



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

OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

FEB 29 2000

Chemical name: Tebuconazole  
PC Code: 128997  
DP Barcode: D262194

MEMORANDUM

SUBJECT: Section 18-Use of Tebuconazole on hazelnuts in Oregon

FROM: Amer Al-Mudallal, Chemist  
Environmental Risk Branch I  
Environmental Fate and Effects Division

*A. Al-Mudallal 2/29/2000*

THRU: Arnet Jones, Branch Chief  
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*Kevin Costello FOR Edward Fite 2/29/2000*

TO: Robert Forrest, PM 05  
Registration Division (7505C)

Below is EFED's response to the State of Oregon application for a specific exemption for the use of tebuconazole (Elite 45 DF) to control eastern filbert blight on hazelnuts.

**I. Summary of Conclusions**

The proposed use of tebuconazole (Elite 45 DF) on hazelnuts in Oregon is not expected to pose significant acute or chronic risk to fish, aquatic invertebrates, aquatic plants, and small mammals. There is however, a potential chronic risk to birds that feed on vegetation (short and tall grass and foliage) resulting from the proposed use of tebuconazole on hazelnuts. Being persistent ( $T_{1/2} \approx 800$  days) and having high affinity ( $K_{oc} = 906$  to  $1251 \text{ ml/g}$ ) for soil sorption, tebuconazole is likely to adhere to soil particles and may move from the application site on entrained sediments in runoff



waters. Oregon soil has a high percentage of soil types C and D (35.2 and 27.3%, respectively<sup>1</sup>) and thus has a high potential for runoff.

For aquatic exposure, the estimated peak concentration of tebuconazole in surface water is not likely to exceed 13.93 µg/L for aerial applications and 12.43 µg/L for ground applications. The average 56 day concentration of tebuconazole in surface water is not likely to exceed 10.11 µg/L for aerial applications and 9.03 µg/L for ground applications. Surface water EECs indicate no acute or chronic risk to aquatic fish or aquatic invertebrates.

For drinking water assessment, the estimated peak (acute) concentration of tebuconazole in drinking water from surface water sources is not likely to exceed 20.79 µg/L for aerial application and 18.53 µg/L for ground applications. The estimated average 56 day (chronic) concentration of tebuconazole in surface water is not likely to exceed 15.10 µg/L for aerial applications and 13.46 µg/L for ground applications.

In coarse texture soils with low organic matter tebuconazole may move into shallow ground water. Oregon soil also contains a large amount of soil group B (33.7%). This is indicative of potential for leaching into groundwater. SCI-GROW estimated concentration of tebuconazole in drinking water from shallow ground water sources is not expected to exceed 0.43 µg/L. Repeated applications may have the potential for residue buildup in sediments that may pose a chronic hazard to aquatic organisms.

The risk quotients for fish, aquatic invertebrates, aquatic plants, and small mammals did not exceed the acute and chronic levels of concern (LOCs) for the proposed application of tebuconazole on hazelnuts. However, the risk quotients indicate that the proposed use is expected to pose a chronic risk to birds. There is a potential chronic risk to endangered bird species that feed on vegetation (short and tall grass and foliage) resulting from the proposed use of tebuconazole. Data are not available to assess the risk to non-target terrestrial plants. The registrant data indicate no risk to non-target insects.

This assessment is based on acceptable and supplemental environmental fate and ecological data reviewed by EFED up to the present time. Additional data (i.e., mobility data, 163-1; terrestrial field dissipation data, 164-1) are currently under review. Since surface and ground water monitoring data for tebuconazole are not available, our aquatic exposure and drinking water assessment were based on modeling.

## **II. Background**

The Oregon Department of Agriculture has filed a petition for exemption to use tebuconazole (Elite 45 DF) on hazelnuts. Elite 45 DF foliar fungicide (EPA Reg. No. 3125-388) is to be used on hazelnuts for the control of eastern filbert blight (EFB) during the 2000 growing season. This is the first year that the department has requested this use of tebuconazole. Fenarimol was requested for this disease from 1993 through 1999, but it is now felt tebuconazole is more

effective. Eastern filbert blight (EFB) can render an orchard unproductive within four years of infection. Complete tree death usually occurs in five to seven years. Since Oregon produces 99% of the hazelnuts in the United States, the entire U.S. production is at risk.

