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# The Chlorpyrifos Risk Assessment

## Part 3: Ecorisk—Guilt by Omission?

Dr. Allan S. Felsot, Environmental Toxicologist, WSU

### **Hidden Secrets**

You would think the Environmental Protection Agency (EPA) would have its hands full trying to implement the Food Quality Protection Act (FQPA) proviso to protect kids without having to worry about dead birds and fish. However, one of the secrets of the FQPA was the hidden mandate to examine ecological risk of all pesticides.

The FQPA required all product tolerances to be reassessed by the year 2006 for registration renewal. The tolerance reassessment process results in a document known as the Reregistration Eligibility Decision Document (RED). Within the RED, two elements are cobbled together: a human-health risk assessment conducted by EPA's Health Effects Division (HED) and an ecological risk assessment penned by EPA's Ecological Fate and Effects Division (EFED).

The HED documents have grabbed all the attention as EPA has dribbled out drafts onto its website, but the EFED reports are overall the most troubling for organophosphorus insecticides (OPs). While the HED analyses are tending to show less

and less risk to humans as real world data are used to refine the acute and chronic dietary exposure assessments, the estimated ecological risks of OPs reported by EFED are almost without exception exceeding EPA's levels of concern (LOCs).

### **Data Dump**

One by one, each OP has been subjected to an ecological risk assessment (ERA) using residue data derived from environmental fate screening models. The draft risk assessments face the obstacle of insufficient data to refine analyses away from the use of screening-level (estimated) data to more realistic, field-derived (measured) data.

However, EPA's EFED may have finally met its match with chlorpyrifos. Without doubt, the chlorpyrifos environmental chemistry and toxicology database is the most complete record of everything you would want to know about the ecotoxicology of an insecticide. Further good news is that an outside observer does not have to rely solely on the manufacturer's (in this

## Chlorpyrifos Ecorisk, cont.

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case, Dow AgroSciences' or DAS') proprietary data to decide if EPA has made a good case about the ecological risks of chlorpyrifos. A ton of information is already published in peer-reviewed journals, including several comprehensive reviews (1, 5, 9).

### **EPA's ABCs of ERAs**

Similar to the human-health risk assessment, the ERA consists of hazard identification, dose-response characterization, exposure assessment, and risk characterization. The first three processes are scientific. They require measurements of pesticide properties, environmental residues, and bioassays (i.e., toxicity testing). For OP insecticides, hazard identification is easy because all of these compounds inhibit the nervous system's signal-modulating enzyme, acetylcholinesterase. Thus, wildlife overexposed to these pesticides will quickly succumb to acute toxicity, but sublethal amounts are also of concern because abnormal behavioral effects can lead to reduced survival. To determine what is reasonably safe, test animals are fed increasing doses (birds, mammals) or are exposed in water to increasing concentrations (fish, invertebrates) to determine innocuous (No Observable Effect Concentration, NOEC) and median lethal levels ( $LD_{50}$ ,  $LC_{50}$ ) of exposure.

The more species tested, the better ecological risk can be characterized. Usually only a handful of mammal, bird, fish, and aquatic invertebrate species are tested; thus, EPA almost always uses the dose-response relationship for the most sensitive species of aquatic invertebrate, fish, and bird (i.e., those with the numerically lowest NOEC and  $LC_{50}$ ). Rat testing data from the health effects risk assessment are used as surrogates for mammalian wildlife.

Once the  $LC_{50}$  and NOEC doses have been pinpointed, EPA determines the range of potential exposures to the pesticide on foliage, in insects, and in water. It is not uncommon for EPA to cite in the RED residues from pesticide monitoring databases. The most often used database has been developed by the U.S. Geological Survey's (USGS) National Water Quality Assessment (NAWQA) Program. The data represent sampling from major watersheds in the United States, many of which encompass agricultural regions. EPA also examines

water residues noted in manufacturer-sponsored field studies.

For foliar residues, EPA examines a database called the Kenaga nomogram. First published in 1972 (6), the nomogram was constructed from measurements of pesticide residues on directly sprayed foliage and fruits. Although based on comparatively few empirical studies, the Kenaga nomogram was later modified with more data in 1994 (3). Given certain inputs like vegetation type and rates of pesticide application, the nomogram is a general estimator of residues on foliage, fruit, nuts, and seeds. It is also used to estimate residues on insects that might be consumed by birds and mammals.

### **Exposure Data Made to Order**

Where data do not exist, EPA will run several types of computer models that simulate pesticide behavior in soil and water. The output from these models is a pesticide residue concentration in water after specific intervals following application. The EPA assumes that the residue is occurring in a one hectare (2.2 acre) pond two meters (6.2 feet) deep. With the model known as GENECC (Generic Expected Environmental Concentration Program), EPA assumes that 5% of the applied pesticide drifted into the pond.

With the more specific, process-oriented model PRZM (Pesticide Root Zone Model), the magnitude of water runoff and soil erosion from a 10 hectare field surrounding the pond will vary depending on the soil type and its properties (e.g., sand content, organic matter), field topography, and the rate of precipitation and water infiltration. Thus PRZM allows variable amounts of the pesticide to move from the field into the pond.

### **Risk Characterization— One Strike and You're Out**

In practice, even if measured residues have been submitted to the agency or published in the scientific literature, EPA still prefers, in the case of ecological risk assessment, to rely on residue numbers generated by simulation models. These simulated numbers are called estimated environmental concentrations (EECs).

Risk is characterized by dividing the EEC by the designated most sensitive  $LC_{50}$  and NOEC. The resulting

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**TABLE 1**  
**EPA's Ecological Risk Presumptions, Risk Quotient (RQ) Basis, and**  
**Corresponding Levels of Concern (LOC)**

Presumed Risk Category	Regulatory Significance	Basis of RQ	RQ LOC Terrestrial Animals	RQ LOC Aquatic Animals
Acute High	Potential for acute risk is high and regulatory action may be warranted in addition to restricted use classification	EEC/LD50 EEC/LC50	0.5	0.5
Acute Restricted Use	Potential for acute risk is high but may be mitigated through restricted use classification	EEC/LD50 EEC/LC50	0.2	0.1
Acute Endangered Species	Potential for acute risk to endangered species is high and regulatory action may be warranted	EEC/LD50 EEC/LC50	0.1	0.05
Chronic Risk	Potential for chronic risk is high and regulatory action may be warranted	EEC/NOEC	1	1

ratio is known as a risk quotient (RQ). EPA compares the RQ to one of four LOCs that represent different categories of presumed risk and regulatory significance (Table 1). Both risk from a single exposure (acute) and a lifetime-equivalent, repeated exposure (chronic) are characterized for terrestrial and aquatic animals. Acute toxicity risk to nontarget plants is also considered, usually based on response of algae in aquatic systems. An RQ from any category exceeding its designated LOC triggers the need to mitigate risk. The method of mitigation, however, is not mentioned in the draft REDs. The values chosen for the LOCs and the methods of mitigation represent risk management rather than the scientific process behind risk assessment.

Based on the magnitude of the LOCs in Table 1, it is obvious that EPA is not trying to keep every last non-human organism alive. For example, with an acute high risk LOC of 0.5, the EEC would be 50% of the value of the LC<sub>50</sub>. Given the form of dose-response curves for susceptible populations, such a residue concentration would still be lethal to some animals. However, for quickly reproducing animals like aquatic invertebrates, overall population size is unlikely to be affected, especially as residues drop even further below the LC<sub>50</sub>. As the magnitude of the LOCs indicates, EPA is less accepting of exposure to endangered species or expo-

sure when reproduction might be adversely affected (i.e., chronic risk).

## Concerned About Chlorpyrifos

When EPA conducts an ERA, it simulates exposure under all relevant crop and application scenarios. The ubiquity of chlorpyrifos registrations resulted in one very long assessment document considering everything from corn to apples to mosquito control. Needless to say, essentially all uses resulted in the calculation of excessive risks to aquatic and terrestrial animals. Examples of the RQs for terrestrial and aquatic animals resulting from exposure following spray applications to

apples are summarized in Tables 2 and 3 (pages 4 and 5), respectively. Given the magnitude of residues simulated on plants and water immediately after application, chlorpyrifos did not have a fighting chance. But is this characterization a figment of some computer programmer's imagination, or is chlorpyrifos wreaking environmental havoc?

