 0.048 262.000 262.000 1.319
4 0.096 254.500 254.500 1.707
5 0.192 207.000 207.000 4.164 *

Dunnett table value = 2.85 (1 Tailed Value, P=0.05, df=5,4)

Larvae length (um), Day 20; mg/L (expt 2)
File: le22 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2		Ho:Control<Treatment			
GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	neg control	2			
2	0.024	2	55.102	19.2	-32.500
3	0.048	2	55.102	19.2	25.500
4	0.096	2	55.102	19.2	33.000
5	0.192	2	55.102	19.2	80.500

Larvae length (um), Day 20; mg/L (expt 2)
File: le22 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2					
GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	2	287.500	287.500	303.750
2	0.024	2	320.000	320.000	303.750
3	0.048	2	262.000	262.000	262.000
4	0.096	2	254.500	254.500	254.500
5	0.192	2	207.000	207.000	207.000

Larvae length (um), Day 20; mg/L (expt 2)
File: le22 Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2					
IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
neg control	303.750				
0.024	303.750	0.840		2.02	k= 1, v= 5
0.048	262.000	1.319		2.14	k= 2, v= 5
0.096	254.500	1.707		2.19	k= 3, v= 5
0.192	207.000	4.164	*	2.21	k= 4, v= 5

s = 19.334

Note: df used for table values are approximate when v > 20.

METAMORPHOSIS

% metamorphosing, day 40; mg/L

File: ptmt Transform: NO TRANSFORM

t-test of Solvent and Blank Controls		Ho:GRP1 MEAN = GRP2 MEAN	
GRP1 (SOLVENT CRTL) MEAN =	91.1500	CALCULATED t VALUE =	1.3134
GRP2 (BLANK CRTL) MEAN =	88.3500	DEGREES OF FREEDOM =	2
DIFFERENCE IN MEANS =	2.8000		

TABLE t VALUE (0.05 (2), 2) = 4.303 NO significant difference at alpha=0.05

TABLE t VALUE (0.01 (2), 2) = 9.925 NO significant difference at alpha=0.01

% metamorphosing, day 40; mg/L

File: ptmt Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	0.670	2.420	3.820	2.420	0.670
OBSERVED	0	5	0	5	0

Calculated Chi-Square goodness of fit test statistic = 10.6612

Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

% metamorphosing, day 40; mg/L

File: ptmt Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 100.445

W = 0.987

Critical W (P = 0.05) (n = 10) = 0.842

Critical W (P = 0.01) (n = 10) = 0.781

Data PASS normality test at P=0.01 level. Continue analysis.

% metamorphosing, day 40; mg/L

File: ptmt Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

Calculated B statistic = 3.17

Table Chi-square value = 13.28 (alpha = 0.01)

Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 1.00

Used for Chi-square table value ==> df (#groups-1) = 4

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

% metamorphosing, day 40; mg/L

File: ptmt Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	155.624	38.906	1.937
Within (Error)	5	100.445	20.089	
Total	9	256.069		

Critical F value = 5.19 (0.05,4,5)

Since $F < \text{Critical } F$ FAIL TO REJECT H_0 :All groups equal

% metamorphosing, day 40; mg/L

File: ptmt Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 H_0 :Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	91.150	91.150		
2	0.02	81.900	81.900	2.064	
3	0.040	86.000	86.000	1.149	
4	0.080	80.500	80.500	2.376	
5	0.160	81.500	81.500	2.153	

Dunnett table value = 2.85 (1 Tailed Value, $P=0.05$, $df=5,4$)

% metamorphosing, day 40; mg/L

File: ptmt Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 H_0 :Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	neg control	2			
2	0.02	2	12.774	14.0	9.250
3	0.040	2	12.774	14.0	5.150
4	0.080	2	12.774	14.0	10.650
5	0.160	2	12.774	14.0	9.650

% metamorphosing, day 40; mg/L

File: ptmt Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	2	91.150	91.150	91.150
2	0.02	2	81.900	81.900	83.950
3	0.040	2	86.000	86.000	83.950
4	0.080	2	80.500	80.500	81.000

5	0.160	2	81.500	81.500	81.000
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% metamorphosing, day 40; mg/L
 File: ptmt Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)				TABLE 2 OF 2	
IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
neg control	91.150				
0.02	83.950	1.606		2.02	k= 1, v= 5
0.040	83.950	1.606		2.14	k= 2, v= 5
0.080	81.000	2.265	*	2.19	k= 3, v= 5
0.160	81.000	2.265	*	2.21	k= 4, v= 5

s = 4.482
 Note: df used for table values are approximate when v > 20.

% dead, day 40; mg/L
 File: ptde Transform: NO TRANSFORM

t-test of Solvent and Blank Controls			Ho:GRP1 MEAN = GRP2 MEAN	
GRP1 (SOLVENT CRTL) MEAN =	2.5000	CALCULATED t VALUE =	-6.7593	
GRP2 (BLANK CRTL) MEAN =	11.6500	DEGREES OF FREEDOM =	2	
DIFFERENCE IN MEANS =	-9.1500			
TABLE t VALUE (0.05 (2), 2) =		4.303**	SIGNIFICANT DIFFERENCE at alpha=0.05	
TABLE t VALUE (0.01 (2), 2) =		9.925	NO significant difference at alpha=0.01	

% dead, day 40; mg/L
 File: ptde Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	0.670	2.420	3.820	2.420	0.670
OBSERVED	0	5	0	5	0

Calculated Chi-Square goodness of fit test statistic = 10.6612
 Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

% dead, day 40; mg/L
 File: ptde Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 85.245

W = 0.983

Critical W (P = 0.05) (n = 10) = 0.842
 Critical W (P = 0.01) (n = 10) = 0.781

 Data PASS normality test at P=0.01 level. Continue analysis.

