6-9-92

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MEMORANDUM

OFFICE OF PESTICIDES AND TOXIC SUBSTANCES

To: Susan Lewis, 21\ Benjamin Chambliss
Fungicide Herbicide Branch
Registration Division

From: Doug Urban, Acting Chief
Ecological Effects Branch
Environmental Fate and Effects Division
H7507C

Douglas D. Urban 6/9/92

Subject: Tebuconazole; review of studies

Mobay Corporation submitted a marine fish early life stage study and an invertebrate life cycle study in support of registration of Tebuconazole. The studies are the followings:

Scott Ward, G., 1991. Toxicity to Embryos and Larvae of the Sheepshead Minnow (Cyprinodon variegatus) Under Flow-Through Test Conditions. MRID No. 420382-02

Sousa, J. V., 1991. (Folicur Technical) Chronic Toxicity to Mysid Shrimp (Mysidopsis bahia) Under Flow-Through Conditions. MRID No. 420382-01.

The studies were reviewed and categorized by EEB as follows:

Guide. Ref. NO.	Species Tested	% A.I.	Study Type	Results	Classification	MRID No.
72-4(a)	Cyprinodon variegatus	97.5%	Fish Early Life Stage	MATC 21.9-47.5 µg/L	Core	420382-02
72-4(b)	Mysidopsis bahia	97.5%	Chronic Invertebrate	MATC 35-61 µg/L	Core	420382-01

The enclosed Data Evaluation Record provide details of the studies. If you have any question please contact Concepción Rodríguez (308-2805) or Harry Craven (305-5320).

DP Barcode : D171265, D171249, D171241, D171258, D171252, D171261, D171239, D171263
PC Code No : 128997
EEB Out : 6/12/92

To: Susan Lewis,21\Benjamin Chabliss
Product Manager
Registration Division

From: Douglas J. Urban, Acting Chief
Ecological Effects Branch/EFED (H7507C)

Attached, please find the EEB review of...

Reg./File # : 003125-GIE Lynx 1.2, 003125-GOE Raxil 0.26 F, 003125-GOU Folicur 3.6 F, 003125-GOG Raxil 2.6 F,003125-GII Elite 45 DF, 003125-GOI Lynx 2, 003125-GIG Folicur Technical, 003125-GOO Lynx 25
Chemical Name : Terbuconazole
Type Product : Herbicide
Product Name : Folicur, Lynx, Raxil, Elite
Company Name : Mobay Corporation
Purpose : Data Submission to Support Registration

Action Code : 116 Date Due : 3/13/92
Reviewer : Concepción Rodríguez

EEB Guideline/MRID Summary Table: The review in this package contains an evaluation of the following:

GDLN NO	MRID NO	CAT	GDLN NO	MRID NO	CAT	GDLN NO	MRID NO	CAT
71-1(A)			72-2(A)			72-7(A)		
71-1(B)			72-2(B)			72-7(B)		
71-2(A)			72-3(A)			122-1(A)		
71-2(B)			72-3(B)			122-1(B)		
71-3			72-3(C)			122-2		
71-4(A)			72-3(D)			123-1(A)		
71-4(B)			72-3(E)			123-1(B)		
71-5(A)			72-3(F)			123-2		
71-5(B)			72-4(A)	420382-02	Y	124-1		
72-1(A)			72-4(B)	420382-01	Y	124-2		
72-1(B)			72-5			141-1		
72-1(C)			72-6			141-2		
72-1(D)						141-5		

Y=Acceptable (Study satisfied Guideline)/Concur
P=Partial (Study partially fulfilled Guideline but

72-1(D)						141-5		

Y=Acceptable (Study satisfied Guideline)/Concur
P=Partial (Study partially fulfilled Guideline but additional information is needed
S=Supplemental (Study provided useful information but Guideline was not satisfied)
N=Unacceptable (Study was rejected)/Nonconcur

MRID NO. 42 0382-01

DATA EVALUATION RECORD

1. **CHEMICAL:** Folicur (Terbuconazole)
Shaughnessey No. 128997

2. **TEST MATERIAL:** Folicur apha-C2, (4-Chlorophenyl) ethyl-alpha -(1,1-dimethyl-ethyl)-H-1, e, 4-triazole-1-ethanol; Batch NOl 9-79-0001; CAS # 107534-96-3; White Powder; 97.5% active ingredient.

3. **STUDY TYPE:** Invertebrate Life Cycle Study. Species tested: Mysidopsis bahia.

4. **CITATION:** Sousa, J. V. 1991. (Folicur Technical) Chronic Toxicity to Mysid Shrimp (Mysidopsis bahia) Under Flow-Through Conditions. Study Number 274.0190.6195.530; Report Number 101231. Prepared by Springborn Laboratories, Inc., Wareham, Mass. Submitted by Mobay Corporation, Kansas City, Missouri. MRID No. 420382-01.

5. **REVIEWED BY:** Concepción Rodríguez
Biologist
Ecological Effects Branch
Concepción Rodríguez 5/18/92

6. **APPROVED BY:** Harry Craven
Supervisor
Ecological Effects Branch
Harry Craven 5/18/92

7. **CONCLUSIONS:** This study is scientifically sound and fullfills the data requirements for a marine invertebrate life cycle study. Reproductive success was the most sensitive factor. The MATC is between 35 - 61 µg a.i./L. The NOEL is 35 µg a.i./L and the LOEL is 61 µg a.i./L. The geometric mean MATC is 46.2 µg a.i./L.

8. **RECOMMENDATIONS:** N\A

9. **BACKGROUND:**

10. **DISCUSSION OF INDIVIDUAL TEST OR STUDY:**

11. **MATERIALS AND METHODS:**

A. **Test Animals:** Mysids/ shrimps/ used for this study were maintained in cultures at Springborn Laboratories, Inc. The original cultures were obtained from Aquatic Biosystems Inc. Fort Collins, Colorado. Mysids were cultured in natural sea water with a salinity range of 25-27 ppm, a pH range of 7.5-7.8, a dissolved oxygen concentration range of 81-96% of saturation and a temperature range of 24-26 °C. Mysids used for the test were ≤24 hours old. Mysids were feed brine shrimp nauplii, ad libitum, twice daily one feeding was enriched with Selco supplement and the other was not.

B. **Test System:** The system consisted of a modified intermittent flow proportional diluter (Mount and Brungs, 1967), a temperature controlled water bath and 14 exposure aquaria (39 x 20 x 25 cm). The system provide five concentrations of test material, a dilution water control, and a solvent control (4.3 µL of acetone per liter of solution). The diluter provided approximately 13 aquaria volume additions per aquarium per day.

The retention chambers (for non-paired mysids) were glass Petri dishes (10 cm diameter, 2 cm deep). A screen collar (363 µm mesh size) was attached to the Petri dish with silicone sealant. Pairing chamber (for sexually mature male and female) were cylindrical glass jars (5.1 cm diameter, 10 cm high) with two 1.9 cm holes covered with nylon screen.

A photoperiod of 16 hours light and 8 hours darkness was provided. Sudden transitions form light to dark and vise versa were avoided. Light intensity was of 12-110 footcandles.

C. **Dosage:** Nominal test concentrations were 200, 100, 50, 25, and 12 µg/L. A dilution solvent control and a dilution water control were used. (4.3 µl/l acetone)

D. **Design:** Organisms were impartially selected and distributed to 28 retention chambers. Each test aquarium contained two retention chambers. Mysid counting was done by lifting the retention chamber from the water and placing it on a black background. When sexual maturity was reached, male/female pairs were transferred to pairing chamber (one pair per chamber). Mysids were fed once daily with enriched brine shrimp and at least daily with non enriched brine shrimp.

The following parameters were recorded throughout the test: dead organisms, unusual behavior, number of dead males and females, number of offspring/female, dead parental mysids, and juveniles. Individual body weight was recorded at the end of the study.

Reproductive success was defined as number of offspring produced per female per reproductive day. Reproductive days are the number of days a female was alive.

