EXPEDITE

Shaughnessy No: 129008

Date Out of EFGWB: 6/1/90

TO: Robert J. Taylor/Cynthia Giles
Product Manager #25
Registration Division (H7505C)

FROM: Emil Regelman, Supervisory Chemist
Environmental Chemistry Review Section #2
Environmental Fate and Ground Water Branch, EFED (H7507C)

THRU: Henry M. Jacoby, Chief
Environmental Fate and Ground Water Branch/EFED (H7507C)

Attached, please find the EFGWB review of:

Reg./File #: 352-LGU; 352-LGL

Common Name: Nicosulfuron

Chemical Name: 3-Pyridinecarboxamide((((4,6-dimethoxypyridin-2-yl)amino-carbonyl)aminosulfonyl))N,N-dimethyl

Type product: Herbicide

Product Name: ACCENT

Company Name: E.I. du Pont de Nemours and Company

Purpose: Review copy of DEB's review regarding crop restrictions and make comments.

Date Received: 4/24/90 EFGWB #: 90-0530; 90-0531

Action Code: 101 Total Reviewing Time (decimal days): 4.5

Deferrals to:
___X___ Ecological Effects Branch, EFED
_____ Science Integration & Policy Staff, EFED
_____ Non-Dietary Exposure Branch, HED
___X___ Dietary Exposure Branch, HED
_____ Toxicology Branch I , HED
___X___ Toxicology Branch II, HED

1. CHEMICAL:

Chemical name: 3-Pyridinecarboxamide(((4,6-dimethyl-2-yl)aminocarbonyl-aminosulfonyl))-N-N-dimethyl

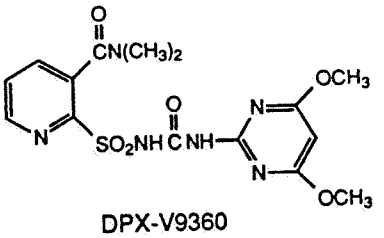
Common name: Nicosulfuron

Company code: "DPX-V9360"

Chemical Abstracts Registry Number: 11991-09-4

Product name: ACCENT

Chemical structure:



DPX-V9360

Physical/Chemical properties of active ingredient:

Molecular weight: 410.10
Physical characteristics: white solid
Solubility (in buffer solution; 28 C)

pH 5.1 to 5.6	390 ppm
pH 6.3	9000 ppm
pH 7.2	18000 ppm
pH 9.0	> 250,000 ppm

pK_a: 4.3

Vapor pressure: 1.2×10^{-16} Torr
Octanol/water partition coefficient:

pH 5	0.44
pH 7	0.017
pH 9	0.01

2. STUDY/ACTION TYPE:

Review copy of Dietary Exposure Branch (DEB) evaluation of Analytical Methods and Residue Data regarding rotational crop restrictions and provide comments to these restrictions.

3. STUDY IDENTIFICATION:

Evaluation of DPX-V9360 residue data in/on corn, by Jerry B. Stokes, Chemist, DEB/HED. In this review, DEB points out that rotational crop restrictions proposed by the registrant may not be adequate and that EFGWB should be aware of these restrictions.

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2. REVIEWED BY:

Silvia C. Termes, Chemist
Review Section #2
OPP/EFED/EFGWB

Signature: _____

Date: June 1st, 1990

3. APPROVED BY:

Emil Regelman
Supervisory Chemist
Review Section #2
OPP/EFED/EFGWB

Signature: _____

Date: 6/1/90

4. CONCLUSIONS:

a. Phytotoxicity concerns

EFGWB has concerns that the rotational crop intervals recommended by the registrant for winter cereals, spring cereals, and possibly for sorghum (Groups A and B) may not be adequate and may result in crop injury. This concern is based on the observation that wheat planted at 120-days posttreatment did not develop normally. At that planting interval, the concentration of parent DPX-V9360 in the soil was 0.001 ppm, suggesting that such levels DPX-V9360 still exhibited phytotoxic activity. From the field dissipation studies (DE, IL, MS), the concentration of parent DPX-V9360 in the 0-3 inch depth was no lower than 0.002 ppm even after 12 months. For the IL site, residues were no lower than 0.005 ppm even after 18 months (see Table in COMMENTS).

The Guidelines for rotational crops given by the registrant in the proposed label take into account soil pH and geographical area and are shown in the attached COMMENTS.