% dead, day 40; mg/L
 File: ptde Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

 Calculated B statistic = 7.60
 Table Chi-square value = 13.28 (alpha = 0.01)
 Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 1.00
 Used for Chi-square table value ==> df (#groups-1) = 4

 Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is
 used to calculate the B statistic (see above).

% dead, day 40; mg/L
 File: ptde Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	358.080	89.520	5.251
Within (Error)	5	85.245	17.049	
Total	9	443.325		

Critical F value = 5.19 (0.05,4,5)
 Since F > Critical F REJECT Ho:All groups equal

% dead, day 40; mg/L
 File: ptde Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	2.500	2.500		
2	0.020	18.100	18.100	-3.778	
3	0.040	13.450	13.450	-2.652	
4	0.080	17.700	17.700	-3.681	
5	0.160	18.000	18.000	-3.754	

 Dunnett table value = 2.85 (1 Tailed Value, P=0.05, df=5,4)

% dead, day 40; mg/L
File: ptde Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2			Ho:Control<Treatment		
GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	neg control	2			
2	0.020	2	11.768	470.7	-15.600
3	0.040	2	11.768	470.7	-10.950
4	0.080	2	11.768	470.7	-15.200
5	0.160	2	11.768	470.7	-15.500

% dead, day 40; mg/L
File: ptde Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2					
GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	2	2.500	2.500	2.500
2	0.020	2	18.100	18.100	15.775
3	0.040	2	13.450	13.450	15.775
4	0.080	2	17.700	17.700	17.700
5	0.160	2	18.000	18.000	18.000

% dead, day 40; mg/L
File: ptde Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2					
IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
neg control	2.500				
0.020	15.775	3.215	*	2.02	k= 1, v= 5
0.040	15.775	3.215	*	2.14	k= 2, v= 5
0.080	17.700	3.681	*	2.19	k= 3, v= 5
0.160	18.000	3.754	*	2.21	k= 4, v= 5

s = 4.129

Note: df used for table values are approximate when v > 20.

Days to metamorphosis; mg/L
File: dymt Transform: NO TRANSFORM

t-test of Solvent and Blank Controls		Ho:GRP1 MEAN = GRP2 MEAN	
GRP1 (SOLVENT CRTL) MEAN =	21.0000	CALCULATED t VALUE =	3.5000
GRP2 (BLANK CRTL) MEAN =	14.0000	DEGREES OF FREEDOM =	2
DIFFERENCE IN MEANS =	7.0000		

TABLE t VALUE (0.05 (2), 2) = 4.303 NO significant difference at alpha=0.05
 TABLE t VALUE (0.01 (2), 2) = 9.925 NO significant difference at alpha=0.01

Days to metamorphosis; mg/L

File: dymt Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	0.670	2.420	3.820	2.420	0.670
OBSERVED	0	3	4	3	0

Calculated Chi-Square goodness of fit test statistic = 1.6265

Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

Days to metamorphosis; mg/L

File: dymt Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 3.000

W = 0.953

Critical W (P = 0.05) (n = 10) = 0.842

Critical W (P = 0.01) (n = 10) = 0.781

Data PASS normality test at P=0.01 level. Continue analysis.

Days to metamorphosis; mg/L

File: dymt Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Bartlett's test for homogeneity of variance

These two tests can not be performed because at least one group has zero variance.

Data FAIL to meet homogeneity of variance assumption.

Additional transformations are useless.

Days to metamorphosis; mg/L

File: dymt Transform: NO TRANSFORMATION

KRUSKAL-WALLIS ANOVA BY RANKS - TABLE 1 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	RANK SUM
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1	neg control	21.000	21.000	19.000
2	0.020	13.000	13.000	6.500
3	0.040	11.500	11.500	3.500
4	0.080	16.000	16.000	12.000
5	0.160	16.500	16.500	14.000

Calculated H Value = 8.519 Critical H Value Table = 7.418
 Since Calc H > Crit H REJECT Ho: All groups are equal.

Days to metamorphosis; mg/L
 File: dymt Transform: NO TRANSFORMATION

DUNNS MULTIPLE COMPARISON - KRUSKAL-WALLIS - TABLE 2 OF 2

GROUP	IDENTIFICATION	TRANSFORMED MEAN	ORIGINAL MEAN	GROUP				
				0	0	0	0	0
				3	2	4	5	1
3	0.040	11.500	11.500	\				
2	0.020	13.000	13.000	.	\			
4	0.080	16.000	16.000	.	.	\		
5	0.160	16.500	16.500	.	.	.	\	
1	neg control	21.000	21.000	.	.	.	.	\

* = significant difference (p=0.05) . = no significant difference
 Table q value (0.05,5) = 2.807 SE = 2.972

Shell length (um), Day 40; mg/L
 File: shle Transform: NO TRANSFORM

t-test of Solvent and Blank Controls Ho: GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	438.0000	CALCULATED t VALUE =	1.5100
GRP2 (BLANK CRTL) MEAN =	405.5000	DEGREES OF FREEDOM =	2
DIFFERENCE IN MEANS =	32.5000		

TABLE t VALUE (0.05 (2), 2) = 4.303 NO significant difference at alpha=0.05
 TABLE t VALUE (0.01 (2), 2) = 9.925 NO significant difference at alpha=0.01

Shell length (um), Day 40; mg/L
 File: shle Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	0.670	2.420	3.820	2.420	0.670
OBSERVED	0	5	0	5	0

Calculated Chi-Square goodness of fit test statistic = 10.6612
 Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

Shell length (um), Day 40; mg/L
File: shle Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 620.000

W = 0.916

Critical W (P = 0.05) (n = 10) = 0.842

Critical W (P = 0.01) (n = 10) = 0.781

Data PASS normality test at P=0.01 level. Continue analysis.