Dissolved oxygen and pH was measured daily in each replicate of controls and each treatment level. Salinity and temperature were measured daily in each replicate of the dilution water control.

All test solutions were sampled and analyzed for Folicur before starting the test and on days 0, 7, 14, 21, 28. Samples were analyzed using high performance liquid chromatography.

E. Statistics: Survival data was arcsine transformed. The controls were compared using Student's t Test (95% level of certainty). Homogeneity of data was checked with Barlett's Test (99% level of certainty). William's Test was used for all statistical analyses to determine treatment level effects. The MATC was calculated as the geometric mean of LOEC and NOEC.

12. REPORTED RESULTS: A summary of the water quality measurements is presented in Table 1. The diluter system function properly throughout the exposure period. Undissolved test material was present in the diluter system and in the highest treatment level (200 µg a.i.\L). Mean measured concentrations were 150, 61, 35, 17, 8.7 µg a.i./L Folicur (see Table 2).

No significant difference exists between control and solvent control in terms of survival, reproduction and growth. Therefore control were pooled.

Mysids survival ranged from 77-89% in treatment levels and 83% in control and 79% in solvent control. No statistical difference exist between treatments and control ($p \leq 0.05$) (see Table 3).

Reproductive success among mysids exposed to 150 and 61 µg a.i./L were significantly different ($p \leq 0.05$) when compared to the controls (see Table 3).

Growth, as total dry body weight, was not significantly different from controls (see Table 4).

13. STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:

The number of offspring produced per female per reproductive day was the most sensitive factor. The NOEL was 35 µg a.i./L. The MATC was between 35-61 µg a.i./L (Geometric mean MATC = 46 µg a.i./L).

Quality Assurance and Good Laboratory Practice Statements were included in the report, indicating that the study was conducted in accordance with FIFRA Good Laboratory Practice Statements Standards set forth in 40 CFR Part 160.

14. **REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:**

A. **Test Procedure:** The test procedures were generally in accordance with protocols recommended by the Standard Guide for Conducting Life-Cycle Toxicity Test with Saltwater Mysids, ASTM (1991).

B. **Statistical Analysis:** Survival data was arcsine transformed. Control and solvent control groups were pooled. Bonferroni's t test was used for all statistical analyses to determine treatment level effects. The MATC was calculated as the geometric mean of LOEC and NOEC.

C. **Discussion And Results:** No significant difference was found between the control and the solvent in all parameters. The Bonferroni's t test showed no significant difference of treatment levels when compared to the control in the following parameters: survival, female weight, and male weight. For reproductive success, there was a significant reduction when compared to the controls at treatment levels 61 and 150 µg a.i./L. Reproductive success was the most sensitive factor. The MATC is 35 - 61 µg a.i./L. The NOEL is 35 µg a.i./L and the LOEL is 61 µg a.i./L. The geometric mean MATC is 46.2 µg a.i./L.

D. **Adequacy of the Study:** This study satisfy the data requirements for marine invertebrate life cycle study.

(1) Classification: Core

(2) Rationale: N\A

(3) Repairability: N\A

15. **COMPLETITION OF ONE-LINER FOR STUDY:** Yes

Page_____ is not included in this copy.

Pages 8 through 11 are not included.

The material not included contains the following type of information:

____ Identity of product inert ingredients.

____ Identity of product impurities.

____ Description of the product manufacturing process.

____ Description of quality control procedures.

____ Identity of the source of product ingredients.

____ Sales or other commercial/financial information.

____ A draft product label.

____ The product confidential statement of formula.

____ Information about a pending registration action.

X FIFRA registration data.

____ The document is a duplicate of page(s) _____.

____ The document is not responsive to the request.

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

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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	GRPS 1&2 POOLED	4			
2	8.7	2	0.545	65.3	0.340
3	17	2	0.545	65.3	0.055
4	35	2	0.545	65.3	0.295
5	61	2	0.545	65.3	0.615
6	150	2	0.545	65.3	0.650

reproductive success
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ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.921	0.184	3.286
Within (Error)	8	0.449	0.056	
Total	13	1.370		

Critical F value = 3.69 (0.05,5,8)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

reproductive success
File: c:\conchi\reproduction Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	GRPS 1&2 POOLED	0.835	0.835		
2	8.7	0.495	0.495	1.659	
3	17	0.780	0.780	0.268	
4	35	0.540	0.540	1.439	
5	61	0.220	0.220	3.001	*
6	150	0.185	0.185	3.172	*

Bonferroni T table value = 2.90 (1 Tailed Value, P=0.05, df=8,5)

reproductive success
File: c:\conchi\reproduction Transform: NO TRANSFORMATION

BONFERRONI T-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	GRPS 1&2 POOLED	4			
2	8.7	2	0.594	71.1	0.340
3	17	2	0.594	71.1	0.055
4	35	2	0.594	71.1	0.295
5	61	2	0.594	71.1	0.615
6	150	2	0.594	71.1	0.650

reproductive success
File: c:\conchi\reproduction Transform: NO TRANSFORMATION

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	0.6250	CALCULATED t VALUE =	-2.6751
GRP2 (BLANK CRTL) MEAN =	1.0450	DEGREES OF FREEDOM =	2
DIFFERENCE IN MEANS =	-0.4200		

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

TITLE: reproductive success
FILE: c:\conchi\reproduction
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	GRPS 1&2 POOLED	1	0.6000	0.6000
1	GRPS 1&2 POOLED	2	0.6500	0.6500
1	GRPS 1&2 POOLED	3	0.8900	0.8900
1	GRPS 1&2 POOLED	4	1.2000	1.2000
2	8.7	1	0.7600	0.7600
2	8.7	2	0.2300	0.2300
3	17	1	0.6700	0.6700
3	17	2	0.8900	0.8900
4	35	1	0.7100	0.7100
4	35	2	0.3700	0.3700
5	61	1	0.2000	0.2000
5	61	2	0.2400	0.2400
6	150	1	0.1700	0.1700
6	150	2	0.2000	0.2000

reproductive success
File: c:\conchi\reproduction Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	GRPS 1&2 POOLED	4	0.600	1.200	0.835
2	8.7	2	0.230	0.760	0.495
3	17	2	0.670	0.890	0.780
4	35	2	0.370	0.710	0.540
5	61	2	0.200	0.240	0.220
6	150	2	0.170	0.200	0.185

reproductive success
File: c:\conchi\reproduction Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	GRPS 1&2 POOLED	0.075	0.274	0.137
2	8.7	0.140	0.375	0.265
3	17	0.024	0.156	0.110
4	35	0.058	0.240	0.170
5	61	0.001	0.028	0.020
6	150	0.000	0.021	0.015

reproductive success
File: c:\conchi\reproduction Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.921	0.184	3.286
Within (Error)	8	0.449	0.056	
Total	13	1.370		

Critical F value = 3.69 (0.05,5,8)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

reproductive success
File: c:\conchi\reproduction Transform: NO TRANSFORMATION

DUNNETTS TEST

****** WARNING ******

This data set has unequal replicates. The Bonferroni T-test should be used instead of the Dunnetts test.

reproductive success
File: c:\conchi\reproduction 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	GRPS 1&2 POOLED	0.835	0.835		
2	8.7	0.495	0.495	1.659	
3	17	0.780	0.780	0.268	
4	35	0.540	0.540	1.439	
5	61	0.220	0.220	3.001	*
6	150	0.185	0.185	3.172	*

Dunnett table value = 2.66 (1 Tailed Value, P=0.05, df=8,5)

reproductive success

survival
File: c:\conchi\survival Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.038	0.008	1.000
Within (Error)	8	0.067	0.008	
Total	13	0.105		

Critical F value = 3.69 (0.05,5,8)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

survival
File: c:\conchi\survival Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETTS TEST

****** WARNING ******

This data set has unequal replicates. The Bonferroni T-test should be used instead of the Dunnetts test.

survival
File: c:\conchi\survival Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	GRPS 1&2 POOLED	1.121	0.808		
2	8.7	1.225	0.885	-1.347	
3	17	1.080	0.770	0.526	
4	35	1.174	0.850	-0.680	
5	61	1.071	0.770	0.653	
6	150	1.178	0.850	-0.735	