Therefore, EEB and RD should be made aware of the persistent phytotoxic residues that may remain at rotation intervals higher than one year. Indication of levels of parent that may be phytotoxic come from field dissipation data, from proposed rotation intervals of 15, 18 and 20 months, and from recommendation of field bioassays.

b. Residue-in-crops concerns

Although the level of parent DPX-V9360 residue in the rotated crops does not appear to be of concern (well-below the 0.1 ppm tolerance petition for corn, for which DEB has supporting data), there is sufficient evidence that the metabolite/degradate Pyridine Sulfonamide is more readily uptaken by plants than parent DPX-V9360 and are present at higher concentrations than parent. This is particularly more marked in soybeans, although the residue concentration of Pyridine Sulfonamide (and other related metabolites) decreases with increasing planting interval (see Table on "Residues in Rotation Crops" in COMMENTS).

It has not been determined by DEB whether the level of Pyridine Sulfonamide should also be regulated (that is, if tolerances for Pyridine Sulfonamide should also be established). Pertinent data have been requested from the registrant and are currently being evaluated by DEB.

If DEB and the Toxicology Branch II do not have any concerns for the residue levels (parent and/or degradates) in the rotation crops shown in the Table, then EFGWB may recommend a minimum rotational crop interval. But if the residues are of concern, then petition of tolerances for the intended rotation crops must be requested from DEB.

7. RECOMMENDATIONS:

The registrant should be informed of the following,

a. EFGWB has concerns about the proposed rotational intervals for wheat (winter/spring) and sorghum (Group A and B states) for reasons explained in the CONCLUSIONS section.

b. EEB and the Registration Division are being made aware of the concerns about phytotoxic residues levels.

c. This review is being deferred to DEB and the Toxicology Branch II to determine if the residues of parent and/or degradates at 10-months are of concern. If, after evaluation by DEB and the Toxicology Branch II, it is determined that the residues at 10 months pose no concern, then a minimum rotation interval of 10-month may be recommended. However, if DEB and Toxicology Branch II conclude that the residues are of concern, then tolerances for the intended rotation crops must be petitioned.

d. A complete copy of this review should be made available to the registrant.

8. BACKGROUND:

E.I. du Pont de Nemours is seeking registration of the new sulfonylurea herbicide ACCENT, which contains the active ingredient DPX-V9360 (nicosulfuron). The currently proposed use is on corn. Data for an EUP was reviewed by EFGWB on 5/1/89 (responses to additional data submitted by the registrant appear in 10/20/89 and 11/29/89 reviews). The Science Chapter for nicosulfuron was completed by EFGWB on 2/22/90 and the review of the registrant's responses are included in EFGWB #90-0483/ 90-0484. The DEB Science Chapter for nicosulfuron (1990, date not specified) indicated that EFGWB should be aware of the rotational crop restrictions recommended in the label for ACCENT. At the time EFGWB reviewed the rotational crop study (2/22/90), no comments were made about the proposed rotational crop intervals because additional data was needed to evaluate the study.

ACCENT herbicide is a water dispersable granule containing 75% of the active ingredient DPX-V9360 (nicosulfuron) by weight. It is a selective herbicide developed to control annual and perennial grass weeds and selected

broadleaf weeds when applied postemergence in field corn. It is not to be used on popcorn, sweet corn, or corn used for seed production.

Foliar absorption is the primary means of ACCENT uptake by the plants. ACCENT should be applied prior to the 10-leaf stage of corn. The application method recommended is by ground spraying. The pesticide should not be applied through any type of irrigation system. Maximum single application rate is 1 oz ai/acre. If split applications are to be made, they should not exceed a total of 1 1/3 oz ai/acre in any crop per year (split applications of 2/3 oz are recommended)

9. DISCUSSION OF INDIVIDUAL STUDIES:

No studies were reviewed. See attached COMMENTS. For additional information see EFGWB #90-0483/90-0484 review and the review of the original study (2/22/90)

10. COMPLETION OF ONE-LINER:

No new data are being incorporated at this time. One-liner was updated after completion of the 2/22/90 Science Chapter.

11. CBI APPENDIX: No CBI Appendix.

COMMENTS

The registrant has included ROTATIONAL CROPS GUIDELINES in their proposed label.

The registrant recommends that ACCENT be not applied to soils with a pH above 7.5 (pH to be determined by laboratory analysis using 1:1 soil:water suspension method on representative soil samples taken at 0-4" depth) The reason why the registrant recommended against application of ACCENT to soils with pHs above 7.5 is because extended soil residual activity could adversely affect crop rotation. The amount of ACCENT residues that may remain in the soil after corn harvest is also dependent on the application rate used, the organic matter content of the soil, climatological characteristics/weather factors, and the time elapsed since application of the herbicide.