Shell length (um), Day 40; mg/L
File: shle Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

Calculated B statistic = 1.70

Table Chi-square value = 13.28 (alpha = 0.01)

Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 1.00

Used for Chi-square table value ==> df (#groups-1) = 4

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

Shell length (um), Day 40; mg/L
File: shle Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	3126.400	781.600	6.303
Within (Error)	5	620.000	124.000	
Total	9	3746.400		

Critical F value = 5.19 (0.05,4,5)

Since F > Critical F REJECT Ho:All groups equal

Shell length (um), Day 40; mg/L
File: shle Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2

Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	neg control	438.000	438.000		
2	0.020	393.000	393.000	4.041	*
3	0.040	418.000	418.000	1.796	
4	0.080	390.000	390.000	4.311	*
5	0.160	404.000	404.000	3.053	*

Dunnett table value = 2.85 (1 Tailed Value, P=0.05, df=5,4)

Shell length (um), Day 40; mg/L
File: shle Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2		Ho:Control<Treatment			
GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	neg control	2			
2	0.020	2	31.736	7.2	45.000
3	0.040	2	31.736	7.2	20.000
4	0.080	2	31.736	7.2	48.000
5	0.160	2	31.736	7.2	34.000

Shell length (um), Day 40; mg/L
File: shle Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)		TABLE 1 OF 2			
GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	neg control	2	438.000	438.000	438.000
2	0.020	2	393.000	393.000	405.500
3	0.040	2	418.000	418.000	405.500
4	0.080	2	390.000	390.000	397.000
5	0.160	2	404.000	404.000	397.000

Shell length (um), Day 40; mg/L
File: shle Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model)		TABLE 2 OF 2			
IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
neg control	438.000				
0.020	405.500	2.919	*	2.02	k= 1, v= 5
0.040	405.500	2.919	*	2.14	k= 2, v= 5
0.080	397.000	3.682	*	2.19	k= 3, v= 5
0.160	397.000	3.682	*	2.21	k= 4, v= 5

s = 11.136

Note: df used for table values are approximate when v > 20.

Open Literature Review Summary

Chemical Name: Treflan (Trifluralin)

CAS No: 1582-09-8

ECOTOX Record Number and Citation: Ecotox Number 11476

Naqvi, S.M., V.O. Davis and R.M. Hawkins. 1985. Percent mortalities and LC₅₀ values for Selected Microcrustaceans Exposed to Treflan®, Cutrine-plus®, and MSMA Herbicides. *Bull. Environ. Contam. Toxicol.* 35, 127-132.

Purpose of Review: Endangered Species/Litigation Support

Date of Review: 07/24/2009

Summary of Study Findings:

Forty-eight hour acute toxicity studies were conducted by exposing ostracods (*Cypria* sp.), cladocerans (*Alonella* sp.), calanoids (*Diaptomus* sp.), and cyclopoids (*Eucyclops* sp.) to Treflan (trifluralin) at nominal concentrations of 0 (negative control), 0.001, 0.005, 0.01, 0.02, 0.05, 0.1, 0.3, 1, 2 and 10 mg/L. After 48 hours of exposure, the LC₅₀ values for cladocerans, calanoids, cyclopods and ostracods were 0.06, 0.08, 0.05 and 0.06 mg/L, respectively, and the LC₉₉ values were 1.3, 1.9, 1.3 and 1.5 mg/L, respectively. NOAEC values were not provided. The results of this study should not be used quantitatively because the initial loading of organisms to the test vessels is unknown, it is unclear if interspecies competition impacted the results of this study, the exposure concentrations were not analytically determined, and the purity of the test material was not reported.

Table 1. Toxicity values of Treflan to four freshwater microcrustaceans.

Endpoint	Cladocera	Calanoida	Cyclopoida	Ostracoda
LC ₅₀	0.06	0.08	0.05	0.06
LC ₉₉	1.3	1.9	1.3	1.5

Methods

Test organisms were collected from a relatively uncontaminated lake (Kernan; not further described) at Southern University campus (Baton Rouge, LA) with a 10-mesh plankton net. Crustaceans were returned to the laboratory and an undisclosed number were placed in an aerated 40 L aquarium for a 96-hour acclimation period. Dilution water was aged and had a DO concentration of 5-6 mg/L. Water from the aquarium holding the crustaceans was filtered

through a dip net to remove larger debris and then passed through a zooplankton net allowing for a maximum number of crustaceans to be collected in a 100 mL glass vial. The vial was shaken and 2 mL were extracted and transferred with a medicine dropper into a 500 mL beaker with 400 mL of test solution.