## Sound Science Means Using the Available Data

EPA derived its exposure estimates for apples using some peculiar assumptions. Chlorpyrifos is used quite a bit on apples nationwide, with 74% of the acreage treated an average of 1.7 times a year using an average rate of 1.43 lbs. active ingredient per acre (ai/acre) (13). In Washington State, 91% of the acreage is treated on average 1.4 times per year at a rate of 1.76 lbs. ai/acre. Contrast these demographic survey statistics with EPA's assumption of eight applications per year at a rate of 1.5 lbs. ai/acre. The label for the use of Lorsban apparently permits up to eight applications per year, but growers aren't going to stay in business for long using maximum amounts.

EPA assumed that chlorpyrifos had a seven-day half-life, meaning half the amount of the chemical would naturally

## Chlorpyrifos Ecorisk, cont.

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dissipate from foliage in seven days. However, several publications indicate that volatilization is a major route of loss from foliage which, when factored in, results in a half-life of less than two days. For example, one reported study of corn foliage showed that 79% of the applied chlorpyrifos volatilized within forty-eight hours (9). Studies of other organophosphate insecticides on different kinds of foliage have indicated a characteristically rapid dissipation, with half-lives less than two days (8, 12, 16).

EPA assumed that broadleaf foliage would have a maximum chlorpyrifos residue of 403 ppm (parts per million) after eight chlorpyrifos applications. Although chlorpyrifos residues on apple foliage have not been reported, parathion on peach foliage in California can serve as a surrogate (16). The maximum parathion residue immediately after application can be estimated as three times the mean residue recovered or 210 ppm based on a rate of 2 lbs. ai/acre. If the half-life is seven days as EPA assumed, then a spreadsheet calculation confirms that 418 ppm would be on the foliage after eight applications. However, if the more realistic half-life of two days is assumed (actually less than one day for parathion), then the maximum foliar residue would be 232 ppm. But if one allows even more realism and estimates foliar residues after a maximum of two applications, then the residue would be only 22 ppm two weeks following the initial spray date. Thus, starting with unrealistic assumptions of spray frequency and unmeasured initial foliar residues on fruit tree foliage, then neglecting to factor in the importance of rapid volatilization in dissipation will result in excessive chronic exposure risk.

The assumptions that EPA used to estimate aquatic exposures suffer from the same dismissal of published litera-

ture as the foliar residue assumptions. The model that EPA used essentially assumed no dissipation of residues once they were in water other than by sedimentation out of the water column. Yet numerous published studies show very rapid volatilization from water, with half-lives ranging from several days (4, 9) to less than twelve hours (7, 10). EPA's sole reliance on the model-generated post-application exposure to chlorpyrifos of 62 ppb and, twenty-one days later, to 30 ppb naturally led to a perception of excessive risk from chronic exposure.

Acute exposure of aquatic organisms also seemed risky

**TABLE 2**  
**EPA Risk Characterization for Terrestrial Animals**  
**Following Lorsban Sprays on Apples\***

	Food Source	† Exposure	Toxicity Endpoint	Toxicity	‡ RQ
Mammals	Foliage	403-717	Acute LD <sub>50</sub>	102	4.0-7.0
	Insects	45-403	Acute LD <sub>50</sub>	102	0.44-4.0
	Fruits, nuts/ seeds	45-403	Acute LD <sub>50</sub>	462	0.097-0.87
	Foliage	403-717	§Sub-acute dietary LC <sub>50</sub>	1330	0.30-0.54
	Foliage	403-717	Reproduction NOEL	10	40-71
Birds	Foliage	403-717	Subacute dietary LC <sub>50</sub>	136	3.0-5.3
	Foliage	403-717	Reproduction NOEL	25	16-29

\* EPA assumed 8 aerial applications of Lorsban at a rate of 1.5 lbs ai/acre at 7-day intervals; the half-life for chlorpyrifos dissipation from foliage was assumed to be 7 days.

† In each food source category, the first exposure number represents the upper estimated concentration for broadleaf foliage, large insects, and fruits, respectively. The second number represents the concentration for short grass, small insects, and nuts/seeds, respectively.

‡ The RQ was calculated by dividing the data in the exposure column by the data in the toxicity column.

§ The sub-acute dietary LC50 and reproduction NOEL are generated in multi-day feeding studies.

# Chlorpyrifos Ecorisk, cont.

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**TABLE 3**  
**EPA Risk Characterization for Freshwater Aquatic Animals Following Lorsban Sprays on Apples.\***

Organism/Endpoint	Exposure	Toxicity Endpoint	Toxicity	RQ
Fish	61.8	Acute LC <sub>50</sub>	1.8	34
Fish	† 30-55	Reproduction NOEC	0.57	53-96
Aq. Invert.	61.8	Acute LC <sub>50</sub>	0.1	620
Aq. Invert.	30-55	Reproduction NOEC	0.04	750-1400

\* EPA did not explicitly state its aquatic residue half-life assumption but it appeared to be approximately 20 days.

† The first number represents the estimated upper concentration at 21 days; the second number is the concentration at 96 h.

to EPA because of assumptions about how much chlorpyrifos runs off into a pond and how much drifts. Assumption of 5% drift from an aerial or airblast sprayer application is highly exaggerated. Using the EPA sanctioned drift model AgDRIFT (2), I simulated a drift scenario assuming an application from an orchard airblast sprayer at a rate of 1.5 lbs. ai/acre. The resulting chlorpyrifos concentration in a pond immediately adjacent to the orchard was 0.16 ppb, representing drift of only 0.2%.

## Getting By With A Little Help from Your Friends

It didn't take too long for me to use the published literature to produce an alternative view of parts of the ecological risk assessment for chlorpyrifos. I didn't even try to tinker with the actual toxicity values as DAS did in its lengthy response to EPA. However, in the spirit of a peaceful year 2000, I want to offer a little bit of friendly advice.

I recognize the utility of models for estimating exposure across a wide variety of cropping and potential environmental scenarios, especially when data are sparse. But an honestly rigorous use of such models would involve a reality check on the EECs. Thus, if the manufacturer's data and published literature indicate environmental residues significantly lower than simulation model

estimates, the models need to be recalibrated. For example, the literature clearly indicates that chlorpyrifos is rapidly volatilized from foliage and water. So why not rerun the models incorporating a realistic parameter of volatility?

Finally, to EPA's credit, it does describe actual incident data involving wildlife and fish kills. It also looks at the well-respected USGS-NAWQA database for pesticide residues. But the agency seems to essentially dismiss the significance of these valuable empirical reports. The NAWQA database, for example, indicates that the highest level of chlorpyrifos found in flowing water, the most relevant ecological setting for us Westerners, is only 0.4 ppb with a 95<sup>th</sup> percentile concentration of 0.026 ppb (15). These very low concentrations and detection frequencies are consistent with other studies focusing specifically on corn growing regions where chlorpyrifos is used (11).

EPA reported nine wildlife- and three fish-kill incidents since the mid-1970s, with nearly all being attributed to urban uses of chlorpyrifos. Let's put this into perspective in relation to the magnitude of chlorpyrifos use on major crops. Four million acres of corn were treated in 1998 with chlorpyrifos at a rate of about 1 lb. ai/acre (14). Liberally assuming that a typical Corn Belt farm is 1000 acres, then at a constant 1998 use rate during the last ten years alone, over 40,000 farms representing an aggregate 40 million acres would have had at least one chlorpyrifos application. If chlorpyrifos is as ecologically risky as EPA estimates it to be, then inquiring minds want to know—where are the dead bodies?

Dead bodies or not, I do know this about our growers and pesticide applicators. They're attending our pesticide applicator training sessions in droves, and they are hungry for best management practice information that improves soil and water quality. If we help them find and/or develop the tools, they will use them. Rest easy, EPA.

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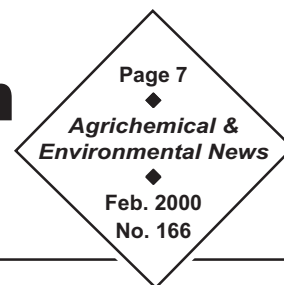
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### Felsot Receives North Star Award

Dr. Allan S. Felsot, Environmental Toxicologist at Washington State University's Food and Environmental Quality Laboratory, and frequent contributor to *Agrichemical and Environmental News*, was honored in December by being named the recipient of the Western Crop Protection Association's "North Star Award." The Western Crop Protection Association (WCPA) is a non-profit trade association representing manufacturers, distributors, formulators, and retailers of crop protection products and services throughout Arizona, California, Hawaii, Idaho, Montana, Nevada, Oregon, Utah, Washington and Wyoming. The North Star award honors individuals who exemplify high standards of stewardship in crop protection. Named for the North Star, the award recognizes those who offer a "guiding light" in the sciences surrounding crop management. As recipients are not generally from the academic community, this is a special honor for our own Dr. Felsot. Congratulations, Allan!