Dunnett table value = 2.66 (1 Tailed Value, P=0.05, df=8,5)

survival
File: c:\conchi\survival Transform: ARC SINE(SQUARE ROOT(Y))

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	GRPS 1&2 POOLED	4			
2	8.7	2	0.183	22.6	-0.077
3	17	2	0.183	22.6	0.038
4	35	2	0.183	22.6	-0.042
5	61	2	0.183	22.6	0.038
6	150	2	0.183	22.6	-0.042

survival
File: c:\conchi\survival Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.038	0.008	1.000
Within (Error)	8	0.067	0.008	
Total	13	0.105		

Critical F value = 3.69 (0.05,5,8)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

survival
File: c:\conchi\survival Transform: ARC SINE(SQUARE ROOT(Y))

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	GRPS 1&2 POOLED	1.121	0.808		
2	8.7	1.225	0.885	-1.347	
3	17	1.080	0.770	0.526	
4	35	1.174	0.850	-0.680	
5	61	1.071	0.770	0.653	
6	150	1.178	0.850	-0.735	

Bonferroni T table value = 2.90 (1 Tailed Value, P=0.05, df=8,5)

survival
File: c:\conchi\survival Transform: ARC SINE(SQUARE ROOT(Y))

BONFERRONI T-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	GRPS 1&2 POOLED	4			
2	8.7	2	0.201	24.8	-0.077
3	17	2	0.201	24.8	0.038
4	35	2	0.201	24.8	-0.042
5	61	2	0.201	24.8	0.038
6	150	2	0.201	24.8	-0.042

TITLE: survival
FILE: c:\conchi\survival
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	GRPS 1&2 POOLED	1	0.7000	0.9912
1	GRPS 1&2 POOLED	2	0.8700	1.2019
1	GRPS 1&2 POOLED	3	0.8300	1.1458
1	GRPS 1&2 POOLED	4	0.8300	1.1458
2	8.7	1	0.9000	1.2490
2	8.7	2	0.8700	1.2019
3	17	1	0.8700	1.2019
3	17	2	0.6700	0.9589
4	35	1	0.8300	1.1458
4	35	2	0.8700	1.2019
5	61	1	0.7700	1.0706
5	61	2	0.7700	1.0706
6	150	1	0.9000	1.2490
6	150	2	0.8000	1.1071

survival
File: c:\conchi\survival Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	GRPS 1&2 POOLED	4	0.991	1.202	1.121
2	8.7	2	1.202	1.249	1.225
3	17	2	0.959	1.202	1.080
4	35	2	1.146	1.202	1.174
5	61	2	1.071	1.071	1.071
6	150	2	1.107	1.249	1.178

survival
File: c:\conchi\survival Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	GRPS 1&2 POOLED	0.008	0.091	0.045
2	8.7	0.001	0.033	0.024
3	17	0.030	0.172	0.122
4	35	0.002	0.040	0.028
5	61	0.000	0.000	0.000
6	150	0.010	0.100	0.071

survival
File: c:\conchi\survival Transform: ARC SINE(SQUARE ROOT(Y))

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	1.0965	CALCULATED t VALUE =	-0.4674
GRP2 (BLANK CRTL) MEAN =	1.1458	DEGREES OF FREEDOM =	2
DIFFERENCE IN MEANS =	-0.0493		

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

Female Weight
File: c:\conchi\femwgh Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.089	0.018	0.720
Within (Error)	8	0.203	0.025	
Total	13	0.293		

Critical F value = 3.69 (0.05,5,8)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

TITLE: Female Weight
FILE: c:\conchi\femwgh
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	GRPS 1&2 POOLED	1	0.7600	0.7600
1	GRPS 1&2 POOLED	2	1.0000	1.0000
1	GRPS 1&2 POOLED	3	1.0000	1.0000
1	GRPS 1&2 POOLED	4	1.3000	1.3000
2	8.7	1	1.1000	1.1000
2	8.7	2	1.0000	1.0000
3	17	1	0.9900	0.9900
3	17	2	1.2000	1.2000
4	35	1	1.1000	1.1000
4	35	2	1.1200	1.1200
5	61	1	0.7600	0.7600
5	61	2	0.9700	0.9700
6	150	1	1.0000	1.0000
6	150	2	0.8800	0.8800

Female Weight
File: c:\conchi\femwgh Transform: NO TRANSFORMATION

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	0.8800	CALCULATED t VALUE =	-1.4056
GRP2 (BLANK CRTL) MEAN =	1.1500	DEGREES OF FREEDOM =	2
DIFFERENCE IN MEANS =	-0.2700		

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

male weight
File: c:\conchi\malwgh Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.066	0.011	2.200
Within (Error)	7	0.036	0.005	
Total	13	0.102		

Critical F value = 3.87 (0.05,6,7)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

male weight
File: c:\conchi\malwgh Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Solvent	0.685	0.685		
2	Control	0.840	0.840	-2.192	
3	8.7	0.865	0.865	-2.546	
4	17	0.860	0.860	-2.475	
5	35	0.835	0.835	-2.121	
6	61	0.745	0.745	-0.849	
7	150	0.720	0.720	-0.495	

Bonferroni T table value = 3.13 (1 Tailed Value, P=0.05, df=7,6)

male weight
File: c:\conchi\malwgh Transform: NO TRANSFORMATION

BONFERRONI T-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	Solvent	2			
2	Control	2	0.221	32.3	-0.155
3	8.7	2	0.221	32.3	-0.180
4	17	2	0.221	32.3	-0.175
5	35	2	0.221	32.3	-0.150
6	61	2	0.221	32.3	-0.060
7	150	2	0.221	32.3	-0.035

TITLE: male weight
FILE: c:\conchi\malwgh
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 7

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Solvent	1	0.6100	0.6100
1	Solvent	2	0.7600	0.7600
2	Control	1	0.8400	0.8400
2	Control	2	0.8400	0.8400
3	8.7	1	0.9000	0.9000
3	8.7	2	0.8300	0.8300
4	17	1	0.8400	0.8400
4	17	2	0.8800	0.8800
5	35	1	0.8700	0.8700
5	35	2	0.8000	0.8000
6	61	1	0.6600	0.6600
6	61	2	0.8300	0.8300
7	150	1	0.7700	0.7700
7	150	2	0.6700	0.6700

male weight
File: c:\conchi\malwgh Transform: NO TRANSFORMATION

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	0.6850	CALCULATED t VALUE =	-2.0667
GRP2 (BLANK CRTL) MEAN =	0.8400	DEGREES OF FREEDOM =	2
DIFFERENCE IN MEANS =	-0.1550		

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

MRID NO. 420382-02

DATA EVALUATION RECORD

1. **CHEMICAL:** Folicur (BAY HWG 1608)

2. **TEST MATERIAL:** Alpha-C2,(4-Chlorophenyl) ethyl-alpha-(1,1-dimethyl)-1H-1,2,-triazole-1-ethanol) Bay H WG-1608; Lot no. 079-0153. Purity 96.4%; Analytical No. 49829; white powder

3. **STUDY TYPE:** Marine fish early life stage

4. **CITATION:** Scott Ward, G., 1991. Toxicity to Embryos and Larvae of the Sheepshead Minnow (Cyprinodon variegatus) Under Flow-Through Test Conditions. Study performed by Toxikon Environmental Sciences, Jupiter, Fla. Laboratory study no. J9101002b. Submitted by Mobay Corporation, Agricultural Chemicals Division, Kansas City, Missouri. MRID No. 420382-02.

5. **REVIEWED BY:** Concepción Rodríguez
Biologist
Ecological Effects Branch
Concepción Rodríguez 6/4/92

6. **APPROVED BY:** Harry Craven
Supervisor
Ecological Effects Branch
Harry T. Craven 6/4/92

7. **CONCLUSIONS:** This study is scientifically sound and meet the guideline requirements for a fish early stage study. Weight was the most sensitive factor. The MATC is between 21.9-47.5 µg/L with a geometric mean of 32.2 µg/L.