Description of the Proposed Use:

Sites to be Treated: Oregon has 28,770 acres of hazelnuts. It is anticipated that a maximum of 21,520 acres could be treated. The emergency EFB risks exist only for hazelnuts grown in the following counties: Clackamas, Columbia, Marion, Multnomah, Polk, Washington, and Yamhill.

Method of Application: Foliar broadcast by air or ground. Ground application in a minimum of 10 gallons of water per acre or application in a minimum of 5 gallons of water per acre. Application through any type of irrigation equipment is prohibited.

Rate of application: Apply a maximum of 8 oz. Elite 45 DF (0.225 lb. a.i.) per acre per application.

Maximum Number of Applications: A maximum of 4 application at a rate of 8 oz. may be applied per acre per crop season.

Total Amount of Pesticide to be Used: At the maximum allowable application rate of 32 oz. of Elite 45 DF (0.9 lb. a.i. tebuconazole) per acre per season, on a maximum of 21,520 acres, a maximum of 43,040 lb. of the formulated product (19,368 lb. a.i.) may be applied.

Use Period: From 3/1/2000 to 5/30/2000.

### **III. Environmental Fate Summary**

Tebuconazole is persistent in soil (aerobic metabolism  $T_{1/2} \approx 800$  days) and moderately mobile to relatively immobile ( $K_d$ 's of adsorption range from 7 to 16,  $K_{oc}$ 's range from 906 to 1251 ml/g). Its mobility increases as the soil organic matter decreases. Tebuconazole has little potential to reach ground water, except in soils of high sand and low organic matter content. During a runoff event, however, tebuconazole will adsorb onto the suspended soil particles and can enter adjacent bodies of surface water via runoff.

The main route of tebuconazole dissipation is soil adsorption which increases with increasing soil organic matter content. Tebuconazole is resistant to hydrolysis ( $T_{1/2} \gg 28$  days), aqueous and soil photodegradation [ $T_{1/2}$  = stable (extrapolated  $T_{1/2}$  600 days) and 191 days, respectively], and soil metabolism (aerobic metabolism  $T_{1/2} \approx 800$  days). Terrestrial field dissipation half lives varied from about 1.6 to 4 months. A supplemental study on bare ground in Florida showed vertical movement of tebuconazole. In sand soil of Vero Beach, FL (sand = 92%, silt = 0.4%, clay = 7.6%, and organic matter = 1%) tebuconazole was detected up to 0.12 ppm in the depth of 6 to 12 inches 30 days after surface application of  $\approx 1.5$  lb. a.i./acre (lower depths were not sampled, MRID 40700963). Tebuconazole has a low potential for bioaccumulation in fish tissues (BCFs = 25X, 228X, and 99X for edible, nonedible, and whole fish tissues).

#### IV. Water resources Summary

##### A. Surface Water

##### 1) Ecological exposure

Due to the lack of monitoring data for tebuconazole, exposure concentrations were estimated using Tier 1 modeling (GENEEC). The model uses the soil/water partition coefficient and degradation half-life values to estimate runoff from a ten hectare field into a one hectare by two meter deep pond. The input parameters and its values for GENEEC (Version 2.1, May 3, 1995) are listed in Table 1.

Table 1. GENEEC Input Parameters for Tebuconazole on Hazelnuts		
MODEL INPUT VARIABLE	INPUT VALUE	SOURCE
Application Rate	0.225 lb. a.i./acre	Label (EPA Reg. No. 3125-388)
Maximum Number of Applications	4	Label (EPA Reg. No. 3125-388)
Interval between Applications	7 days	Label (EPA Reg. No. 3125-388)
Soil Organic Carbon Partitioning Coefficient ( $K_{oc}$ )	906 ml/g (min. value)	MRID 40995922
Aerobic Soil Metabolism	$t_{1/2}$ =800 days	MRID 40700959
Water Solubility	32 mg/L @ 20°C	One-Liner
Aerobic Aquatic Metabolism	Assumed to be stable	Not submitted
pH 7 Hydrolysis	$t_{1/2}$ =stable	MRID 40700957
Photolysis	$t_{1/2}$ =stable (0)	MRID 40700958