# Pesticide Exposure and Children

## Part 1: Why Focus on Kids?



Dr. Richard Fenske, Professor of Environmental Health, UW

As the year 2000 begins, the link between pesticides and children has become a high profile issue for consumer groups, the chemical manufacturing industry, and government agencies. Even Congress is getting into the act. "Pesticide risk unknown at schools" reads the headline of an Associated Press article published in the January 5 *Seattle Times*. Senator Lieberman from Connecticut, Senator Torricelli from New Jersey, and our own Senator Murray are proposing new legislation that would require schools to notify parents before pesticides are used. Their concerns have been spurred by a recent General Accounting Office report which concluded that little is known about pesticide use in schools and the potential exposure of children.

Once again we find ourselves confronted with controversy and uncertainty about the health risks of pesticides. We have stepped into what has recently been called the "risk information vacuum" by two Canadian academics, Douglas Powell and William Leiss, in their book, *Mad Cows and Mother's Milk: The Perils of Poor Risk Communication* (McGill-Queen's University Press, 1997). It is always refreshing to view U.S. risk controversies through the eyes of our northern neighbors. Powell and Leiss sit outside the fray, and are able to take a more sanguine look at the heated health risk debates that seem to thrive in this country.

If we imagine the risk information vacuum from a chemist's perspective, we might see three sealed glass vessels in a line connected by stopcocks. The central vessel is a vacuum; one of its neighboring vessels contains various types of scientific knowledge; its other neighbor contains a mix of anecdotal information, speculation, anxiety, and even dread—let's call it "caution." If the two stopcocks are opened simultaneously, some combination of knowledge and caution will fill the vacuum. With pesticides and children we have a low concentration of scientific knowledge, but plenty of caution, so the vacuum quickly fills with a lopsided mixture. Until more scientific knowledge can be developed to supplant caution, the controversy continues.

### **Problems with Fleas**

My own concern about children and pesticides was sparked by a series of informal side meetings held at national conferences of the American Chemical Society, starting about 1986. At the time I was at the Agricultural Experiment Station at Rutgers University in New Jersey, and my work dealt with fluorescent tracer evaluation of exposures during pesticide applications. In these meetings scientists from government, industry, and academia got together to discuss what we came to call the "indoor occupant exposure" issue. Our attention focused quickly on the use of indoor broadcast spraying and "bombs" (total release aerosol canisters) to control fleas. Several organophosphates and carbamates with moderate acute toxicity were registered for this use. Scientists at North Carolina State University (Wright, Leidy, and others) had done some controlled spraying in dormitories, and measured residues of such compounds as chlorpyrifos and diazinon. Scientists at Dow had also conducted a study of broadcast spraying of Dursban™. But none of these studies had systematically estimated risks to children. What kinds of risks did these treatments pose, we wondered? Scientists from one major chemical manufacturer had done some controlled spraying with their product, and concluded that the possible risk for a crawling infant in a home soon after broadcast treatment exceeded their comfort zone. The company voluntarily withdrew its product registration for broadcast application around 1987.

I had done several research projects with scientists at Health Canada in Ottawa, and we soon found a common interest in this "new" issue of children's residential pesticide exposure. I was asked to develop exposure assessment guidelines for indoor environments, and in 1988 we tested the guidelines in a study with Dursban, following label instructions for broadcast treatment, and using some middle-of-the-road assumptions regarding skin contact and absorption. We published our findings in 1990 in the *American Journal of Public Health* (vol. 80, pp. 689-693), concluding that exposure levels within the first twenty-four to forty-eight hours "could result in doses at or

...continued on next page

above the threshold of toxicological response.” Our findings were quite similar to those of the aforementioned industry scientists who had withdrawn their product for broadcast use. Seven years later Dow and United States Environmental Protection Agency (USEPA) agreed to remove broadcast and total release aerosol applications from the Dursban product label on the basis of potential risks to children.

### **Children’s Environmental Health**


If we have eliminated some of the high exposure scenarios for children and pesticides, why do concerns continue? Are children really at risk in schools? Do crack-and-crevice or lawn applications pose a hazard? To answer these questions we need to step away from the issue of pesticide safety and look more broadly at concerns about children’s health. In the early 1990s a national network of public health professionals formed to focus on environmental hazards and children. The primary concern of this group was that children were being overlooked in research and health risk assessments. One result of their efforts was a 1996 Executive Order directing all federal agencies to develop an explicit strategy for including children’s health in their evaluations. Now, researchers who apply for funding from the National Institutes of Health need to explain why they are **not** including children in their projects. The spotlight has clearly been shifted to reach children. Environmental health research now includes such questions as: what do children eat and how does it differ from adult diets? Where do children spend their time and how do they interact with their environment? How

does hand-to-mouth activity in infants and toddlers affect exposure to environmental contaminants? Results from this research will add new knowledge to our understanding of pesticide health risks and reduce the uncertainty that currently fills the risk information vacuum. The National Institute

for Environmental Health Sciences and the USEPA recently partnered in funding eight new “pediatric environmental health” research centers, one of which is here in the University of Washington’s Department of Environmental Health. These new centers are part of the national effort to understand health risks in children.

### **Children and Susceptibility**

The final element of concern related to children’s health is children’s susceptibility to certain environmental hazards. The discovery over the past two decades of the health effects of lead on children has been instructive. Since 1960 our estimate of an acceptable lead exposure level for children has decreased steadily, dropping from 60 to 10 micrograms per deciliter of blood, according to the Centers for Disease Control and Prevention (Table 1). Some scientists believe that effects can occur from exposures below 10 µg/dL; work is underway to test this hypothesis.

The lesson to be learned from lead exposure is that children may have very different susceptibilities than adults, particularly in the very early years of life. It is well known, for instance, that infants have very low levels of the enzyme methemoglobin reductase, making them particularly susceptible to anemia, or “blue baby syndrome.” (See related article in *AENews* Issue 150, Oct. 1998.) Also, the enzyme that breaks down the pesticide parathion and its oxon derivative is not fully expressed until about two years, so until that time young children are probably at elevated risk from exposure. These examples point to a need for a better understanding of developmental factors in young children. Public health is about the prevention of disease, and it is only with a solid scientific base that we can develop policies that are protective, fair, and cost-effective. Part 2 will review our recent work on pesticide exposure in children in Wenatchee. 

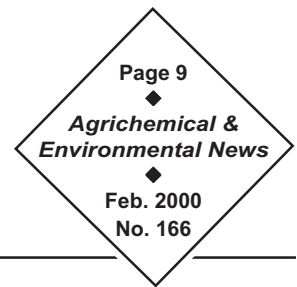
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**TABLE 1**  
**CDC Action Levels for**  
**Blood Lead in Children**

Years	Blood Lead Level (µg/dL)
1960-1970	60
1970-1985	30
1985-1991	25
1991-	10



# Ding, Dong—It's Not Avon® “Pest Board Calling”



Sally O'Neal Coates, Editor of Research Publications, WSU

It happens all over the state of Washington. It may have happened in your neighborhood or the neighborhood of someone you care about. It just may have happened to *you*. It goes something like this:

(KNOCK, KNOCK)

HOMEOWNER (opening door): "Yes? May I help you?"

CALLER: "I'd like to talk with you about that crabapple tree in your backyard..."

The county pest board has come calling. And, unlike the caller in the old joke who says, "I'm from the IRS and I'm here to help you," these officials are actually in the business of helping.

## **The Purpose of Pest Boards**

Pest boards have been established in counties throughout Washington State in an effort to maintain "growing areas free of pests to ensure unrestricted trade in national and international markets." Specific pest problems vary from county to county, but the phenomenon of infection is a constant reality. When a horticultural product is infected (in the sense of "infested with pests or diseases," as defined by the Revised Code of Washington), it has a nasty tendency to pass that infection on to nearby plants similar in nature. Pest boards have been organized in counties where lack of coordinated pest control has been identified as an actual or potential barrier to trade.

The main purpose of pest boards is to educate home fruit tree owners and, in some cases, commercial growers as to the proper means of pest control for those specific pests identified as problematic in that county.

## **Organization and Funding**

County pest boards vary in precise structure and source(s) of funding. Not all Washington State counties have active pest boards, though any county can establish one. Established boards range from all volunteer to professionally coordinated and staffed. In most cases, pest boards are less-than-full-time

endeavors, operating in cooperation with county extension offices and/or county commissioners and/or other entities such as weed boards, often sharing office space with these organizations.