8. **RECOMMENDATIONS:**

9. **BACKGROUND:**

10. **DISCUSSION OF INDIVIDUAL TEST OR STUDY:**

11. **MATERIALS AND METHODS:**

A. **Test Animals**: Fish were adult sheepshead minnows (Cyprinodon variegatus). They were obtained from Aquatic BioSystems, Fort Collins, CO and TRAC Labs, Gulf Breeze, FL. Adult were maintained for a minimum of 11 days, prior to hormone injection at, Toxikon Environmental Sciences, Jupiter Fl. Food for adult fish was a commercial flake food form Zeigler Brothers, Gardners, PA or frozen brine shrimp (Artemia salina) from San Francisco Bay Brand, Inc., Newark, CA. No diseases were observed neither disease treatments were administered during the 2 week period before hormone injection.

The eggs were obtained by stripping adult females. Egg production was enhanced by injecting the human chorionic gonadotropin hormone during two consecutive days, four days before stripping. To fertilize eggs, a sperm suspension from macerated testes from mature males, was added.

B. **Test System**: The study was conducted under flow-through conditions. The diluter system was a modified proportional vaccum-siphon based on the original design of Mount and Brings (1967). The system was calibrated to provide a test concentration series with a 50 percent dilution and equal solvent concentration in all test concentrations. A stock solution of the test material was prepared in dimethilformamide (DMF) and pumped into the chemical mixing chamber. This solution was proportionally diluted in the diluter system to provide the lower test concentrations. The solvent control and all treatments has a concentration of 25 μL/L of DMF. The dilution control did not contain solvent. Each treatment solution was split by a splitter box into two portions for duplicate test chambers delivery. The diluter provided approximately 8.4 volume additions every 24 hours.

Test chambers were approximately 24-L glass tanks with automatic glass siphons. Incubation chambers were 60 mm diameter glass tubes with 315 μm mesh screen attached with silicone sealant between two tube sections. Two incubation chambers were within each treatment replicate tank. Test solutions were split prior entering each replicate test chamber by Y tubes. Water flows directly into each embryo incubation chamber. Chambers were randomly positioned in water bath.

A photoperiod of 16 hours light, 8 hours dark was provided. To simulate dawn and dusk, a 15 minute transition period of lower intensity incandescent lighting was provided to simulate dawn and dusk. Light intensity ranged between 4:27 to 8:20 micro Einstein/second/meter square. After hatching, fish were transferred to screen retention chambers within the same test chamber.

C. **Dosage**: Five nominal concentrations were used: 6.25, 12.5, 25.0, 50.0 and 100.0 µg/L. A dilution water control and a solvent control were used.

D. **Design**: Twenty embryos were impartially added to each chamber in groups of five. Survival of embryos was recorded daily until hatchling was complete. Fish survival was monitored daily until test termination (28 days posthatch). "Complete hatch was considered to be when 90% of all embryos within the solvent control hatched of the total number which finally hatched". Notes were made on abnormal behavior or physical appearance of fish.

Fish were fed throughout all test with live brine shrimp (Aquarium products, Glen Burne, MD). Feeding schedule was: once a day until day 14, twice a day from day 14 to 16 and three times daily on day 16 and after. Fish were not fed the day before termination. Fish were measured (standard length) and weighted at the end of test.

Temperature in the dilution water control was recorded hourly using a data logger. Temperature in the water bath was recorded continuously with a minimum/maximum thermometer. Salinity in dilution water control was measured daily using a refractometer. DO and pH were measured at the beginning of the test and weekly thereafter in all test solutions.

The concentration of chemical was measured one day before the initiation of the test and on days 0, 7, 14, 21, 28, and 36. Samples were taken from controls and each test solution. Analysis of concentrations were measured using high performance liquid chromatography.

E. **Statistics**: Embryo hatchability and juvenile survival of control and solvent control were compared using Fisher's Exact Test. Standard length and wet weight were evaluated with Student's t-test. Hatching and survival values were normalized using arcsine square

root transformation. ANOVA was used to detect statistical differences between solvent control and treatment group. A Dunnett's multiple comparison test was done. The probability level was 0.05. The most sensitive criteria was used to calculate the MATC.

12. **REPORTED RESULTS:** The mean measured concentrations during the 28-day posthatch exposure were 5.04, 9.20, 21.9, 47.5, 99.3 µg/L (81, 74, 88, 95, and 99 percent from nominal). No undissolved test substance was observed in test chambers. Bacterial growth occurred in the solvent control and in all treatments.

Viability of embryos was verified 3 days after fertilization. Viability of control and solvent control embryos was 91 percent. Viability of treatment embryos ranged from 90 to 96 percent. Hatching in control was 4 days, it was delayed in the solvent control and was completed in 9 days. Hatching in the control was 85%, in the solvent control was 66% and ranged from 71% in 99.3 µg/L to 85% in 21.9 µg/L (Table 3). Hatching in the solvent control was significantly reduced from hatching in the control. Hatching in both controls and all test concentrations exceeds 50 percent.

Survival of juvenile fish ranged from 72% in 9.20 µg/L to 93% in 47.5 µg/L (Table 4). Survival in dilution water control was not different from solvent control (88% and 87% respectively). Survival in the treatments was not significantly different from pooled controls. Survival is defined as total number of fish divided by total number of embryos. Abnormalities included two-headed fry and backbone deformations.

Mean lengths of fish ranged from 12.7 mm in 99.3 µg/L to 14.1 mm in 9.20 µg/L (Table 5). Mean wet weights of fish ranged from 57.3 mg in 99.3 µg/L to 85.0 mg in 5.04 µg/l (Table 6). Growth, as measured by length and wet weight, was significantly reduced in the dilution water control when compared to the solvent control. Growth was also reduced at 99.3 µg/L as compared to solvent control fish.

Water quality parameters are presented in Tables 7, 8 and 9. Dissolved oxygen concentrations were reduced and aeration was initiated on day 14 and continued throughout the study. A water quality characterization is presented in Appendix A.

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:**

The MATC for sheepshead minnow juveniles exposed to BAY HWG-1606 was between 21.9 and 47.5 µg/L based on a reduction in growth as wet weight at 47.4 µg/L. Based on geometric mean of the MATC limits, a point estimate of the MATC is 32.2 µg/L. The NOEC was 21.9 µg/L.

The relationship between growth (length and wet weights) and the BAY HWG-1606 is not clearly established. "The bacterial growth which occurred in the solvent control significantly enhanced growth of fish relative to the dilution water control. Fish in all test concentrations were, on the average, also larger and heavier than fish in the dilution control. Although no conclusive evidence can be provided from these results, it is possible that the reduction in the growth of treatment fish was not a direct effect, but rather an artifact produced by the effect of BAY HGW-1608 on the bacterial population within each test chamber." If this relationship is true then the MATC will be > 99.3 µg/L and the NOEC 99.3 µg/L. An additional test with a low concentration of the solvent may clarify the effect of BAY HWG-1608 on growth of the sheepshead minnow."

Quality Assurance and Good Laboratory Practice Statements were included in the report, indicating that the study was conducted in accordance with FIFRA Good Laboratory Practice Statements Standards set forth in 40 CFR Part 160.

14. **REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:**

A. **Test Procedure:** The test procedures were generally in accordance with protocols recommended by the guidelines, but deviated from the SEP or ASTM (1987) as follows:

A diluter malfunction occurred on day 16 and affected two test solutions.

The diluter system was switched off for 20.5 hours as a result of human error.

Low dissolved oxygen concentrations required aeration starting on day 14.

Temperature range from 24.8 to 29.4°C. SEP recommends that temperature should not deviate by more than 2°C.

Time to swim-up was not reported.

The relative standard deviation (RSD) is 52% for the control group and 40% for the solvent control group.

SEP establishes that RSD must not be greater than 40% in any control.

B. **Statistical Analysis**: Hatching and survival values were arcsine square root transformed using TOXSTAT program prior to statistical analysis.

For growth parameters, length and weight, Duncan's multiple range and Dunnett's T-test were used.