Table 2. GENEEC EECs ( $\mu\text{g/L}$ ) for Tebuconazole on Hazelnuts							
Crop	Application Method	Application Rate (lbs. ai/acre)	Number of Applications	Application Interval (days)	GENEEC Peak EEC ( $\mu\text{g/l}$ )	GENEEC 21 Day EEC ( $\mu\text{g/l}$ )	GENEEC 56 Day EEC ( $\mu\text{g/l}$ )
hazelnuts	aerial spray or ground spray	0.225	4	7	13.93	12.08	10.11
					12.43	10.77	9.03

Estimated peak surface water concentrations of tebuconazole are not likely to exceed 13.93  $\mu\text{g/L}$

for aerial applications and 12.43 µg/L for ground applications. The average 56 day (chronic) concentration of tebuconazole in surface water is not likely to exceed 10.11 µg/L for aerial applications and 9.03 µg/L for ground applications.

## 2) Drinking water

GENEEC modeling was also used for the Tier 1 drinking water analysis. The highest registered use rate of 1.35 lb. ai/acre (0.225 lb. ai/acre x 6 applications per season) as labeled for cherries, peaches, and nectarines was used to estimate the concentration of tebuconazole in drinking water. The estimated peak (acute) concentration of tebuconazole in drinking water from surface water sources is not likely to exceed 20.79 µg/L for aerial application and 18.53 µg/L for ground applications. The estimated average 56 day (chronic) concentration of tebuconazole in surface water is not likely to exceed 15.10 µg/L for aerial applications and 13.46 µg/L for ground applications.

Crop	Application Method	Application Rate (lbs. ai/acre)	Number of Applications	Application Interval (days)	GENEEC Peak Conc. (µg/l)	GENEEC Average 56 day Conc. (µg/l)
Cherries Peaches Nectarines	aerial spray	0.225	6	7	20.79	15.10
	ground spray				18.53	13.46

## 3) Monitoring

There are no surface water monitoring data for tebuconazole. Tebuconazole was not analyzed under the National Water-Quality Assessment Program of the U.S. Geological Survey.

### B. Ground Water

There are no ground water monitoring data for tebuconazole. Tebuconazole was not listed in the 1992 *Pesticides in Ground Water Database*, U.S. EPA/EFED/EFGWB, and was not included in the National Pesticide Survey, USEPA 1990. SCI-GROW screening model was used to estimate ground water concentrations. The model estimates upper bound ground water concentrations of pesticides likely to occur when the pesticide is used at the maximum allowable rate in areas where ground water is vulnerable to contamination. Table 4 lists the model input parameters.

<b>Table 4. SCI-GROW Input Parameters for Tebuconazole on Hazelnuts</b>	
<b>MODEL INPUT VARIABLE</b>	<b>INPUT VALUES</b>
Koc	1023 ml/g
Application Rate	0.0.225 lb. a.i./acre
Number of Applications / Season	6
Aerobic Soil Metabolism Half-life	800 days
Hydrolysis	stable

The SCI-GROW model estimated the concentration of tebuconazole in drinking water from shallow ground water sources to be 0.43 µg/L. This concentration can be considered as both the acute and chronic value.

### **C. Drinking Water Concentration Recommendations**

For HED's human health risk assessment, EFED recommends an **acute concentration** of **20.79 µg/L** and a **chronic concentration** of **15.10 µg/L**, as estimated by GENECC, the tier1 surface water screening model. EFED believes these values are conservative drinking water estimates.

### **V. Aquatic Organisms Risk Assessment**

Table 5 presents the toxicity data for the most sensitive aquatic organisms reviewed by EFED.

<b>Table 5. Aquatic Organism Toxicity / Hazard estimates</b>							
<b>Common Name</b>	<b>% ai</b>	<b>Toxicity (mg/L)</b>	<b>NOEL (mg/L)</b>	<b>MRID #</b>	<b>EEC ppb</b>	<b>Acute RQ</b>	<b>Chronic RQ</b>
Green algae	97.5	4D EC50 1.45 ppm	0.32	0995908	13.93 (peak)	0.01	
Water flea	96.3	48 HR EC50 4.0 ppm	0.74	40700913	13.93 (peak)	0.003	
Water flea	96.3	21D LOEC 0.23 ppm	0.12	40700915	12.08 (21 d)		0.10
Mysid	96.3	96 HR LC50 0.49 ppm	<0.3	40995902	13.93 (peak)	0.03	
Mysid	97.5	28 D LOEC 0.061 ppm	0.035	42038201	12.08 (21 d)		0.35
Rainbow trout	96.3	96 HR LC50 4.4 ppm	1.5	40700911	13.93 (peak)	0.003	
Rainbow trout	96.3	83D LOEC 0.025 ppm	0.012	40700914	10.11 (56 d)		0.84
Sheepshead minnow	96.3	96 HR LC50 5.9 ppm	<1.2	40995904	13.93 (peak)	0.002	
Sheepshead minnow	96.4	36 D LOEC 0.047 ppm	0.022	42038202	10.11 (56 d)		0.46