After 48 hours of exposure, the test solutions were filtered through a 6.0 cm diameter glass funnel covered with a nylon cloth. Test organisms were retained on the cloth and immediately transferred to a Petri dish (100 x 15 mm) containing water. Live and dead organisms were counted and mortality data from 3 separate trials were averaged to calculate percent mortalities. Control mortality was corrected using Abbot's formula and the LC_{50} and LC_{99} values were estimated using probit analysis.

Results

The pH, temperature and hardness averaged of the dilution water averaged 7.8, $20 \pm 3^{\circ}\text{C}$ and 15 mg/L, respectively. A total of 3348 microcrustaceans were included in the test with Treflan. Two other pesticides were tested along with Treflan (Cutrine-plus® and MSMA) and Treflan was found to be the most toxic. No sub-lethal effects were reported and raw data were not provided, precluding the reviewer's statistical verification of the reported toxicity values.

Description of Use in Document (QUAL, QUAN, INV):

Qualitative

Rationale for Use:

Provides toxicity information for invertebrates in a mixed species system

Limitations of Study:

Raw data were not provided, no analytical verification was conducted to determine the actual Treflan concentrations that microcrustaceans were exposed to and the purity of the test material was not reported. Additionally, loading of organisms to the test vessels was not controlled so the terminal mortality counts have no baseline reference and it is impossible to know if the different treatment groups contained similar numbers of organisms. Furthermore, because initial loading is unknown it is unclear what effect interspecies competition may have had on organism response in this study. While this test suggests differing sensitivities to Treflan, further testing is required to accurately quantify toxicity values to individual species. The results from this study should be used for qualitative purposes only.

Primary Reviewer: John Marton, Cambridge Environmental, Inc.

Secondary Reviewer: Christine Hartless, EFED/ERB1

Open Literature Review Summary

Chemical Name: Trifluralin

CAS No: 1582-09-8

ECOTOX Record Number and Citation: Ecotox Number 20430

Poleksic, V. and C. Karan. 1999. Effects of trifluralin on carp: biochemical and histological evaluation. *Ecotoxicology and Environmental Safety* 43, 213-221.

Purpose of Review: Litigation/Endangered Species (036101)

Date of Review: 09/14/2009

Summary of Study Findings:

Acute and subacute toxicity tests were conducted with carp (*Cyprinus carpio* L) to determine the median lethal concentration and effects on relative growth rates, biochemical parameters (alkaline phosphatase [ALP], aspartate aminotransferase [AST], alanine aminotransferase [ALT] activities in serum, gills, liver and kidney) and structure of the gills, liver and kidneys. The 96-hr LC₅₀ value (with 95% C.I.) was 0.045 (0.036-0.051) mg/L based on nominal concentrations. The 14-d subacute test resulted in a decrease in relative growth rate and an increase in functional enzyme activities in blood serum and the organs, most notably at the highest nominal concentration (0.02 mg/L). ALP and AST activity was increased at all treatment levels in either the gills and/or livers. Gill and liver abnormalities were noted in the 0.01 and 0.02 mg/L nominal concentrations and kidney abnormalities were observed at the 0.02 mg/L treatment level only.

Methods

Trifluralin (α,α,α -trifluoro-2,6-dinitro-*N,N* dipropyl-*p*-toluidine; purity 99%) was supplied by Pestanal. The stock solution and serial dilutions were made in water with an ultrasound water bath.

Carp were obtained from Ečka fish farm. At the beginning of the acute toxicity test, fish averaged 3.3 ± 0.15 cm in body length and 0.39 ± 0.06 g in body weight and were approximately 6 months old. At the beginning of the subacute toxicity tests, fish averaged 15.3 ± 1.1 cm in body length and 154.6 ± 20.9 g in body weight and were approximately 1.5 years old. Tests were conducted following guidelines outlined in OECD test methods 203 and 204.

Assay water was de-chlorinated tap water with a pH of 7.8-8.2, DO of 7.9-10.5 mg/L, hardness of 150-230 mg/L as CaCO₃ and a temperature of 20.0±1.0°C. The photoperiod was maintained at 12L:12D. Fish were acclimated to test conditions for 21 days prior to testing.

The 96-hour acute toxicity test was conducted with nominal concentrations of 0 (negative control), 0.025, 0.05, 0.1 and 0.2 mg/L, with ten fish per treatment. Mortality was assessed at 24, 48 and 96 hours and the LC₅₀ values were determined using the Litchfield and Wilcoxon (1949) method. The 14-day subacute toxicity tests were conducted with nominal concentrations of 0 (negative control), 0.005, 0.01 and 0.02 mg/L, with 8 fish per treatment. Prior to test initiation, fish were weighed and their length was measured. No mortality was recorded during the subacute toxicity test. At test termination, fish were sacrificed via decapitation and the blood and organs were collected and prepared for additional analysis.

Alkaline phosphatase (ALP), aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were determined in serum, gills, liver and kidneys from control and treatment fish from the subacute toxicity test. ALP activity was determined using the methods described by McComb and Bowers (1972). AST and ALT activities were determined using the methods described by Bergmeyer *et al.* (1976). Test kits from INEP, Zemun were used for all determinations. Portions of the gills, liver and kidney were sampled from the same fish, fixed in 4% formaldehyde and processed for histological examination using standard techniques with hematoxylin and eosin staining. Results were analyzed using Student's *t* test to determine if statistically significant differences were detected.