Table 1 lists representatives and contact telephone numbers for several of the more active county pest boards. The listed contact person may be a county extension agent, salaried coordinator, field inspector, or grower/volunteer, and the telephone may be an office number, home number, or a cell phone bouncing around on the seat of a pick-up. In each case, it is a number likely to result in an informed response to questions.

Most active pest boards have received some sort of funding from the county they serve. In many cases, this funding has been reduced or eliminated completely in the wake of Initiative 695, leaving many pest boards scrambling for resources. Washington State Department of Agriculture (WSDA) has a representative on each county pest board and is working on proposed legislation that would provide an additional funding avenue for county pest boards. As proposed, this legislation would be grouped into a bill that includes rewriting the Horticultural Plants and Facilities statute (commonly known as the "nursery law") and would amend the pest board statute (RCW 15.08) to include authorization for an assessment method of funding modeled after weed board funding. The new bill would not exempt county commissioners from the provisions of I-695; any assessments would be subject to vote. According to WSDA Assistant Director of Laboratory Services Mary Toohey, the bill has been cleared by the governor for introduction to the state legislature at this writing. While most pest boards support WSDA's work on this score, not everyone welcomes the idea of assessments à la weed boards. In the words of one pest board spokesperson, such funding solutions tend to be a "cute puppy, ugly dog" phenomenon.

In the meantime, pest boards are seeking grants, appealing to industry, and relying on volunteer efforts to pursue their objectives.

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Sally O'Neal Coates, Editor of Research Publications, WSU

**TABLE 1  
 SELECTED COUNTY PEST BOARDS AND REPRESENTATIVES**

County	Contact	Phone
Adams	Karen Lewis	(509) 346-1377
Benton	Frank Wolf	(509) 786-5609
Chelan-Douglas	Marlane Gurnard	(509) 665-7195
Franklin	Tom Wilson (Apr-Sept)	(509) 545-3847
Grant	Karen Lewis	(509) 346-1377
Kittitas	Urban Eberhart	(509) 962-7507
Okanogan	Dan McCarthy	(509) 322-1286
Skagit	Dyvon Havens	(360) 428-4270
Walla Walla	Walt Gary	(509) 527-3260
Whatcom	John Belisle	(360) 398-9187
Yakima	Mike Klaus, Ron Britt	(509) 225-2609

## What Happens in the Trenches

Washington State pest board issues pertain almost exclusively to tree fruits. Issues arise primarily in one of the following two scenarios:

- 1) In areas with higher population and greater agricultural/residential proximity, backyard fruit trees, which often go untreated or improperly treated for pests, cause problems for nearby commercial growers.
- 2) In older agricultural areas, abandoned orchards no longer receiving appropriate pest control create problems for viable orchards nearby.

The first scenario is by far more prevalent than the second in most counties. The Benton County Pest Board, for example, reported 207 contacts with alleged offenders in the past year, only 4 of which were commercial. Other high population counties report a similar preponderance of homeowner contacts. In counties with more agricultural acreage such as Chelan and Douglas, the split between complaints about residential vs. commercial trees is closer to half-and-half. The most extreme example of the abandoned orchard issue is in Okanogan County,

where, in 1999, the county pest board instigated removal of 360 acres of abandoned orchards. "And," emphasizes board representative Dan McCarthy, "these are only the ones we received complaints about!" He described this as a mere "drop in the bucket" compared to actual acreage that has gone out of production, adding that some 150 acres remain uninvestigated from late-season complaints.

Such large-scale tree removal is expensive (\$300 per acre by one estimate) and complicated. Where owners are unable to properly manage their orchards' pests, counties can obtain a release from the owner, contract for removal services, and place a lien against the property. But the contractors must be paid. In the case of Okanogan County, the upfront money for much of the orchard removal was funded by county coffers (some \$25,000 of a total \$40,000 pest board budget). While waiting to recoup these funds, the county is investigating short-term loans to bridge the gap so that removals can continue this season. Yakima and Skagit counties have initiated large scale tree removals as well, using combinations of volunteer labor (such as from neighboring orchardists who benefit from the trees' removal), industry contribution, and county funding. Not every county gets involved in the business of tree removal.

## Door-to-Door: The Backyard Fruit Tree

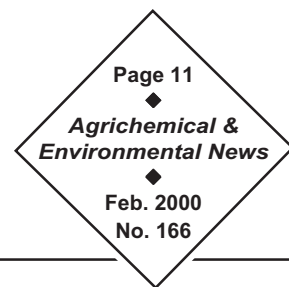
Volunteer Kittitas County Pest Board Coordinator Urban Eberhart may have explained it best when he likened fruit tree ownership to pet ownership: "Nobody has trouble understanding what you do if you own a pet—you take responsibility."

In the eyes of the state, that goes for fruit tree ownership as well. RCW 15.09 states that the owner of the fruit tree is responsible for controlling destructive pests and diseases of that tree. Pest boards become involved when a tree or trees is believed to pose an economic threat to commercial fruit trees.

How do specific backyard trees come to the attention of county pest boards? Some counties are proactive,

...continued on next page

# Pest Boards, cont.



Sally O'Neal Coates, Editor of Research Publications, WSU

canvassing neighborhoods near orchards in search of trees that have the potential to host pests identified by their county as problematic, while other counties operate on a more reactive basis, responding only to formal complaints from commercial growers.

In Skagit County, where apple maggot quarantine is in effect, the board takes a largely proactive approach. Fruit shipping outside the county must be certified by WSDA; certification entails WSDA trapping and monitoring in a half-mile radius from the subject orchard. The Skagit County Pest Board takes the monitoring a step further, trapping in the half-mile to one-mile radius from the subject orchard.

In many counties, homeowners are contacted only when a commercial grower files a formal complaint. When the pest board receives such a complaint, they send an investigator to visit with the homeowner.

Several boards, including Benton, Walla Walla, and Franklin counties, have included a proactive component in their program by mailing out information—either reminders to past offenders, or general “how-to-control-your-pests” information to those in target areas. Walla Walla has cooperated in starting an educational program, offering classes to educate backyard fruit tree and small orchard owners on proper pest control.

## ***It's All About Information***

Pest boards across the state agree that education is their number one objective. Whether a backyard fruit tree comes under scrutiny as the result of canvassing or a grower complaint, the mission of the pest board investigator is to discover whether a problem exists (i.e., a pest is not under control), then to provide information to the tree owner on how to eliminate that problem. Options include contacting the county Cooperative Extension office for information on proper pesticide use and timing, and cutting the tree down. In some cases, stripping the tree of fruit and disposing of the fruit in a prescribed manner is an option. Some codling moth cases can be controlled by bagging pears and apples as a barrier to infection; this labor-

intensive remedy is seldom chosen by home fruit tree owners. For those wishing to control by spraying, investigators may also recommend tree trimming so pesticides can reach target areas.

Not surprisingly, many homeowners, when faced with the reality of spray logistics and timing, choose to cut down their tree. This is fine with the pest boards, whose representatives are quick to point out the relative expense of producing homegrown fruit on a properly managed tree compared to purchasing commercially grown fruit.

According to most county pest board representatives with whom I spoke, backyard fruit tree owners welcome information, and most contacts are cordial, even if the board's and the Cooperative Extension office's advice is not followed to the letter. Repeat contact seems to be the key to compliance.

Do homeowners always welcome the knock of authority at their doors? Not according to Karen Lewis, who has been with the Grant and Adams county pest boards for twelve years. “I've had doors slammed in my face, guns pulled on me,” she said. “One individual shouted, ‘This is why I left Russia!’ before slamming the door on me.” Regardless of their reception, says Karen, she and WSDA representative Ron Fox proceed (“with utmost diplomacy!”) to distribute information.

But for the most part, it seems that homeowners are more ignorant than malicious. Many fruit tree owners spray, but use the wrong chemistries. Benton County reported a case where the tree owner was dousing a tree with dormant oils throughout the summer; Chelan-Douglas dealt with a “home remedy” fan who favored a concoction involving stale beer and ammonia (see related article by Dr. Catherine Daniels, “Is it Snake Oil?” in *AENews* Issue 163, Nov. 1999). More often, homeowners who spray do so at the wrong time or not often enough. Some backyard tree owners don't believe their trees harbor pests until shown the evidence in monitoring traps. Others actually “don't know they have a fruit tree.” Benton County Pest

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Sally O'Neal Coates, Editor of Research Publications, WSU

Board Coordinator Frank Wolf describes trade show encounters where he asks passersby, "Do you have a fruit tree?" Most immediately answer, "No," then, after a moment's pause or further questioning, admit—as though realizing it for the first time—that they have a fruit tree, but "We don't eat from it." As though not eating the fruit makes it somehow not a fruit tree. As though that has anything to do with exacerbating the pest problem.