The calculated risk quotients indicate that acute and chronic LOCs for fish, aquatic invertebrates, and aquatic plants are not exceeded.

## **VI. Terrestrial Animal Risk Assessment**

Table 6 presents the toxicity data for terrestrial organisms and rat toxicity values which were obtained from the Agency's Health Effects Division (HED) to substitute for wild mammal testing.

Common Name	% ai	LD <sub>50</sub> and LOEL in ppm	MRID #
Rat - oral acute	97.1 <sup>tech</sup>	LD <sub>50</sub> (fasted)>5000(F)/3933mg/kg(M) (unfasted)>4264 (F)/3352 mg/kg(M)	40700917
Rat (Wistar)	95.2%	2 generation reproductive study dose 1, 100, 300, & 1000 ppm for 2 generation NOEL=300	40700946
Mallard Duck	96.3	8 D LC50 >4816 ppm NOEL<4816	40700907
Mallard Duck	97.4	avian reproductive study 28WKS LOEC >75.8 ppm NOEL=75.8	40700909

Product	Application Rate (lb. ai/acre)	Food Item	Predicted Maximum Residue (ppm) at 1 lb. ai/acre <sup>1</sup>	Predicted Maximum Residue (ppm) at Labeled Application Rate <sup>2</sup>
Tebuconazole	0.225	Short grass	240	54.0
		Tall grass	110	24.8
		Broadleaf/forage plants and small insects	135	30.4
		Fruits, pods, seeds, and large insects	15	3.4

<sup>1</sup> Predicted maximum and mean residues are for a 1 lb. ai/a application rate and are based on Hoerger and Kenaga (1972) as modified by Fletcher *et al.* (1994).

<sup>2</sup> residue = (residue @ 1 lb. ai/acre)(labeled application rate)



**Table 8. Terrestrial Risk Quotient (One Application)**

Species	Exposure	Toxicity	Acute RQ	Chronic RQ
Birds	Short grass = 54 ppm	LC <sub>50</sub> >4816 ppm <sup>1</sup>	0.01	0.71
	Tall grass = 24.8 ppm		0.01	0.33
	Foliage = 30.4 ppm	LOEL= 75.8 ppm <sup>2</sup>	0.01	0.40
	Seeds = 3.4 ppm		0.00	0.04
Small Mammals 15 g	Short grass = 54 ppm	LD <sub>50</sub> /day = 3328 ppm LOEL=300 ppm	0.02	0.18

<sup>1</sup> for Mallard Duck<sup>2</sup> for Bobwhite Quail and Mallard Duck**Table 9. Terrestrial Risk Quotient (Four Applications)**

Species	Exposure	Toxicity	Acute RQ	Chronic RQ
Birds	Short grass = 172.3 ppm	LC <sub>50</sub> >4816 ppm <sup>1</sup>	0.04	2.27
	Tall grass = 79.0 ppm		0.02	1.04
	Foliage = 96.9 ppm	LOEL= 75.8 ppm <sup>2</sup>	0.02	1.28
	Seeds = 10.8 ppm		0.00	0.14
Small Mammals 15 g	Short grass = 172.3 ppm	LD <sub>50</sub> /day = 3328 ppm LOEL=300 ppm	0.05	0.57

<sup>1</sup> for Mallard Duck<sup>2</sup> for Bobwhite Quail and Mallard Duck

The FATE program, with a default foliar half-life of 30 days, was used to calculate the terrestrial acute and chronic risk quotients resulting from multiple applications of tebuconazole on hazelnuts. The calculated risk quotients indicate that acute and chronic LOCs for birds and small mammals are not exceeded for one application of tebuconazole. For multiple applications of tebuconazole, the acute LOCs for birds and small mammals are not exceeded but the chronic LOCs for birds that feed on vegetation (short and tall grass and foliage) are exceeded. Since the terrestrial plant data are not available for tebuconazole, EFED can not make any predictions concerning potential risk to terrestrial plant species. Based on LC<sub>50</sub> value of 176 µg/bee (Bayer Report No. 99753, 1987, LC<sub>50</sub> not evaluated by EFED), it can be concluded that there are no risks to non-target insects from the proposed use of tebuconazole.