Results

Acute Toxicity

The 24, 48 and 96-hour LC₅₀ values were 0.185, 0.066 and 0.045 mg ai/L, respectively (Table 1).

Table 1. Median lethal concentrations and 95% C.I.

Exposure Period	LC ₅₀ (95% C.I.) (mg/L)
24	0.185 (0.173-0.189)
48	0.066 (0.054-0.075)
96	0.045 (0.036-0.051)

Subacute Toxicity

Body Weight Change

The study authors reported that no significant differences were detected between the control and treatment fish based on changes in body weight. Relative growth rates averaged 0.6 mg/g/d in the negative control and 0.2, 0.07 and -0.3 mg/g/d in the nominal 0.005, 0.01 and 0.02 mg/L treatment groups, respectively. The resulting NOAEC value was 0.02 mg/L.

Biochemistry

Carp at the 0.02 mg/L treatment level exhibited a statistically significant ($P < 0.01$) increase in ALP activity in the kidney compared to the control. Kidneys from fish at the two lower concentrations also exhibited statistically significant ($P < 0.05$) increases in ALP activity. Furthermore, increased ALP activity ($P < 0.05$) was observed in the gills of fish from the 0.01 and 0.02 mg/L treatment groups and in livers of fish at the 0.02 mg/L treatment level.

AST activity in the gills of fish from the 0.01 and 0.02 mg/L treatment groups was significantly increased at the $P=0.01$ significance level and at $P=0.05$ significance level for fish from the 0.005 mg/L treatment group. A uniform but statistically significant ($P<0.05$) increase of AST activity was found in liver and blood serum at all treatment levels, relative to the negative control.

ALT activity was significantly increased ($P < 0.05$) in all organs from fish at 0.02 mg/L.

Histology

Gills- Normal histology was observed in gills from fish in the control and 0.005 mg/L treatment level. At the 0.01 mg/L treatment level, hyperplasia of epithelium between secondary lamellae which focally led to the fusion of adjacent secondary lamellae were found. Additionally, edema of subepithelial space, wrinkled respiratory epithelium, curled secondary lamellae and some chloride cell hypertrophy were observed. At the 0.02 mg/L treatment level, observations included lifting of the secondary epithelium, curled secondary lamellae and chloride cell hypertrophy. Epithelial hyperplasia led to the fusion of several lamellae and changes in supporting cartilage of gill filaments were observed.

Liver- No differences were observed in liver structure between the control and 0.005 mg/L treatment level fish. At the 0.01 mg/L treatment level, only slight vacuolation of hepatocytes was recorded. At the 0.02 mg/L treatment level, vacuolation and areas of nuclear pycnosis of hepatocytes was noted.

Kidney- Normal histological structure was observed in the control and 0.005 and 0.01 mg/L treatment groups. At the highest treatment group, degeneration of tubular epithelial cells with ectasy of Bowman's capsules and their capillaries was observed.

Description of Use in Document (QUAL, QUAN, INV):

Qualitative

Rationale for Use:

The lack of sufficient data to determine actual concentrations in the acute carp toxicity test precludes quantitative use of the LC₅₀ in the assessment.

Limitations of Study:

Raw data were not provided, therefore, the reviewer was unable to statistically verify the reported results. No analytical verification was conducted to confirm the actual concentrations that carp were exposed to during acute and subacute tests.

Primary Reviewer: John Marton, Cambridge Environmental, Inc.

Secondary Reviewer: Marie Janson, Environmental Scientist, ERB1/EPA

Open Literature Review Summary

Chemical Name(s): Trifluralin

CAS No.: 1582-09-8

ECOTOX Record Number and Citation:

Couch, J. A., Winstead, J. T., Hansen, D. J., and Goodman, L. R. (1979). Vertebral Dysplasia in Young Fish Exposed to the Herbicide Trifluralin. *J.Fish Dis.*2:35-42; *EPA-600/J-79-072, Environ.Res.Lab., U.S.EPA, Gulf Breeze, FL:11 p.(U.S.NTIS PB80-177751).*

EcoReference No.: 6425

Chemical of Concern: TFN; Habitat: A; Effect Codes: BCM,GRO; Rejection Code: NO ENDPOINT(TFN).

Purpose of Review: Litigation/Endangered Species

Date of Review: May 22, 2009

Summary of Study Findings:

Sheepshead minnows (*Cyprinodon variegates* Lacopede) exposed to 5.5 to 31 µg/L of trifluralin during the first 28 days of life developed a vertebral dysplasia. It consisted of semi-symmetrical hypertrophy of vertebra, three to 20 times normal. Effects of the abnormal vertebral development were dorsal vertebral growth into the neural canal, ventral compression of renal ducts, and longitudinal fusion of vertebrae. Fish, exposed for 51 days to 16.6 µg/l trifluralin and thereafter depurated for 41 days, showed no increase in vertebral dysplasia during depuration; however, residual spinal column damage was evident. Serum calcium concentrations were elevated in adult fish exposed for 4 days to 16.6 µg/l trifluralin.

Methods:

Two trifluralin exposure tests of sheepshead minnow life stages (zygote, embryo, larval, juvenile and young adults) were completed in flowing seawater. The study authors stated they followed the methods of methods of continuous experimental exposure of the fish from zygote to adult have been described by Hansen, Goodman & Wilson (1977).