The registrant has proposed the following Rotational Crop Guidelines (Minimum Recrop Intervals) and recommended that the minimum recrop intervals listed below be observed in order to avoid plant injury.

Group A- All states; soil pH 7.0 or below
or states of AL, AR, FL, GA, LA, MS, and TX except Panhandle; soil pH 7.5 or less

Group B- States of DE, MD, NJ, PA, NC, SC, WV, VA, KY, TN, TX Panhandle and MO Bootheel; soil pH 7.0-7.5

Group C- States not listed in Groups A or B; soil pH 7.0-7.5

	Minimum Time Before Planting Rotational Crops (Months from last ACCENT application)		
CROP	Group A	Group B	Group C
Field corn	Anytime	Anytime	Anytime
Winter cereals	3	3	15
Soybeans	8	8	8
Spring cereals	8	8	18
Alfalfa	9	15	FB*
Clover	9	15	FB
Dry beans	8	20	FB
Sorghum	9	20	FB
All other crops require completion of a successful field bioassay			

* Successful field bioassay (see below)

The registrant have also given guidelines on how to conduct field bioassays for nonlisted crops

a. A successful field bioassay must be completed the season before planting.
b. A successful field bioassay means growing to maturity a strip of crop(s) intended for production the following year and the test strip should include knolls and low areas.
c. Suggested interval before planting bioassay crops is,
Group A, 9 months; Group B, 15 months; Group C, 20 months
For alfalfa and clover in Group C, 9 months

EFGWB has completed the review of additional information on the confined rotational crop study (EFGWB #90-0483/90-0484), which was requested by the in the 2/22/90 review.

The information provided by the registrant on crop health/development during the course of the study has indicated that wheat crop (Anza) planted at 120-days (4-months) posttreatment showed severe seedling stunting up to approximately the fourth leaf stage, which caused a substantial decline in the overall plant population within the pots at an estimate of 50%. Although plants that survived the initial stunting were said to continue growing at a delayed rate and it was reported that maturity was delayed by 15 days. Overall yields were down, but normal yield per surviving plant was observed. Wheat planted at 10 months posttreatment were reported as not showing any noticeable adverse effects and normal yields and developments were observed.

At the time of the 120-day planting, the residues of parent DPX-V9360 in soil were 0.001 and 0.002 ppm for the pyrimidine- and pyridine-labeled studies, respectively. This suggests that this level of parent DPX-V9360 can be potentially phytotoxic to wheat. From the results of the reviewed field dissipation studies, the concentration of parent DPX-V9360 in the 0-3 inch depth was no lower than 0.002 ppm even after 12 months for the three sites studied (DE, IL, MS); for the IL site, residues were not lower than 0.005 ppm even after 18 months (see Table). Therefore, EFGWB feels that the rotational crop intervals proposed for rotation of winter cereals and spring cereals may not be adequate (particularly for the 3-month rotation interval for Group A and Group B states) because of potential for crop injury. Same may apply to sorghum.

For the leafy (lettuce, 120-days and 10 months), root (radish, 10 months), and legume (soybean, 30 and 120 days; 10 months) crops, no appreciable effect in the overall health and development was noted.

Residues of parent DPX-V9360 in wheat parts at 10-months aging were not detectable (<0.001 ppm) in straw/chaff, 0.001 ppm in forage/hay and 0.002 ppm in grain. The data on corn reviewed by DEB support the proposed 0.1 ppm tolerance for corn, but no data were available to support a decrease of DPX-V9360 to 0.05 ppm. However, Pyridine Sulfonamide residues were higher than residues for parent (0.038 ppm in straw/chaff; 0.008 ppm in forage/hay) and comparable in grain (0.003 ppm).

Residues of Pyridine Sulfonamide were also higher than residues of parent DPX-V9360 in soybeans, lettuce leaves, and radish greens (see Table).

For soybeans, residues of N-Desmethyl DPX-V9360 were higher than residues of parent DPX-V9360, but lower than those of Pyrimidine Amine. However, residues of Pyridine Sulfonamide decreased with increasing planting interval. In soybean seeds, other metabolites related to Pyridine Sulfonamide were also identified, but their concentration also decreased with increasing planting interval. These metabolites labeled as Compound A, B, and C were subsequently identified as Compound A being a mixture of three other

(unidentified) metabolites; Compound B as an amino acid conjugate of Pyridine Sulfonamide, and Compound C as an N-malonyl conjugate of Compound B.