### **Name That Problem Pest**

Pest boards in Washington State are concerned almost exclusively with tree fruit pests. Apple and cherry pests are primary, followed by pears and soft fruits. Some counties, including Skagit, Grant, and Adams, have looked into potato issues, but, for the most part, growers are still handling these problems independently.

West of the Cascades, apple maggot is the main concern. Quarantines are in effect in most western Washington counties that prohibit shipping of fruit not certified free of apple maggots by WSDA. Skagit's main concern is apple maggot, but they have recently added codling moth to their list. Whatcom County, to which the apple maggot quarantine is expected to extend this year, has comparatively little tree fruit. Their pest board became active in 1998 to stay proactive on the apple maggot issue and to evaluate the potential for soilborne pathogen problems in their considerable raspberry acreage.

East of the Cascades, codling moth is king, due to the large amount of apple acreage, followed by cherry fruit fly. California's "zero-tolerance" policy on cherry fruit fly makes control of this pest especially important. Counties with vast acreage planted to mature orchards, such as Okanogan County, concentrate on these pests. Other counties, such as Adams and Grant, where the orchard industry is relatively new (with a boom in plantings in the late 1970s and early 1980s) and row-crop adjacency to orchards is more common, list more problem pests, including San Jose scale, leafrollers, pear psylla, fireblight, Lygus bug, and lacanobia.

### **Effecting Solutions**

Pest boards are making a difference. Homeowner education and repeated contact, particularly from the same individuals over a period of time, seem to be effective in encouraging adoption of appropriate pest management. Some commercial growers believe that board actions don't go far enough. In truth, pest board efforts are hampered both by funding (who's going to pay to remove that abandoned orchard or print those pamphlets?) and by lack of enforcement authority.

Some counties are working toward creative solutions between growers and hobbyists. Residential neighbors could contract with commercial neighbors to spray their trees, for example, resulting in a cost-effective and beneficial solution for all concerned.

Removing home fruit trees is always a good solution, from a pest management perspective: simple and permanent. But, even if persuaded that homegrown treefruit makes no economic sense, homeowners can, understandably, be reluctant to give up their favorite shade tree. Tom Wilson of the Franklin County Pest Board would like to see a "tree buyback" program in place whereby a fruit tree owner who agreed to cut down a tree received, say, a certificate for \$25 good toward purchase of a non-fruit-bearing shade tree at a local nursery.

### **In Their Own Words**

The pest board members with whom I spoke emphasized the cooperative nature of the pest board concept. Not only do board members serve on a voluntary basis, the entire pest management strategy they advocate is about neighbors helping neighbors, volunteering to ensure that pests are managed to a level that trade can proceed.

With hard and soft chemistries and organic methods, pest management is, in the words of Karen Lewis, "not a black-and-white issue anymore." In fact, as Urban Eberhart points out, "IPM can't work without this sort of cooperation."


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# Pest Boards, cont.

**Sally O’Neal Coates, Editor of Research Publications, WSU**

Marlane Gurnard, of the Chelan-Douglas Counties Pest Board, sums up the issue of cooperation and reduced pesticide use:

*“Nobody likes to buy produce with lots of sprays on them. So folks use that as an excuse for not spraying their fruit. So if you have an orchardist who, as with many, is going to softer chemistries, and a neighbor lets his pests get out of control through ignorance or negligence or wanting to avoid sprays, sometimes that orchardist has no solution except heavier spraying.”*

It seems that a great deal of media, regulatory, and scientific attention is devoted to exhorting commercial growers to “be good neighbors” to nearby homeowners and consumers at large. Indeed, a great number of pages in *Agrichemical and Environmental News* are devoted to those issues. Perhaps it’s only fair that consumers, including those with fruit trees in their yard, return the favor. 

*Sally O’Neal Coates is an Editor of Research Publications for WSU, and Editor of Agrichemical and Environmental News. She can be reached at [scoates@tricity.wsu.edu](mailto:scoates@tricity.wsu.edu) or (509) 372-PEST.*

# Pesticide Applicator Training

Washington State University offers PRE-LICENSE courses (for those who do not have a license and need one) and RECERTIFICATION courses (for those who need to renew their current licenses). Fees are \$35 per day if postmarked 14 days before the program, otherwise \$50 per day. This fee DOES NOT include WSDA license test fees, which range from \$25 to \$170; for information on testing and fees, contact WSDA at (360) 902-2020 or <http://www.wa.gov/agr/test/pmd/licensing/index.htm>. Recertification courses offer 6 credits per day. FOR MORE INFORMATION or REGISTRATION: (509) 335-2830, [pest@cahe.wsu.edu](mailto:pest@cahe.wsu.edu) or <http://pep.wsu.edu>.

Recertification Courses		Pre-License Courses	
Eastern Washington	Western Washington	Eastern Washington	Western Washington
Spokane Agricultural Spokane Valley Doubletree Inn Feb 14	Highline Community College Feb 3 & 4	Spokane Spokane Valley Doubletree Inn Feb 15, 16, 17	Mount Vernon, Cottontree Inn Feb 8, 9, 10
	Mount Vernon, Cottontree Inn Feb 9 & 10		Kirkland, Lake WA Technical College, Feb 15, 16, 17
	Kirkland, Lake WA Technical College, Feb 16 & 17		Tacoma, Pacific Lutheran U Feb 29, Mar 1, 2
Spokane Spokane Valley Doubletree Inn Feb 16 & 17	Tacoma, Pacific Lutheran U Mar 1 & 2	Spokane Agricultural Private Applicator License Spokane Valley Doubletree Inn Mar 25	Tacoma Aquatics, PLU Mar 1
	Seattle, U of Washington Mar 16 & 17		Puyallup, WSU Campus Mar 28, 29, 30
	<b>DEALER MANAGER RECERTIFICATION COURSE</b> Puyallup WSU Feb 15		Puyallup, WSU Campus Apr 4, 11, 18, 25 (Special 4-day course)

# Y2K: It's Not Bugging the Bugs

Dr. Doug Walsh, WSU Entomologist

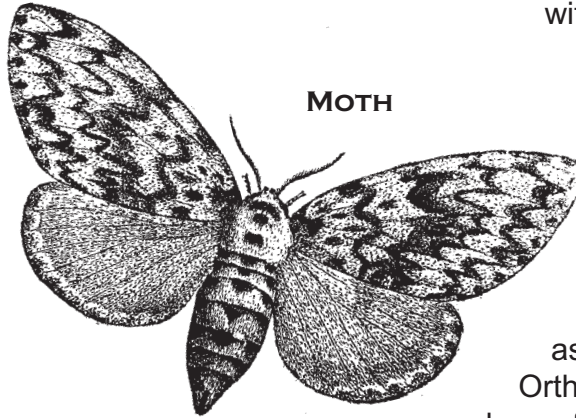
Now that all the hoopla about "Y2K bugs" has passed, I just wanted to assure you all that the internal clocks of all the *real* bugs of the Pacific Northwest were completely unaffected. Arthropods will arise this spring and proceed with their usual activities just as they have for millions of years: eating, chewing, biting, sucking, flying, and (most importantly) reproducing.

Taxonomists currently estimate that about 100,000 named species of terrestrial arthropods (insects, spiders, ticks and mites) live in America north of Mexico. Every year, each species must find a way to overcome the power outage and temperature drop we commonly refer to as winter. Canned food, portable heaters, and bottled water are not options. Monarch butterflies overcome winter by avoidance, migrating south in fall to the warmer climes of Mexico or California. Some subtropical insects actually re-colonize territories, pushing northward annually with no return ticket in a cyclic, reproductive dead end. Houseflies, as their name implies, keep warm through the winter by moving into our homes as uninvited guests. However, most insects in temperate regions stay put. How do they manage? They have evolved a physiological *diapause* or resting stage to survive the harsh conditions of winter.