1. The first test involved exposure of different groups of fish (zygote to 28 days) to 1.2, 2.7, 5.5, 20 and 31 µg/L of trifluralin (average measured concentrations); lethality data and histological specimens were obtained.
2. In the second test, early life stages (zygote up to 51 days) and adults were exposed to 16.6 µg/L trifluralin (average measured concentrations) to obtain further histological specimens. These fish were allowed to depurate in clean water for 41 days and were radiographed at the conclusion of the study.

3. Pooled serum samples were taken from adult sheepshead minnows exposed for 4 days to 16.6 µg/L trifluralin for determination of serum calcium concentrations. Similar measurements were made on control and feral fish serum calcium concentrations. Blood samples were pooled within each of the above groups because fish sizes were small.

Chemical analyses of trifluralin were conducted by gas chromatography of exposure water and fish tissue.

Results:

1. Histological study of longitudinal horizontal sections of 28-day-old fish, exposed to 5.5, 20 and 31 µg/L trifluralin throughout their early development (from zygote) revealed an extreme dysplasia of vertebrae: the dominant feature was hyperostosis, primarily involving acellular bone. Control fish of the same stage of development and feral fish of approximately the same size had normal, thin vertebral walls (from 5 to 6 µm thick). Trifluralin-exposed fish had vertebrae with hypertrophied walls (from 18 to 75 µm thick). All exposed fish examined (10 fish for each of the above concentrations) had hypertrophied vertebrae; all controls (10 fish) were normal. Author does not state whether any adverse effects were observed in the lowest test concentrations (1.1 and 2.7 µg/L). In addition, the author does not state if mortalities occurred at any test concentration.
2. The 51-day exposure to 16.6 µg/L trifluralin produced the same results. All exposed fish, but no control fish, had the vertebral dysplasia. Furthermore, fish exposed in the second test for 51 days (from zygote to adults) had a more pronounced dysplasia of their vertebrae than fish exposed for only 28 days. A few fish that survived 51 days exposure to 16.6 µg/L trifluralin were then depurated for 41 days and showed no increase in vertebral dysplasia after cessation of exposure. However, residual damage in the form of malformed and displaced vertebrae was revealed by radiographs. Other bony elements in the fish showed no obvious effects from exposure to trifluralin. Cranial bone and cartilage appeared normal.
3. A significant increase in serum calcium concentration occurred only in the pooled serum sample from adult fish exposed for 4 days to 16.6 µg/L trifluralin. Serum calcium concentrations in this sample (27.4 mg/dl) were almost twice that found in control (15.7 mg/dl), feral (15 mg/dl) and kepone-exposed fish (14.8 mg/dl) samples. Inferences are limited as there were no replications within treatment groups. It was not reported if any vertebral dysplasia was observed in the four day exposure period.

Pathological effects of the dysplasia for both experiment 1 and experiment 2 included: (1) dorsal outgrowth of vertebrae into the neural canal, thus compressing the spinal cord, (2) ventral outgrowth of vertebrae, thus compressing the mesonephric ducts draining the kidneys and (3) fusion of vertebrae, resulting in apparent loss of somatic flexibility.

The study authors evaluated the possibility that a trifluralin contaminant (dipropolnitrosamine) was the cause of the bone deformities. Chemical analysis indicated that in a solution of 50 µg/L or less of trifluralin in seawater, the concentration of dipropyl nitrosamine was 0.30 ng/L or less. They concluded that the nitrosamine contaminant was not related to the vertebral dysplasia.

Description of Use in Document (QUAL, QUAN, INV):

This study will be used qualitatively as it does not have the most sensitive endpoint, but it does describe an uncommon sub-lethal effect.

Rationale for Use:

This study will be used Qualitatively as it does not have the most sensitive endpoint, but it does describe an uncommon sub-lethal effect.

Limitations of Study:

- Mortalities during study not described.
- Presence and description of any effects in the two lowest test groups (1.1 and 2.7 µg/L) of the 28-day study not described.
- No replicates of blood serum concentrations.

Primary Reviewer:

Christine Hartless, OPP/EFED/ERB1

Open Literature Review Summary

Chemical Name(s): Trifluralin

CAS No.: 1582-09-8

ECOTOX Record Number and Citation:

Couch, J. A. (1984). Histopathology and Enlargement of the Pituitary of a Teleost Exposed to the Herbicide Trifluralin. *J Fish Dis* 7: 157-163.

EcoReference No.: 48406

Chemical of Concern: TFN; Habitat: A; Effect Codes: PHY; Rejection Code: LITE
EVAL CODED(TFN).

Purpose of Review: Litigation/Endangered Species

Date of Review: August 22, 2009

Summary of Study Findings:

Pituitaries of sheepshead minnows, *Cyprinodon variegatus*, exposed for 19 months to 1-5 µg/L trifluralin in the laboratory exhibited enlargement, pseudocysts, congestion of blood vessels and oedema. Most of the fish with an enlarged pituitary also had induced diffuse and/or focal vertebral hyperostosis and other dysplastic vertebral changes.

Methods:

Two groups of *Cyprinodon variegatus* were exposed to trifluralin for 19 months. Surviving fish were measured for standard length, examined grossly for external lesions and then fixed directly in Davidson's fixative, after their abdomens were slit open to permit quick penetration of fixative. Brains and attached pituitaries were dissected from preserved fish. Specimens that were damaged during dissection were not used. Each pituitary's length and width was measured from the ventral aspect. Measurements were made using a dissecting microscope (x 25) and fine needle calipers, calibrated to resolve approximately 1/10 ml.