C. **Discussion And Results**: Hatching of eggs in the control was completed by day 4 which is the average time to hatch for the sheepshead minnow. Hatching in solvent control was delayed. Hatching seems to be influenced by the presence of the solvent. The control and solvent control were not significantly different for hatching and survival. There was no significant difference between treatments for hatching and survival.

For growth parameters, length and weight, the control and solvent control were statistically different. Solvent control was compared with treatments assuming that the effect of bacteria (bacteria was present in the solvent control and in all treatments) and solvent was the same in all treatments. Reduction in length at 99.3 μg/L was significantly different from solvent control. Reduction in weight at 47.5 and 99.3 μg/L was significantly different from solvent control. Based on weight, which was the most sensitive factor, the MATC is between 21.9-47.5 μg/L. The geometric mean in 32.2 μg/L.

This study is scientifically sound and meet the guideline requirements for a fish early stage study.

D. **Adequacy of the Study**:

(1) Classification: Core

(2) Rationale: N/A

(3) Repairability: No

15. **COMPLETITION OF ONE-LINER FOR STUDY**: Yes

Page_____ is not included in this copy.

Pages 37 through 42 are not included.

The material not included contains the following type of information:

____ Identity of product inert ingredients.

____ Identity of product impurities.

____ Description of the product manufacturing process.

____ Description of quality control procedures.

____ Identity of the source of product ingredients.

____ Sales or other commercial/financial information.

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Solvent Control

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File:B:SOLRES Page 1

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OBS	TRT	LENGTH	WEIGHT
1	a	15	90
2	a	15	98
3	a	9	71
4	a	15	100
5	a	15	116
6	a	13	56
7	a	15	125
8	a	16	137
9	a	13	45
10	a	13	57
11	a	13	57
12	a	12	49
13	a	18	176
14	a	16	121
15	a	17	122
16	a	11	37
17	a	15	81

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OBS	TRT	LENGTH	WEIGHT
18	a	14	81
19	a	15	111
20	a	17	116
21	a	15	99
22	a	15	102
23	a	12	43
24	a	14	103
25	a	17	164
26	a	.	.
27	a	.	.
28	a	.	.
29	a	.	.
30	a	.	.
31	a	.	.
32	a	14	72
33	a	12	40
34	a	13	54

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OBS	TRT	LENGTH	WEIGHT
35	a	13	49
36	a	14	86
37	a	14	72
38	a	15	95
39	a	14	72
40	a	13	76
41	a	14	61
42	a	13	69
43	a	17	131
44	a	16	91
45	a	15	79
46	a	14	73
47	a	15	88
48	a	16	83
49	a	12	35
50	a	12	38
51	a	12	39

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File:B:SOLRES Page 2

OBS	TRT	LENGTH	WEIGHT
52	a	14	64
53	a	.	.
54	a	.	.
55	a	.	.
56	a	.	.
57	a	.	.
58	a	.	.
59	a	.	.
60	a	.	.
61	a	.	.
62	a	.	.
63	b	15	99
64	b	16	102
65	b	16	103
66	b	15	93
67	b	13	53
68	b	16	103

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OBS	TRT	LENGTH	WEIGHT
69	b	15	87
70	b	15	83
71	b	13	69
72	b	15	108
73	b	12	39
74	b	13	56
75	b	13	66
76	b	14	62
77	b	10	33
78	b	15	82
79	b	12	47
80	b	14	97
81	b	17	155
82	b	11	28
83	b	14	63
84	b	16	131
85	b	16	144

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OBS	TRT	LENGTH	WEIGHT
86	b	17	171
87	b	13	60
88	b	12	47
89	b	.	.
90	b	.	.
91	b	.	.
92	b	.	.
93	b	.	.
94	b	14	78
95	b	15	89
96	b	15	110
97	b	15	102
98	b	16	89
99	b	10	28
100	b	16	105
101	b	14	79
102	b	14	73

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OBS	TRT	LENGTH	WEIGHT
103	b	15	95

104	b	15	96
105	b	12	36
106	b	15	130
107	b	12	61
108	b	17	160
109	b	13	58
110	b	15	98
111	b	18	240
112	b	14	97
113	b	11	36
114	b	10	19
115	b	9	18
116	b	.	.
117	b	.	.
118	b	.	.
119	b	.	.

OBS	TRT	LENGTH	WEIGHT
120	b	.	.
121	b	.	.
122	b	.	.
123	b	.	.
124	b	.	.
125	c	15	107
126	c	13	152
127	c	16	112
128	c	16	120
129	c	13	66
130	c	16	97
131	c	13	69
132	c	17	148
133	c	12	37
134	c	15	83
135	c	12	45
136	c	14	61

OBS	TRT	LENGTH	WEIGHT
137	c	18	146
138	c	13	77
139	c	12	43
140	c	16	131
141	c	16	92
142	c	11	27
143	c	11	25
144	c	11	30
145	c	13	65
146	c	11	32
147	c	13	62
148	c	.	.
149	c	.	.
150	c	.	.
151	c	.	.
152	c	.	.
153	c	.	.

OBS	TRT	LENGTH	WEIGHT
154	c	.	.
155	c	.	.
156	c	15	94
157	c	15	80

158	c	13	60
159	c	16	124
160	c	13	73
161	c	11	25
162	c	16	97
163	c	15	84
164	c	16	103
165	c	15	88
166	c	17	141
167	c	15	93
168	c	16	145
169	c	16	130
170	c	15	118

OBS	TRT	LENGTH	WEIGHT
171	c	12	44
172	c	14	68
173	c	18	208
174	c	11	39
175	c	10	20
176	c	.	.
177	c	.	.
178	c	.	.
179	c	.	.
180	c	.	.
181	c	.	.
182	c	.	.
183	c	.	.
184	c	.	.
185	c	.	.
186	c	.	.
187	d	11	33

OBS	TRT	LENGTH	WEIGHT
188	d	13	63
189	d	15	73
190	d	13	49
191	d	13	50
192	d	15	92
193	d	6	6
194	d	13	50
195	d	12	44
196	d	15	93
197	d	15	77
198	d	15	79
199	d	17	166
200	d	12	62
201	d	10	23
202	d	14	78
203	d	12	45
204	d	14	80

OBS	TRT	LENGTH	WEIGHT
205	d	14	71
206	d	11	30
207	d	12	41
208	d	14	100
209	d	15	109
210	d	15	103
211	d	16	96

212	d	15	85
213	d	15	62
214	d	12	54
215	d	.	.
216	d	.	.
217	d	.	.
218	d	15	100
219	d	11	37
220	d	15	98
221	d	15	86

OBS	TRT	LENGTH	WEIGHT
222	d	17	171
223	d	13	82
224	d	12	63
225	d	15	75
226	d	12	36
227	d	12	42
228	d	13	59
229	d	14	53
230	d	18	138
231	d	17	121
232	d	15	71
233	d	14	89
234	d	15	111
235	d	15	96
236	d	17	132
237	d	14	55
238	d	11	43

OBS	TRT	LENGTH	WEIGHT
239	d	13	42
240	d	18	179
241	d	9	17
242	d	15	97
243	d	15	83
244	d	.	.
245	d	.	.
246	d	.	.
247	d	.	.
248	d	.	.
249	e	16	131
250	e	14	69
251	e	14	74
252	e	12	38
253	e	13	39
254	e	15	95
255	e	15	78

OBS	TRT	LENGTH	WEIGHT
256	e	16	93
257	e	15	86
258	e	14	71
259	e	13	62
260	e	16	113
261	e	11	27
262	e	14	54
263	e	9	25
264	e	15	80
265	e	14	56

266	e	16	126
267	e	13	50
268	e	12	52
269	e	11	29
270	e	13	50
271	e	16	91
272	e	15	75

OBS	TRT	LENGTH	WEIGHT
273	e	15	95
274	e	13	43
275	e	13	62
276	e	12	43
277	e	8	10
278	e	.	.
279	e	.	.
280	e	12	43
281	e	14	66
282	e	12	48
283	e	10	23
284	e	11	26
285	e	15	104
286	e	15	89
287	e	14	74
288	e	13	56
289	e	14	67