### VIII. Endangered Species

The LOCs for endangered species were not exceeded. EFED does not anticipate direct acute or chronic toxic hazards to endangered fish, aquatic invertebrates, aquatic plants, small mammals,

and birds from one application of tebuconazole. There is however, a potential chronic risk to endangered bird species that feed on vegetation (short and tall grass and foliage) resulting from the proposed multiple application use of tebuconazole.

### **IX. Recommended Label Restrictions**

The present product label does not indicate that the product is toxic to freshwater fish. The label only indicate that it is toxic to estuarine and marine invertebrates.. Tebuconazole exhibits chronic toxicity to freshwater fish which should be reflected in the environmental hazard statement on the Elite 45 DF label as well as any other products containing tebuconazole. Other portions of the hazard statement appear appropriate.

The present Elite 45 DF foliar fungicide (EPA Reg. No. 3125-388) label states the following:

#### Environmental Hazards:

This pesticide is toxic to estuarine and marine invertebrates. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Runoff may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwater or rinsate.

### **X. References**

1- Kellogg, R.L., Maizel, M.S., and Goss, D.W. Agricultural chemical use and ground water quality: Where are the potential problems areas? Soil Conservation Service, USDA, 1992.

DP BARCODE: D262194

CASE: 292509  
SUBMISSION: S573126

DATA PACKAGE RECORD  
BEAN SHEET

DATE: 01/07/00  
Page 1 of 1

\* \* \* CASE/SUBMISSION INFORMATION \* \* \*

CASE TYPE: EMERGENCY EXEMP ACTION: 510 SEC18-OC F/F USE  
RANKING : 0 POINTS ()  
CHEMICALS: 128997 Tebuconazole

ID#: 00OR0006

COMPANY:

PRODUCT MANAGER: 05 ROBERT FORREST 703-308-9376 ROOM: CM2 248  
PM TEAM REVIEWER: STEPHEN SCHAIBLE 703-308-9362 ROOM: CM2 267  
RECEIVED DATE: 12/30/99 DUE OUT DATE: 02/18/00

\* \* \* DATA PACKAGE INFORMATION \* \* \*

DP BARCODE: 262194 EXPEDITE: N DATE SENT: 01/07/00 DATE RET.: / /  
CHEMICAL: 128997 Tebuconazole  
DP TYPE: 001

	CSF: N		LABEL: Y		
ASSIGNED TO	DATE IN	DATE OUT	ADMIN DUE DATE: 01/27/00		
DIV : EFED	01/07/00	02/29/00	NEGOT DATE: / /		
BRAN: ERB1	01/07/00	02/29/00	PROJ DATE: / /		
SECT: IO	01/07/00	02/29/00			
REVR : <i>K. Costello</i>	01/07/00	02/29/00			
CONTR:	01/07/00	02/29/00			

\* \* \* DATA REVIEW INSTRUCTIONS \* \* \*

Please review this section 18 request from Oregon to use tebuconazole on hazelnuts to control Eastern filbert blight. This is the first year this use has been requested by Oregon; fenarimol was requested for this disease from 1993 through 1999, but it is now felt tebuconazole is more effective. Please indicate if exposure to non-target organisms is of concern, including Federally-listed species. Additionally, please indicate if there are any environmental fate or groundwater concerns. If I can be of help, please call. Steve Schaible (308-9362)

\* \* \* DATA PACKAGE EVALUATION \* \* \*

No evaluation is written for this data package

\* \* \* ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION \* \* \*

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL
262191		01/07/00	01/27/00	Y	N	Y
262192	APPB/IO	01/07/00	01/27/00	Y	N	Y
262193	EAB/IO	01/07/00	01/27/00	Y	N	Y