Significance of differences between means of length and width of pituitaries from a single control group and from each of the two experimental groups were determined by *t-tests* with significance criteria set at the 0.01 level. No comparison between the two experimental groups was made.

Brains and attached pituitaries were embedded in paraffin wax, sectioned parasagittally and sagittally at 7 µm, and stained with Glenner's stain which differentially stains the various functional, cellular regions of the pituitary to identify differences visually.

Results:

Occurrence of vertebral lesions

No vertebral lesions were observed in the control fish. Numbers and types of lesions in the exposed fish are provided in Table 1.

Table 1. Lesions produced in *Cyprinodon variegatus* after 19 months exposure to trifluralin

Group	Exposure duration	Diffuse vertebral dysplasia	One or more focal vertebral lesions	Combined pituitary enlargement and histopathologic changes
Control	Zygote to 19 mths	None	None	None
I (1-5 µg/L in flowing seawater)	Zygote to 19 mths	17/20	7/20	10/20
II (1-5 µg/L in flowing seawater)	30 days to 19 mths	18/20	11/20	11/20

Effects on the pituitary glands

Pituitary length and width was statistically significantly larger ($p < 0.01$) for each of exposure groups when compared to the control.

The pituitary from control fish was compact and reniform in parasagittal and sagittal sections. The neurohypophyseal region was moderately vascularized and lightly chromophilic with Glenner's stain. No demonstrable alpha-like cells were observed in the preparations. Vascular channels in the majority of control fish were small and unremarkable, containing relatively few red blood cells (RBCs).

The pituitary from exposed fish was less compact and more irregular in form. The typical reniform shape of normal glands was lost and the general structural integrity compromised. The enlarged pituitary displayed a variety of histopathological changes, with the occurrence of fluid-filled pseudocysts being the most striking. At least 10 of 20 pituitaries of fish from exposure groups I and II had pseudocysts (1 to 5/pituitary) which were 0.07-0.1 mm in diameter and, in some cases, occupied a significant portion of a glandular region. Each pseudocyst appeared to possess a limiting membrane, but not an epithelium. Similar but smaller cysts were seen in three control pituitaries. Congestion, stasis and dilation of blood vessels were very apparent in pituitaries of exposed fish.

Description of Use in Document (QUAL, QUAN, INV):

This study will be used Quantitatively as it does not have the most sensitive endpoint, but it does describe an uncommon sub-lethal effect.

Rationale for Use:

This study will be used Quantitatively as it does not have the most sensitive endpoint, but it does describe an uncommon sub-lethal effect.

Limitations of Study:

- Measured concentrations of trifluralin not provided.
- Test water parameters (pH, temp, DO, etc) not provided
- Raw data not provided.

Primary Reviewer:

Christine Hartless, OPP/EFED/ERB1

Open Literature Review Summary

Chemical Name(s): Trifluralin

CAS No.: 1582-09-8

ECOTOX Record Number and Citation:

Koyama, J. (1996). Vertebral Deformity Susceptibilities of Marine Fishes Exposed to Herbicide. *Bull. Environ. Contam. Toxicol.* 56 : 655-662.

EcoReference No.: 17085

Chemical of Concern: TFN; Habitat: A; Effect Codes: GRO,MOR; Rejection Code: NO CONTROL(TFN).

Purpose of Review: Litigation/Endangered Species

Date of Review: October 1, 2009

Summary of Study Findings:

Koyama (1996, E17085) estimated 96-hr LC₅₀s and vertebral deformity rates in 10 marine fish species after exposure to trifluralin, as a Japanese end-use product. Two species had non-definitive LD₅₀s <5.0 µg/L, definitive LC₅₀s ranged from 21 to 120 µg/L, and two species had LC₅₀s of >56 and >74 µg/L. Vertebral deformities were observed in eight of the 10 evaluated species, they were not observed in the two species in which an LC₅₀ was not reached. For those species which had vertebral lesions, the lesions were observed at concentrations as low as 5 to 30 µg/L, depending on species. Vertebral deformity rates in fish exposed to concentrations at or above the lowest concentration at which any deformities were observed ranged from 14 to 82%.

Methods:

Larvae of 10 fish species were used because of their higher susceptibilities to the toxicity of chemicals than young or adult fish. These marine fish species were Japanese Bounder (*Paralichthys olivaceus*), black sea bream (*Acanthopagrus shlegeli*), red sea bream (*Pagrus major*), herring (*Clupea pallasii*), jacobever (*Sebastes schlegeli*), yellowtail (*Seriola quinqueradiata*), longchin goby (*Chasmichthys dolichognathus*), girella (*Girella punctata*), mullet (*Mugil cephalus*) and grunt (*Parapristipoma trilineatum*). Japanese flounder, black sea bream and red sea bream were obtained from the Kanagawa Prefectural Aquacultural Center located in central Japan. Herring and jacobever were obtained from the Japanese Association of Sea Farming, Miyako Branch located in northeastern part of Japan. Yellowtail, longchin goby, girella, mullet and grunt were collected at the shore near the National Research Institute of Fisheries Science in central Japan. The fish were acclimated to the experimental water temperature in 60-L glass aquaria filled with filtered seawater for 1 wk. During acclimation, seawater was aerated to keep the oxygen saturation level above 60%. About 10-L of seawater in the aquaria were changed to remove feces and remaining food every day. Dissolved oxygen

concentration and salinity of the seawater were measured at the start and end of acclimation and were similar to the test solution.