OBS	TRT	LENGTH	WEIGHT
290	e	16	107
291	e	16	116
292	e	14	76
293	e	14	59
294	e	13	46
295	e	15	61
296	e	12	71
297	e	15	86
298	e	15	93
299	e	13	44
300	e	13	56
301	e	13	60
302	e	14	62
303	e	12	38
304	e	15	73
305	e	14	71
306	e	16	77

OBS	TRT	LENGTH	WEIGHT
307	e	17	133
308	e	.	.
309	e	.	.
310	e	.	.
311	f	16	100
312	f	17	120
313	f	13	62
314	f	11	30
315	f	11	36
316	f	14	43
317	f	10	30
318	f	14	72
319	f	13	64

320	f	14	78
321	f	14	73
322	f	8	14
323	f	15	86

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OBS	TRT	LENGTH	WEIGHT
324	f	15	95
325	f	10	29
326	f	10	24
327	f	14	80
328	f	12	42
329	f	14	72
330	f	.	.
331	f	.	.
332	f	.	.
333	f	.	.
334	f	.	.
335	f	.	.
336	f	.	.
337	f	.	.
338	f	.	.
339	f	.	.
340	f	.	.

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OBS	TRT	LENGTH	WEIGHT
341	f	.	.
342	f	12	40
343	f	11	27
344	f	14	73
345	f	12	46
346	f	15	80
347	f	12	40
348	f	13	60
349	f	13	53
350	f	13	69
351	f	15	81
352	f	10	22
353	f	12	39
354	f	11	28
355	f	12	43
356	f	13	55
357	f	10	25

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OBS	TRT	LENGTH	WEIGHT
358	f	13	59
359	f	15	90
360	f	12	38
361	f	10	34
362	f	13	80
363	f	11	41
364	f	11	43
365	f	13	58
366	f	17	123
367	f	15	83
368	f	.	.
369	f	.	.
370	f	.	.
371	f	.	.
372	f	.	.

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General Linear Models Procedure
Class Level Information

Class	Levels	Values
TRT	6	a b c d e f

Number of observations in data set = 372

NOTE: Due to missing values, only 293 observations can be used in this analysis.

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General Linear Models Procedure

Dependent Variable: LENGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	63.64568810	12.72913762	3.11	0.0094
Error	287	1173.66489210	4.08942471		
Corrected Total	292	1237.31058020			

R-Square	C.V.	Root MSE	LENGTH Mean
0.051439	14.70988	2.022233	13.7474403

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General Linear Models Procedure

Dependent Variable: LENGTH

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	63.64568810	12.72913762	3.11	0.0094

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	63.64568810	12.72913762	3.11	0.0094

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General Linear Models Procedure

Duncan's Multiple Range Test for variable: LENGTH

NOTE: This test controls the type I comparisonwise error rate, not the experimentwise error rate

Alpha= 0.05 df= 287 MSE= 4.089425
WARNING: Cell sizes are not equal.
Harmonic Mean of cell sizes= 48.34309

Number of Means	2	3	4	5	6
Critical Range	0.817	0.859	0.886	0.907	0.924

Means with the same letter are not significantly different.

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General Linear Models Procedure

Duncan Grouping	Mean	N	TRT
A	14.174	46	a
A			
A	14.093	43	c
A			
A	14.021	48	b
A			
A	13.778	54	d
A			
A	13.684	57	e
B	12.733	45	f

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General Linear Models Procedure

Dunnett's T tests for variable: LENGTH

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 287 MSE= 4.089425
Critical Value of Dunnett's T= 2.522

Comparisons significant at the 0.05 level are indicated by '***'.

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General Linear Models Procedure

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
c - a	-1.163	-0.081	1.001	
b - a	-1.205	-0.153	0.899	
d - a	-1.419	-0.396	0.627	
e - a	-1.500	-0.490	0.521	
f - a	-2.510	-1.441	-0.371	***

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General Linear Models Procedure

Dunnett's One-tailed T tests for variable: LENGTH

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 287 MSE= 4.089425
Critical Value of Dunnett's T= 2.239

Comparisons significant at the 0.05 level are indicated by '***'.

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General Linear Models Procedure

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
c - a	-1.041	-0.081	0.879	
b - a	-1.087	-0.153	0.781	
d - a	-1.305	-0.396	0.512	
e - a	-1.387	-0.490	0.408	
f - a	-2.390	-1.441	-0.491	***

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General Linear Models Procedure

Dunnett's One-tailed T tests for variable: LENGTH

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 287 MSE= 4.089425
Critical Value of Dunnett's T= 2.239

Comparisons significant at the 0.05 level are indicated by '***'.

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General Linear Models Procedure

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
c - a	-1.041	-0.081	0.879
b - a	-1.087	-0.153	0.781
d - a	-1.305	-0.396	0.512
e - a	-1.387	-0.490	0.408
f - a	-2.390	-1.441	-0.491

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OBS	TRT	LENGTH	WEIGHT
1	a	15	90
2	a	15	98
3	a	9	71
4	a	15	100
5	a	15	116
6	a	13	56
7	a	15	125
8	a	16	137
9	a	13	45
10	a	13	57
11	a	13	57
12	a	12	49
13	a	18	176
14	a	16	121

15	a	17	122
16	a	11	37
17	a	15	81

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OBS	TRT	LENGTH	WEIGHT
18	a	14	81
19	a	15	111
20	a	17	116
21	a	15	99
22	a	15	102
23	a	12	43
24	a	14	103
25	a	17	164
26	a	.	.
27	a	.	.
28	a	.	.
29	a	.	.
30	a	.	.
31	a	.	.
32	a	14	72
33	a	12	40
34	a	13	54

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OBS	TRT	LENGTH	WEIGHT
35	a	13	49
36	a	14	86
37	a	14	72
38	a	15	95
39	a	14	72
40	a	13	76
41	a	14	61
42	a	13	69
43	a	17	131
44	a	16	91
45	a	15	79
46	a	14	73
47	a	15	88
48	a	16	83
49	a	12	35
50	a	12	38
51	a	12	39

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OBS	TRT	LENGTH	WEIGHT
52	a	14	64
53	a	.	.
54	a	.	.
55	a	.	.
56	a	.	.
57	a	.	.
58	a	.	.
59	a	.	.
60	a	.	.
61	a	.	.
62	a	.	.
63	b	15	99
64	b	16	102
65	b	16	103
66	b	15	93
67	b	13	53
68	b	16	103

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OBS	TRT	LENGTH	WEIGHT
69	b	15	87
70	b	15	83
71	b	13	69
72	b	15	108
73	b	12	39
74	b	13	56
75	b	13	66
76	b	14	62
77	b	10	33
78	b	15	82
79	b	12	47
80	b	14	97
81	b	17	155
82	b	11	28
83	b	14	63
84	b	16	131
85	b	16	144

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OBS	TRT	LENGTH	WEIGHT
86	b	17	171
87	b	13	60
88	b	12	47
89	b	.	.
90	b	.	.
91	b	.	.
92	b	.	.
93	b	.	.
94	b	14	78
95	b	15	89
96	b	15	110
97	b	15	102
98	b	16	89
99	b	10	28
100	b	16	105
101	b	14	79
102	b	14	73

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OBS	TRT	LENGTH	WEIGHT
103	b	15	95
104	b	15	96
105	b	12	36
106	b	15	130
107	b	12	61
108	b	17	160
109	b	13	58
110	b	15	98
111	b	18	240
112	b	14	97
113	b	11	36
114	b	10	19
115	b	9	18
116	b	.	.
117	b	.	.
118	b	.	.
119	b	.	.