DEB has not yet determined if tolerances for Pyridine Sulfonamide need to be established (that is, if Pyridine Sulfonamide is of regulatory concern). This need will be determined after reviewing requested field data on corn.

COMPARISON OF THE AMOUNT (ppm) OF PARENT DPX-V9360 AT THREE SITES, 0-3; 3-6; 6-9; 9-14 INCHES

Application rate of 1 oz ai/A (Data taken from field dissipation studies; values shown are the average of the pyridine- and pyrimidine-^{14}C labeled studies)

SITE	Day 0	Week	Week	"1 mon" Week	"2 mon" Week	"4 mon" Week	"9-10 mon" Week	"12 mon" Week	"15 mon" Week	"18 m Week
Newark, DE		1.14	2.14	4.14	9.14	17.86	38.86	52.57	67.14	78.57
0-3	0.078	0.054	0.046	0.032	0.011	0.003	0.004	0.004	0.002	NH
3-6	NE	ND	NE	NE	ND	ND	ND/NH	NH	NH	NE
6-9	ND	NE	NE	NE	NE	ND/NE	NE/ND	NE	NE	NE
9-14	ND	ND	ND	ND	ND/NE	NE	NE	NE	NE	NE
Rochelle, IL		1	2	3.86	8.71	17.43	43.43	52	65.29	75.74
0-3	0.080	0.063	0.061	0.045	0.031	0.011	0.006	0.006	0.005	0.005
3-6	ND	ND	NE/ND	NE	NH/NE	0.005	NH	0.004	0.002	NH
6-9	ND	ND	ND	ND/NE	NE	NE	NE	NE	NE	NE
9-14	ND	ND	ND	ND	ND	NE	NE	NE	NE	NE
Greenville, MS		1.14	2	4.29	17.43	34.86	-	52	65.29	78,42
0-3	0.070	0.051	0.037	0.021	0.013	0.006	-	0.005	0.002	0.002
3-6	ND	ND/NE	NE/ND	NE	NE	NE	-	NE	NH/NE	NH
6-9	ND	ND	ND	ND	ND	NE	-	NE	NE	NE
9-14	ND	ND	ND	ND	ND	ND	-	ND	ND/NE	NE

ND= Not Detected, DPX-V9360 < 0.0005 ppm; NE= Not Extracted, DPX-V9360 ≤ 0.01 ppm;
NH= Not Analyzed by HPLC (extracts contain less than the concentration in NE)
SOILS: DE (SL 0-14 in; pH 6.5); IL (SL (0-3), pH 4.7; L (3-6, pH 5.3; 6-9, pH 4.7), CL (9-14), pH 4.9
MS (SL 0-6, pH 8.1), L (6-14, pH 7.5). SL= silt loam; L= loam; CL= clay loam.

RESIDUES IN ROTATION CROPS

Crop/Crop Fraction	Soil aging time	Total radioactive residues, ppm[a] Pyr. ^{14}C	Pyrim. ^{14}C	Composition, ppm Parent	Pyr. Sulf.	N-Des.	Others[b]
Soybean forage/hay	30-day	0.221	0.060	0.002	0.080	0.025	A
	120-day	0.191	0.056	0.002	0.071	0.022	B
	10 months	0.075	0.014	nd	0.021	0.002	C
Soybean seed	30-day	0.226	0.043	nd	0.023	0.003	D
	120-day	0.157	0.033	nd	0.015	0.002	E
	10 months	0.069	0.012	nd	0.013	nd	F
Lettuce	120-day	0.050	0.015	0.002	0.019	-	G
	10 months	0.011	0.003	nd	0.004	-	H
Wheat forage/hay	120-day	0.112	0.033	ne	ne	-	I
	10 months	0.043	0.009	0.001	0.008	-	J
Wheat straw/chaff	120-day	0.246	0.099	0.004	0.056	-	K
	10 months	0.185	0.056	0.007	0.038	-	L
Wheat grain	120-day	0.025	0.020	0.005	0.003	-	M
	10 months	0.014	0.006	0.005	0.003	-	N
Radish greens	10 months	0.027	0.004	0.001	0.010	-	O
Radish root	10 months	0.006	0.003	na	na	-	P

[a]Calculated as DPX-V9360 equivalents; nd= not detected; ne= not extracted; na= not analyzed

[b]"Polars", "Bound radioactivity", "Other species resolved by chromatography", "Compounds A, B, and C" (which contain the pyridine ring) and seen in D, E, and F. For details see Tables VII, VII, IX and X. Compounds A, B and C have been identified. Seedling stunting for wheat crop planted at 120-days.