Trifluralin was obtained commercially from Sionogi Cherm. Ind. Ltd. Trifluralin was provided as an emulsifiable-concentrate and contained solvent and emulsifier 55%. The stock solution of 1000 mg/L of trifluralin was prepared. The test solutions were prepared by adding the stock solution of trifluralin to filtered seawater. Five to seven concentrations of trifluralin solution (Table 1) plus a control were prepared for each fish species. Test solutions were renewed on the second and third day; concentrations were analytically determined by gas chromatography immediately before and after renewing the test solutions. The trifluralin concentrations were shown as the mean.

During and after exposure, the dead and surviving fish were fixed with 5% formaldehyde-seawater, and lateral and dorsal views were X-rayed to examine the vertebral deformities. After exposure for 96 hr, LC₅₀ of trifluralin was calculated using probit or graphic methods (APHA 1989) to compare with the concentrations causing vertebral deformities.

Table 1. Water temperatures, the ranges of trifluralin concentration and the sizes of fish used.

Species	Water temp. mean (°C)	Standard length mean (cm)	Body weight mean (g)	Trifluralin conc. range (mg/L)
Yellowtail	24.2	3.1	0.45	0.005-0.071
Japanese flounder	24.5	4.0	1.02	0.02 -0.076
Black sea bream	24.5	3.6	1.76	0.007-0.056
Longchin goby	24.3	3.7	1.05	0.012-0.23
Girella	24.4	4.4	2.69	0.023-0.21
Red sea bream (small)	25.8	1.9	0.20	0.023-0.21
(medium)	25.6	3.0	0.72	0.008-0.136
(large)	24.7	3.4	1.11	0.006-0.138
Mullet	24.8	4.2	1.63	0.003-0.049
Grunt	24.4	5.7	3.15	0.01 -0.131
Herring	16.4	4.5	0.67	0.005-0.159
Jacopever	19.2	2.5	0.33	0.012-0.074

Results:

There were no vertebral deformities in the control fish.

Some fish exposed to trifluralin exhibited the typical deformities of the vertebral column and these deformities seem to be fractures or dislocations. In girella, mullet and herring, most of the fish with vertebral defonnities showed convulsion, and had lateral stripes on their bodies caused by hemorrhage as well.

Ninety-six-hr LC₅₀ values and no mortality concentrations of trifluralin were calculated (Table 2). Because all the yellowtail and herring died at 0.005mg/L (the lowest concentration), they exhibited the lowest 96-hr LC₅₀s, <0.005mg/L. Girella and longchin goby exhibited the highest 96-hr LC₅₀s, 0.11 and 0.12mg/L respectively.

The no observed deformity concentration (NODC) and the lowest observed deformity concentration (LODC) of trifluralin were also determined (Table 2). NODC is the highest concentration at which the deformities were not observed. LODC is the lowest concentration at which the deformities were observed.

Two deformity rates were also calculated. Deformity rate A is the deformity rate observed below no mortality concentration, was calculated using the number of live fish below the no mortality concentration. Deformity rate B is the deformity rate observed above LODC and calculated from the number of live and dead fish which had vertebral deformities above LODC. Deformity rates A and B ranged from 0 to 50% and from 14 to 82%, respectively.

Table 2. Acute effective concentrations of trifluralin on vertebral deformity and 96-hr LC₅₀

Species	NODC	LODC	Deformity rate A*	Deformity rate B**	No mortality conc.	96-hr LC ₅₀
	(mg/L)	(mg/L)	(%)	(%)	(mg/L)	(mg/L)
Yellowtail	>0.071	>0.071	ND***	ND	< 0.005	< 0.005
Japanese flounder	0.02	0.03	11	33	0.03	0.056
Black sea bream	0.007	0.019	38	75	0.024	>0.056
Longchin goby	0.012	0.023	10	33	0.042	0.12
Girella	0.023	0.031	48	82	0.061	0.11
Red sea bream (small)	< 0.013	< 0.013	50	50	0.013	0.026
(medium)	0.008	0.016	0	50	< 0.008	0.022
(large)	< 0.006	< 0.006	7	26	0.006	0.021
Mullet	0.003	0.005	25	55	0.016	0.032
Grunt	0.012	0.019	0	38	0.011	0.033
Herring	0.009	0.013	0	14	< 0.005	< 0.005
Jacopever	>0.074	>0.074	ND	ND	< 0.012	>0.074

*: Deformity rate below no mortality conc, **:Deformity rate above LODC, ***: Not determined

Description of Use in Document (QUAL, QUAN, INV):

This study will be used Quantitatively as it was conducted using a Japanese end-use product for trifluralin.

Rationale for Use:

This study will be used quantitatively because the study was conducted with a foreign end-use product. The LD₅₀s here are more sensitive than those used in the risk estimation. In addition, it describes an unusual sub-lethal effect (vertebral deformities).

Limitations of Study:

- Raw data were not provided
- Study uses a foreign end-use product and a listing of the inert ingredients is not provided.

Primary Reviewer:

Christine Hartless, OPP/EFED/ERB1