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OBS	TRT	LENGTH	WEIGHT
120	b	.	.
121	b	.	.
122	b	.	.
123	b	.	.
124	b	.	.
125	c	15	107
126	c	13	152
127	c	16	112
128	c	16	120
129	c	13	66
130	c	16	97
131	c	13	69
132	c	17	148
133	c	12	37
134	c	15	83
135	c	12	45
136	c	14	61

OBS	TRT	LENGTH	WEIGHT
137	c	18	146
138	c	13	77
139	c	12	43
140	c	16	131
141	c	16	92
142	c	11	27
143	c	11	25
144	c	11	30
145	c	13	65
146	c	11	32
147	c	13	62
148	c	.	.
149	c	.	.
150	c	.	.
151	c	.	.
152	c	.	.
153	c	.	.

OBS	TRT	LENGTH	WEIGHT
154	c	.	.
155	c	.	.
156	c	15	94
157	c	15	80
158	c	13	60
159	c	16	124
160	c	13	73
161	c	11	25
162	c	16	97
163	c	15	84
164	c	16	103
165	c	15	88
166	c	17	141
167	c	15	93
168	c	16	145
169	c	16	130
170	c	15	118

OBS	TRT	LENGTH	WEIGHT
171	c	12	44

172	c	14	68
173	c	18	208
174	c	11	39
175	c	10	20
176	c	.	.
177	c	.	.
178	c	.	.
179	c	.	.
180	c	.	.
181	c	.	.
182	c	.	.
183	c	.	.
184	c	.	.
185	c	.	.
186	c	.	.
187	d	11	33

OBS	TRT	LENGTH	WEIGHT
188	d	13	63
189	d	15	73
190	d	13	49
191	d	13	50
192	d	15	92
193	d	6	6
194	d	13	50
195	d	12	44
196	d	15	93
197	d	15	77
198	d	15	79
199	d	17	166
200	d	12	62
201	d	10	23
202	d	14	78
203	d	12	45
204	d	14	80

OBS	TRT	LENGTH	WEIGHT
205	d	14	71
206	d	11	30
207	d	12	41
208	d	14	100
209	d	15	109
210	d	15	103
211	d	16	96
212	d	15	85
213	d	15	62
214	d	12	54
215	d	.	.
216	d	.	.
217	d	.	.
218	d	15	100
219	d	11	37
220	d	15	98
221	d	15	86

OBS	TRT	LENGTH	WEIGHT
222	d	17	171
223	d	13	82
224	d	12	63
225	d	15	75

226	d	12	36
227	d	12	42
228	d	13	59
229	d	14	53
230	d	18	138
231	d	17	121
232	d	15	71
233	d	14	89
234	d	15	111
235	d	15	96
236	d	17	132
237	d	14	55
238	d	11	43

OBS	TRT	LENGTH	WEIGHT
239	d	13	42
240	d	18	179
241	d	9	17
242	d	15	97
243	d	15	83
244	d	.	.
245	d	.	.
246	d	.	.
247	d	.	.
248	d	.	.
249	e	16	131
250	e	14	69
251	e	14	74
252	e	12	38
253	e	13	39
254	e	15	95
255	e	15	78

OBS	TRT	LENGTH	WEIGHT
256	e	16	93
257	e	15	86
258	e	14	71
259	e	13	62
260	e	16	113
261	e	11	27
262	e	14	54
263	e	9	25
264	e	15	80
265	e	14	56
266	e	16	126
267	e	13	50
268	e	12	52
269	e	11	29
270	e	13	50
271	e	16	91
272	e	15	75

OBS	TRT	LENGTH	WEIGHT
273	e	15	95
274	e	13	43
275	e	13	62
276	e	12	43
277	e	8	10
278	e	.	.
279	e	.	.

280	e	12	43
281	e	14	66
282	e	12	48
283	e	10	23
284	e	11	26
285	e	15	104
286	e	15	89
287	e	14	74
288	e	13	56
289	e	14	67

OBS	TRT	LENGTH	WEIGHT
290	e	16	107
291	e	16	116
292	e	14	76
293	e	14	59
294	e	13	46
295	e	15	61
296	e	12	71
297	e	15	86
298	e	15	93
299	e	13	44
300	e	13	56
301	e	13	60
302	e	14	62
303	e	12	38
304	e	15	73
305	e	14	71
306	e	16	77

OBS	TRT	LENGTH	WEIGHT
307	e	17	133
308	e	.	.
309	e	.	.
310	e	.	.
311	f	16	100
312	f	17	120
313	f	13	62
314	f	11	30
315	f	11	36
316	f	14	43
317	f	10	30
318	f	14	72
319	f	13	64
320	f	14	78
321	f	14	73
322	f	8	14
323	f	15	86

OBS	TRT	LENGTH	WEIGHT
324	f	15	95
325	f	10	29
326	f	10	24
327	f	14	80
328	f	12	42
329	f	14	72
330	f	.	.
331	f	.	.
332	f	.	.
333	f	.	.

334	f	.	.
335	f	.	.
336	f	.	.
337	f	.	.
338	f	.	.
339	f	.	.
340	f	.	.

OBS	TRT	LENGTH	WEIGHT
341	f	.	.
342	f	12	40
343	f	11	27
344	f	14	73
345	f	12	46
346	f	15	80
347	f	12	40
348	f	13	60
349	f	13	53
350	f	13	69
351	f	15	81
352	f	10	22
353	f	12	39
354	f	11	28
355	f	12	43
356	f	13	55
357	f	10	25

OBS	TRT	LENGTH	WEIGHT
358	f	13	59
359	f	15	90
360	f	12	38
361	f	10	34
362	f	13	80
363	f	11	41
364	f	11	43
365	f	13	58
366	f	17	123
367	f	15	83
368	f	.	.
369	f	.	.
370	f	.	.
371	f	.	.
372	f	.	.

General Linear Models Procedure
Class Level Information

Class	Levels	Values
TRT	6	a b c d e f

Number of observations in data set = 372

NOTE: Due to missing values, only 293 observations can be used in this analysis.

General Linear Models Procedure

Dependent Variable: WEIGHT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	29551.48379	5910.29676	4.69	0.0004
Error	287	361810.38652	1260.66337		
Corrected Total	292	391361.87031			

R-Square	C.V.	Root MSE	WEIGHT Mean
0.075509	47.12664	35.50582	75.3412969

General Linear Models Procedure

Dependent Variable: WEIGHT

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	29551.48379	5910.29676	4.69	0.0004
Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	29551.48379	5910.29676	4.69	0.0004

General Linear Models Procedure

Duncan's Multiple Range Test for variable: WEIGHT

NOTE: This test controls the type I comparisonwise error rate, not the experimentwise error rate

Alpha= 0.05 df= 287 MSE= 1260.663
WARNING: Cell sizes are not equal.
Harmonic Mean of cell sizes= 48.34309

Number of Means	2	3	4	5	6
Critical Range	14.35	15.09	15.56	15.92	16.22

Means with the same letter are not significantly different.

General Linear Models Procedure

Duncan Grouping	Mean	N	TRT
A	85.140	43	c
A			
A	84.958	48	b
A			
A	83.130	46	a
A			
B A	75.741	54	d
B			
B C	67.404	57	e
C			
C	57.33	45	f

C 57.333 45 f

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General Linear Models Procedure

Dunnett's T tests for variable: WEIGHT

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 287 MSE= 1260.663
Critical Value of Dunnett's T= 2.522

Comparisons significant at the 0.05 level are indicated by '***'.

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General Linear Models Procedure

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
c - a	-16.984	2.009	21.002	
b - a	-16.647	1.828	20.303	
d - a	-25.355	-7.390	10.576	
e - a	-33.474	-15.727	2.020	
f - a	-44.571	-25.797	-7.023	***

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General Linear Models Procedure

Dunnett's One-tailed T tests for variable: WEIGHT

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 287 MSE= 1260.663
Critical Value of Dunnett's T= 2.239

Comparisons significant at the 0.05 level are indicated by '***'.

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General Linear Models Procedure

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
c - a	-14.853	2.009	18.871	
b - a	-14.574	1.828	18.230	
d - a	-23.339	-7.390	8.560	
e - a	-31.482	-15.727	0.029	
f - a	-42.464	-25.797	-9.130	***

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General Linear Models Procedure

Dunnett's One-tailed T tests for variable: WEIGHT

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 287 MSE= 1260.663
Critical Value of Dunnett's T= 2.239

Comparisons significant at the 0.05 level are indicated by '***'.