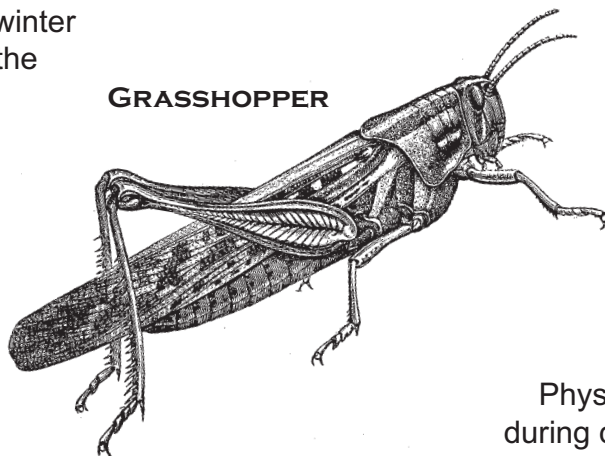
BEE

The overwintering stage evolved by insects can vary considerably from species to species, and specifics such as timing can vary



MOTH

within a species, but some general trends exist. Most insects in the orders Orthoptera (grasshoppers, crickets, katydids) and Homoptera (aphids, leafhoppers, mealybugs) overwinter as eggs. However, some Orthopterae and most members of the order Odonata (dragonflies, damselflies) overwinter as nymphs (larval form resembling the adult form, only smaller). Most Lepidoptera (moths and butterflies) overwinter as larvae (caterpillars) while many Hemiptera (true bugs), Coleoptera (beetles), and Hymenoptera (bees, wasps) overwinter as adults. Most spider mites overwinter as adult females, but the European Red Mite (a common pest of fruit trees) overwinters in the egg stage.



GRASSHOPPER

Physiological changes during diapause include an increase in the viscosity of body fluids and the production of glycerol. These changes inhibit the formation of ice crystals and help prevent the destruction of body tissues from freezing. Less typical changes include a shift in color, such as occurs in the female two-spotted spider mite, which becomes red during its diapause. The coloration change results from an accumulation of carotenoid compounds dissolved in fats and lipoproteins. Very little water remains in the mite's body; the minimal water required for

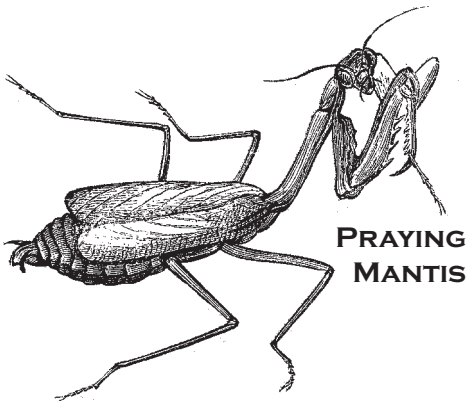
# Y2K Bugs, cont.

Dr. Doug Walsh, WSU Entomologist

metabolism is obtained through the oxidation of fat (Boudreaux 1963). Bonarenko (1958) demonstrated that diapausing female spider mites in Siberia could survive temperatures as low as  $-11.2^{\circ}\text{F}$  for several months.

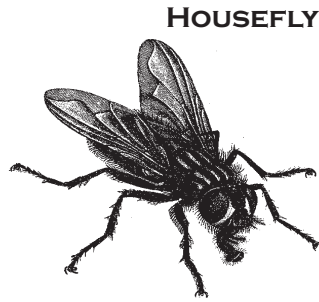
Typically, pest insects and mites interpret environmental signals for the initiation of diapause. The chief factor for most insects and mites in diapause initiation is a decreasing photoperiod (day length). Insects and mites "anticipate" winter's drop in temperature with an endocrine response to shortened day length, initiating the physiological changes described above. Despite environmental cues, some pest species will continue to develop and reproduce as long as weather conditions prove favorable.

Break from diapause or the resumption of normal physiological behavior is also under endocrine control, stimulated by environmental conditions. Insects and mites react to increasing temperatures and day length in spring, typically becoming active in spring concurrent with the availability of their host plant or other food source.




PRAYING  
MANTIS

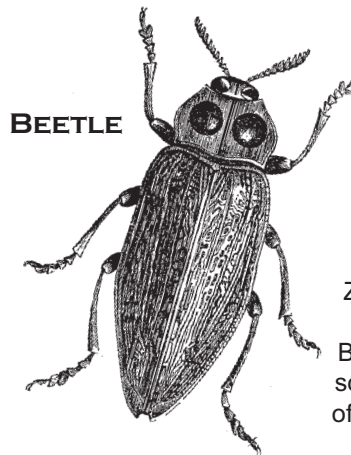
In short, the "real" bugs of Y2K are alive and well. So if you felt vaguely disappointed that the new millennium



HOUSEFLY

doomsayers were wrong, don't worry: there will be plenty of Y2K bugs all over the Northwest in about three months. 

*Dr. Douglas B. Walsh is an Entomologist and Agrichemical and Environmental Education Specialist with WSU. He can be reached at the Prosser Irrigated Agriculture Research and Extension Center (IAREC) at (509) 786-2226 or [dwalsh@tricity.wsu.edu](mailto:dwalsh@tricity.wsu.edu).*

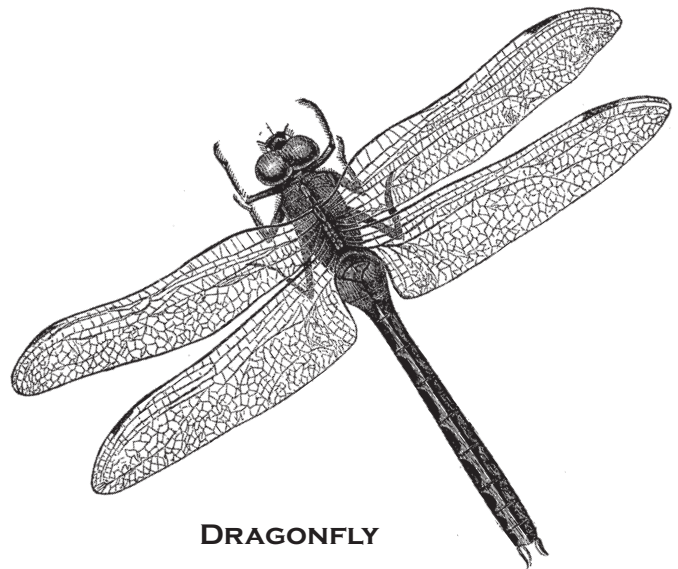


BEETLE

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Boudreaux, H.B. 1963. Biological aspects of some phytophagous mites. Annual Review of Ent. 8:137-154.



DRAGONFLY

# EPA's Response to "Requiem for Methyl Parathion"

Jack E. Housenger, Environmental Protection Agency

*The Managing Editor of Agrichemical and Environmental News received this letter in response to an article published in our September 1999 edition. The letter is reprinted in its entirety with permission of the author. Copies of the article to which he refers are available upon request by calling (509) 372-7378 or it can be seen on the Internet at <http://www2.tricity.wsu.edu/aenews/Sept99AENews/Sept99AENews.htm#anchor1736767>.*

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, DC 20460

OFFICE OF PREVENTION,  
PESTICIDES AND TOXIC SUBSTANCES

Dear Catherine Daniels, Managing Editor:

This letter is in response to Dr. Allan Felsot's article, "Requiem for Methyl Parathion," in the September issue of *Agrichemical and Environmental News* (No. 161, p. 3-4). Although I found the article entertaining, I would like to correct some of the assertions stated by Dr. Felsot regarding the methyl parathion risk assessment.

First, Dr. Felsot's claim that, "...EPA assumed the residues [for apples and peaches] were at the level of the tolerance, which was 1 ppm" is incorrect. The acute dietary risk assessment for methyl parathion is highly refined, using USDA Pesticide Data Program (PDP) data, which reflect residue levels close to the point of consumption, and, as stated by Dr. Felsot himself, "the best source of food residue data for most consumed fruits..." The most refined analysis conducted for methyl parathion included: (1) PDP monitoring data for blended commodities; (2) PDP composite data adjusted for single servings; (3) PDP single serving monitoring data; (4) FDA monitoring data; (5) field-trial data for other commodities; and (6) percent crop treated data. This dietary assessment is further refined using all available monitoring, processing and cooking factors. Additional refinements could include market basket monitoring for residue and a residue reduction study reflecting frying or baking. However, these data would not be likely to change the risk estimates appreciably, based on the degree to which such factors have been incorporated already. Additionally, EPA used available percent crop treated

data, roughly 25%, as opposed to the 100% implied by Dr. Felsot. This assessment does *not* include potential dietary exposure from methyl parathion residues in drinking water.