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General Linear Models Procedure

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
c - a	-14.853	2.009	18.871
b - a	-14.574	1.828	18.230
d - a	-23.339	-7.390	8.560
e - a	-31.482	-15.727	0.029
f - a	-42.464	-25.797	-9.130

1	CONTROL	2			
2	SOLVENT	2	0.196	23.1	0.190
3	5.04	2	0.196	23.1	0.075
4	9.2	2	0.196	23.1	0.100
5	21.9	2	0.196	23.1	0.000
6	47.5	2	0.196	23.1	0.090
7	99.3	2	0.196	23.1	0.140

TITLE: HATCHING
FILE: c:\conchi\folicur\hatch
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 7

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.9000	1.2490
1	CONTROL	2	0.8000	1.1071
2	SOLVENT	1	0.7000	0.9912
2	SOLVENT	2	0.6200	0.9066
3	5.04	1	0.8500	1.1731
3	5.04	2	0.7000	0.9912
4	9.2	1	0.7800	1.0826
4	9.2	2	0.7200	1.0132
5	21.9	1	0.8000	1.1071
5	21.9	2	0.9000	1.2490
6	47.5	1	0.8000	1.1071
6	47.5	2	0.7200	1.0132
7	99.3	1	0.7200	1.0132
7	99.3	2	0.7000	0.9912

HATCHING
File: c:\conchi\folicur\hatch Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	2	1.107	1.249	1.178
2	SOLVENT	2	0.907	0.991	0.949
3	5.04	2	0.991	1.173	1.082
4	9.2	2	1.013	1.083	1.048
5	21.9	2	1.107	1.249	1.178
6	47.5	2	1.013	1.107	1.060
7	99.3	2	0.991	1.013	1.002

HATCHING
File: c:\conchi\folicur\hatch Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	CONTROL	0.010	0.100	0.071
2	SOLVENT	0.004	0.060	0.042
3	5.04	0.017	0.129	0.091
4	9.2	0.002	0.049	0.035
5	21.9	0.010	0.100	0.071
6	47.5	0.004	0.066	0.047
7	99.3	0.000	0.016	0.011

HATCHING
File: c:\conchi\folicur\hatch Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.087	0.014	2.000
Within (Error)	7	0.047	0.007	
Total	13	0.134		

Critical F value = 3.87 (0.05,6,7)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

HATCHING
File: c:\conchi\folicur\hatch Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	1.178	0.850		
2	SOLVENT	0.949	0.660	2.740	
3	5.04	1.082	0.775	1.147	
4	9.2	1.048	0.750	1.556	
5	21.9	1.178	0.850	0.000	
6	47.5	1.060	0.760	1.409	
7	99.3	1.002	0.710	2.103	

Dunnett table value = 2.82 (1 Tailed Value, P=0.05, df=7,6)

HATCHING
File: c:\conchi\folicur\hatch Transform: ARC SINE(SQUARE ROOT(Y))

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	CONTROL	2			
2	SOLVENT	2	0.199	23.5	0.190
3	5.04	2	0.199	23.5	0.075
4	9.2	2	0.199	23.5	0.100
5	21.9	2	0.199	23.5	0.000
6	47.5	2	0.199	23.5	0.090
7	99.3	2	0.199	23.5	0.140

HATCHING
File: c:\conchi\folicur\hatch Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.087	0.014	2.000
Within (Error)	7	0.047	0.007	
Total	13	0.134		

Critical F value = 3.87 (0.05,6,7)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

HATCHING
File: c:\conchi\folicur\hatch Transform: ARC SINE(SQUARE ROOT(Y))

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	1.178	0.850		
2	SOLVENT	0.949	0.660	2.740	
3	5.04	1.082	0.775	1.147	
4	9.2	1.048	0.750	1.556	
5	21.9	1.178	0.850	0.000	
6	47.5	1.060	0.760	1.409	
7	99.3	1.002	0.710	2.103	

Bonferroni T table value = 3.13 (1 Tailed Value, P=0.05, df=7,6)

HATCHING
File: c:\conchi\folicur\hatch Transform: ARC SINE(SQUARE ROOT(Y))

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

6	47.5	2	0.569	65.8	0.340
7	99.3	2	0.569	65.8	0.070

TITLE: MORTALITY
FILE: c:\conchi\folicur\mort
TRANSFORM: ARC SINE(SQUARE ROOT(Y))
NUMBER OF GROUPS: 7

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	SOLVENT	1	0.8900	1.2327
1	SOLVENT	2	0.8400	1.1593
2	CONTROL	1	0.8600	1.1873
2	CONTROL	2	0.9100	1.2661
3	5.04	1	0.7600	1.0588
3	5.04	2	0.0780	0.2830
4	9.20	1	0.7400	1.0357
4	9.20	2	0.6900	0.9803
5	21.9	1	0.8800	1.2171
5	21.9	2	0.7200	1.0132
6	47.5	1	0.0910	0.3064
6	47.5	2	0.9600	1.3694
7	99.3	1	0.6600	0.9483
7	99.3	2	0.9300	1.3030

MORTALITY
File: c:\conchi\folicur\mort Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SOLVENT	2	1.159	1.233	1.196
2	CONTROL	2	1.187	1.266	1.227
3	5.04	2	0.283	1.059	0.671
4	9.20	2	0.980	1.036	1.008
5	21.9	2	1.013	1.217	1.115
6	47.5	2	0.306	1.369	0.838
7	99.3	2	0.948	1.303	1.126

MORTALITY
File: c:\conchi\folicur\mort Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM

1	SOLVENT	0.003	0.052	0.037
2	CONTROL	0.003	0.056	0.039
3	5.04	0.301	0.549	0.388
4	9.20	0.002	0.039	0.028
5	21.9	0.021	0.144	0.102
6	47.5	0.565	0.752	0.532
7	99.3	0.063	0.251	0.177

MORTALITY
File: c:\conchi\folicur\mort Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.498	0.083	0.606
Within (Error)	7	0.957	0.137	
Total	13	1.455		

Critical F value = 3.87 (0.05,6,7)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

MORTALITY
File: c:\conchi\folicur\mort Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	SOLVENT	1.196	0.865		
2	CONTROL	1.227	0.885	-0.083	
3	5.04	0.671	0.419	1.419	
4	9.20	1.008	0.715	0.508	
5	21.9	1.115	0.800	0.219	
6	47.5	0.838	0.525	0.967	
7	99.3	1.126	0.795	0.190	

Dunnett table value = 2.82 (1 Tailed Value, P=0.05, df=7,6)

MORTALITY
File: c:\conchi\folicur\mort Transform: ARC SINE(SQUARE ROOT(Y))

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	SOLVENT	2			

2	CONTROL	2	0.843	97.5	-0.020
3	5.04	2	0.843	97.5	0.446
4	9.20	2	0.843	97.5	0.150
5	21.9	2	0.843	97.5	0.065
6	47.5	2	0.843	97.5	0.340
7	99.3	2	0.843	97.5	0.070

MORTALITY
File: c:\conchi\folicur\mort Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	6	0.498	0.083	0.606
Within (Error)	7	0.957	0.137	
Total	13	1.455		

Critical F value = 3.87 (0.05,6,7)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

MORTALITY
File: c:\conchi\folicur\mort Transform: ARC SINE(SQUARE ROOT(Y))

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	SOLVENT	1.196	0.865		
2	CONTROL	1.227	0.885	-0.083	
3	5.04	0.671	0.419	1.419	
4	9.20	1.008	0.715	0.508	
5	21.9	1.115	0.800	0.219	
6	47.5	0.838	0.525	0.967	
7	99.3	1.126	0.795	0.190	

Bonferroni T table value = 3.13 (1 Tailed Value, P=0.05, df=7,6)

MORTALITY
File: c:\conchi\folicur\mort Transform: ARC SINE(SQUARE ROOT(Y))

BONFERRONI T-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	SOLVENT	2			
2	CONTROL	2	0.865	99.9	-0.020