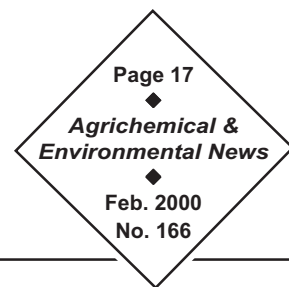
Second, the decision to retain the full 10X FQPA Safety Factor for methyl parathion was based on evidence from available data of irreversible neurotoxic effects caused by methyl parathion at low doses, and uncertainty posed by a substantial data gap that can be filled with the submission of a Developmental Neurotoxicity Test. The data that were instrumental in this decision are: (1) Neuropathology reported in acceptable studies submitted by the registrant; (2) Fetal/neonate susceptibility reported in open literature citations which were retrieved and reviewed by the Agency; and, (3) Fetal/neonate sensitivity/susceptibility reported in studies submitted by the registrant during the comment period. Further details on the effects and results of EPA's evaluations of these data can be found in documents filed in the Pesticide Docket for methyl parathion, also posted on the EPA's web site at [www.epa.gov/pesticides/op/methyl\\_parathion.htm](http://www.epa.gov/pesticides/op/methyl_parathion.htm). These data, taken *in toto* require that the 10X FQPA Safety Factor be retained until such time as the Agency receives an acceptable Developmental Neurotoxicity Test. When this study is received and reviewed, EPA will reevaluate the retention, reduction, or removal of the 10X FQPA Safety Factor based upon the weight of the evidence. The decision to retain the FQPA Safety Factor, as you can see, is not a decision taken lightly, as you imply.

Third, the Agency measures risk at the 99.9<sup>th</sup> percentile of consumption in an effort to capture as many persons exposed as possible. Although admittedly conservative, EPA feels that this is an appropriately inclusive approach for capturing potential exposure to pesticides. In fact, based on the use pattern before the voluntary cancellation was agreed upon, dietary

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## Response from EPA, cont.



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Jack E. Housenger, Environmental Protection Agency

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risks to children 1-6 years old from methyl parathion were above EPA's level of concern at the 90<sup>th</sup> percentile, without including possible exposure from methyl parathion residues in drinking water.

Last, Dr. Felsot humorously claims that, "...[methyl parathion] went down in flames," and included a headstone with "R.I.P M.P." inscribed. Again, entertaining, but a bit misleading. The voluntary cancellation of methyl parathion uses on fruits and vegetables – although reducing estimated dietary risk by 90% to children – affected only about 10% of current methyl parathion use. In other words, 90% of methyl parathion uses, roughly four million pounds of active ingredient, were unaffected, including its important uses on cotton and wheat. Additionally, as stated in the article, "Response to EPA Action, Methyl Par-

athion and Azinphos-Methyl Loss will Impact Tree Fruit Industry," in the same issue of *Agrichemical and Environmental News* (p. 1-2), Dr. Jay Brunner states that, "It is unlikely that loss of methyl parathion will have a sudden and dramatic impact on most Washington apple growers."

Again, I found your article amusing, but short on facts. EPA is confident that the action taken August 2, 1999, was appropriate and based on solid science. Thank you for the opportunity to comment.

Sincerely,

Jack E. Housenger, Associate Director  
Special Review and  
Reregistration Division

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## Response to EPA

*Dr. Allan S. Felsot, a frequent contributor to Agrichemical and Environmental News, responds to Associate Director Housenger's above letter.*

I am tickled pink that EPA Associate Director Housenger has decided to respond to an essay appearing in our humble little newsletter. I try to read all of the pesticide-related material his agency produces, and I even use it in my teaching and extension program. But to think they read my stuff has me blushing peach blossom pink.

I am also delighted that at least one beleaguered EPA staff person has a sense of humor, and I sense that he has duly noted the tongue-in-cheek nature of some of my comments.

Associate Director Housenger has made three fine points that I welcome this opportunity to respond to. Regarding his first point—my ignorance about the source of dietary residues used in the acute and chronic dietary risk assessment of methyl parathion (MP)—he is absolutely correct. Hoping not to seem too defensive, I can explain my inaccurate characterization.

Within two days of reading the press release concerning the cancellation of MP uses on tree fruits, I was writing the requiem essay. My computer files indicate I sent the copy to our editor on August 4, 1999. (ED. NOTE: Due to the monthly cycle of editing, drafts, and approvals, and the mechanics of printing within an academic institution, articles are typically due to the *AENews* Editor approximately one month prior to issue date.) To prepare my essay, I double checked the EPA web site to determine if a revised MP risk assessment had been released since the one dated September 1998. It had not, and not being aware of what was in the works (I'm not that much of an industry lackey), I relied on the earlier draft assessment.

After I submitted my essay, I went to Europe and did not return until the latter part of August. During the interim, EPA released to its web site a revised risk assessment (on August 10, 1999). This revised document is well crafted and has included raw data files to show how dietary exposure was estimated.

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Dr. Allan S. Felsot, Environmental Toxicologist, WSU

By the time I returned from my trip to Europe, there was no point in printing a correction based on the revised risk assessment because the compound was out of the picture as far as our fruit growers were concerned, and it was time to move on.

So, on point one, Dr. Housenger has set the record straight, and I regret having misled our faithful readers. On the other hand, maybe EPA ought to make a revised risk assessment available the day before they hold their press conference. Then we can all see what's up their sleeves. At least consider releasing information to the Cooperative Extension Service. After all, we are the people who have to do the risk communication in the agricultural communities.

Associate Director Housenger made two additional points in his letter, one regarding EPA's decision to "retain the full 10X FQPA Safety Factor," and the other regarding EPA's choice to measure risk at the 99.9<sup>th</sup> percentile. Allow me to address each of these points in turn.

Associate Director Housenger described why the EPA imposed an additional 10X FQPA Safety Factor on the Reference Dose (RfD, equal to the NOEL divided by 100) to derive a tenfold lower Population Adjusted Dose (PAD). My essay did support the contention that MP was "no lover of children." To give credence to my sardonic comment, I even footnoted a recently published paper that EPA did not have time to put in its risk assessment. I was wrong, however, about the toxicity endpoint dose chosen for the acute reference dose (RfD). Once again, my oversight was related to lack of access to the revised risk assessment.

But while we are on the issue, let's explore this 10X factor from my admittedly ignorant perspective. In the revised Toxicology Chapter of the MP RED (Re-registration Eligibility Decision Document), the author states the following justification for the extra safety factor. "Although differential sensitivity to young animals was not revealed in standard prenatal developmental and multi-generation reproductive toxicity studies, qualitative evidence of increased sensitivity

to perinatal rats has been identified in the open literature." Let's be honest about the experiments in this literature.

In all of the studies cited, rats are exposed to doses equivalent to substantial percentages of the lower end of the oral LD<sub>50</sub>. At such doses, I would expect a lot of injury, whether to the mother or fetus and neonate. Thus, the putative differential sensitivity has all been determined from acutely toxic doses. True, the doses didn't cause outright death, but a lot of weird things happen along the way to that endpoint.

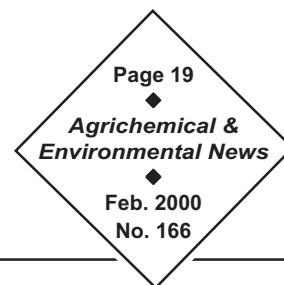
The reality of all OP residue exposure in food is that doses are far below a NOEL that is based on the most sensitive endpoint of response, inhibition of plasma cholinesterase (ChE). ChE inhibition is the same sensitive endpoint in rats and humans exposed to acute OP doses. Thus, rats are adequately predictive of human health effects. In the one relevant literature study that EPA cited in support of the extra safety factor (Gupta et al. 1985), the lowest dose to the pregnant mother (dam) was about 25% of the low end of the LD<sub>50</sub>, and this exposure went on for 14 days! Despite exposure to such an acute dose that either intoxicated the dams or resulted in significant decreases in acetylcholinesterase activity, there was no effect on rat pup brain weight, morphology, nor a surrogate measure of brain development (muscarinic receptor binding assay).

I do realize EPA's dilemma in regard to the specific language of the FQPA and children. The fact that EPA feels the existing database is inadequate and desires an acute neurodevelopmental toxicity study is enough to invoke the imposition of a 10X safety factor under the law. Still, it is hard to ignore the fact that the endpoint chosen for the acute RfD was a one-year feeding study. That choice hardly seems consistent with the need for information regarding acute dietary exposure.

I've yet to see the body of mechanistic toxicology literature that EPA has cited include doses encompassing a NOEL. So still unanswered in the pub-

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## Response to EPA, cont.



Dr. Allan S. Felsot, Environmental Toxicologist, WSU

lished literature is whether or not there is differential sensitivity between adults and neonates at exposures equivalent to the NOEL. In data submitted by the manufacturer thus far, there seems to be no differential sensitivity at those levels. But I too await the results of the manufacturer's acute neuro-developmental toxicity study. I was hoping my friends in industry would take note of my not so thinly veiled message in the essay—if you want to play you better ante up with adequate data.

But please don't tell me the decision to impose the extra 10X safety factor is based on a scientific principle. If the regulatory world were really interested in the science, it would be demanding (or at least funding) studies to better quantify the NOEL and what is happening biochemically at that dose and below. How about funding research that validates the RfD and doses ten times that level? Alas, my colleagues in toxicology may find such an endeavor lacks sufficient challenge. Negative measurements (i.e., lack of response) make lousy publication material.

Regarding the use of the 99.9<sup>th</sup> percentile level of acute dietary residue exposure, it sounds great on paper but EPA knows that it is a very unstable expo-

sure level. Indeed, as one repeatedly runs a probabilistic dietary exposure assessment model based on Monte Carlo analysis, different exposure levels are produced with each run. However, if EPA insists on protecting kids at this simulated level of exposure, that is the agency's prerogative. It is a risk management agency not an academic institution.

In closing, I thank Associate Director Housenger for reading our newsletter and responding to set the record straight. Sound science involves open discussion of the issues. Therefore, I invite EPA staff members to engage us egghead academics in dialog. As long as the managing editor of this newsletter gives the OK, we will publish their responses. Heck, I will probably even agree with a lot of what they might say.

### EDITORS' NOTE

The editors of *Agrichemical and Environmental News* welcome opposing viewpoints, and will print such items on a space-available basis. All *AENews* articles must relate to agrichemical and/or environmental and/or human health issues, must be timely and well written, and must exhibit factual reporting and/or be based on scientific principles. No ad hominem attacks are allowed regardless of scientific basis.

## Dear Aggie

Providing answers to the questions you didn't know you wanted to ask

*In contrast to the usually more sober contributors to the Agrichemical and Environmental News, Dear Aggie deals lightly with the peculiarities that cross our paths and helps decipher the enigmatic and clarify the obscure. Questions may be e-mailed to Dear Aggie at [dearaggy@tricity.wsu.edu](mailto:dearaggy@tricity.wsu.edu). Opinions are Aggie's and do not reflect those of WSU.*

Dear Aggie:

*Sometimes I think there's no point trying to make sense of labels and tolerances without a detailed map, compass, and headlamp. Recently, I had a simple question about paraquat and grapes. Specifically, why is paraquat (Zeneca/Gramoxone Extra Herbicide, EPA Reg. No. 10182-280) labeled for use on grapes when*

*there is no tolerance for that crop/chemistry combination in 40 CFR 180.205? The good folks at EPA told me paraquat was covered by the small fruit and berries crop group tolerance of 0.05ppm, but that just left me more puzzled. I found "small fruit" listed under paraquat in 40 CFR 180.205, but I can't find "small fruit" defined in my current materials. It's not listed as a "crop grouping" (40 CFR 180.41). It seems to me that*

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***“small fruit” should have a crop group number or should be listed as a commodity. I also looked on page 302 40 CFR (7-1-98 Edition) and hoped to see “small fruit” defined. No dice. So here I am, still lost and...***

### ***Groping for Grape Groupings***

Dear Grape Groper:

You know how Aggie loves a mystery. This one just gets curiouser and curiouser the more you dig. For one thing, the Pesticide Tolerance Commodity/Chemical Index lists about fifty pesticides under “grapes,” but not paraquat (page 641/642 40 CFR, 7-1-98 Edition). The Crop Grouping Commodities Index (page 699 40 CFR 7-1-98 Edition) lists neither grapes nor small fruit as a “commodity,” apparently because grapes are not listed in a crop grouping. (Incidentally, many other fruits and vegetables far more exotic than grapes are listed here.) The Pesticide Chemical News Guide classifies grapes under the Food Crop Index as “Unclassified Food Commodities: A.” When I look under “Unclassified Food Commodities: A,” I find both grapes (nestled

companionably between figs and mushrooms) and paraquat, but no tolerance is provided, just a dash (-), which indicates no tolerance has been established. Meanwhile, under listings for other pesticides such as diuron (40 CFR 180.106), propyzamide (40 CFR 180.317), and ziram (40 CFR 180.116), grapes are listed as “grapes.”


Sometimes, even Aggie needs a little help. In this case, I went back to the horse’s mouth—this horse being EPA—for the following explanation. The paraquat RED has been generated, but grape data is still under analysis. In the past few years, various crop groupings have been updated and modified. Before the changes, there was a crop group called “small fruits” that included not only all the berries, but also grapes and strawberries. The new crop group name is “berries” and does NOT include grapes and strawberries. Once all the data is in place, no “small fruit” tolerance will be necessary. In the meantime, until the Wonderful World of Regulatory Actions catches up, grapes are covered by this small fruit tolerance. Incidentally, if you had had the good sense to ask about strawberries instead of grapes, this would have been a shorter letter—the strawberry data is complete. 

## PNN Update

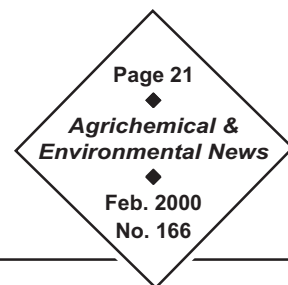
**Jane M. Thomas, Pesticide Notification Network Coordinator**

The Pesticide Notification Network (PNN) is operated by WSU's Pesticide Information Center for the Washington State Commission on Pesticide Registration. The system is designed to distribute pesticide registration and label change information to groups representing Washington's pesticide users.

PNN notifications are available on our web page. To review those sent out in December, either access the PNN page via the Pesticide Information Center On-Line (PICOL) Main Page, <http://picol.cahe.wsu.edu/>, or directly, at <http://www.tricity.wsu.edu/~mantone/pl-newpnn.html>.

We hope that this new electronic format will be useful. Please let us know what you think by submitting comments to Jane Thomas at (509) 372-7493 or [jmthomas@tricity.wsu.edu](mailto:jmthomas@tricity.wsu.edu). 

# Federal Register Summary



*In reviewing the December postings in the Federal Register, we found the following items that may be of interest to the readers of Agrichemical and Environmental News.*

In the December 1 Federal Register, EPA announced that the Reregistration Eligibility Decision (RED) for triphenyltin hydroxide is now available for review and comment. A complete copy of the RED and the summary fact sheet may be accessed electronically at [http://www.epa.gov/opsrrd1/REDs/index\\_h2z.html#T](http://www.epa.gov/opsrrd1/REDs/index_h2z.html#T). The comment period on this RED extends until 2/29/00. (Page 67265)

In the December 1 Federal Register, EPA announced that the revised risk assessment for propetamphos was available for review and comment. A copy of the risk assessment can be accessed at <http://www.epa.gov/pesticides/op/propetamphos.htm>. Comments should be submitted to EPA on or before 1/31/00. (Page 67263)

In the December 3 Federal Register, EPA announced that, in accordance with an earlier agreement, it had received requests from various azinphos methyl manufacturers to delete use on sugarcane, ornamentals (except for nursery stock), Christmas trees, forest trees, shade trees, and on cotton brown in Louisiana and in states east of the Mississippi. In addition, EPA received a request from Micro Flo to cancel some of its azinphos methyl registrations. (Page 67899)

In the December 3 Federal Register, EPA announced that the reregistration eligibility decisions (RED) for captan, EPTC, folpet, niclosamide, and lampricide were available for review and comment. Both the complete REDs and the Fact Sheets are available for review on EPA's website at <http://www.epa.gov/opsrrd1/REDs/>. (Page 67902)

In the December 8 Federal Register, EPA announced that the revised risk assessments for methidathion and oxydemeton methyl were available for review and comment. Comments must be submitted to EPA on or before 2/7/00. These documents are available on the web at <http://www.epa.gov/pesticides/op/>

[methidathion.htm](http://www.epa.gov/pesticides/op/odm.htm) and <http://www.epa.gov/pesticides/op/odm.htm>. (Page 68679)

In the December 16 Federal Register, EPA announced that the revised risk assessment for dimethoate was available for review and comment. Comments must be submitted to EPA on or before 2/14/00. These documents are available electronically on the web at <http://www.epa.gov/pesticides/op/dimethoate.htm>. (Page 70254)

In the December 21 Federal Register, EPA announced that it is soliciting input on the assessment of the potential for allergenicity of non-digestible proteins expressed as plant pesticides. The specific case in question concerns the Cry9C insecticidal protein derived from *Bacillus thuringiensis* and expressed in field corn. In addition to EPA data evaluation records, the Agency is asking for comment on questions within an EPA background document regarding the use of amino acid homology, the brown Norway rat model, and other items regarding the assessment for potential allergenicity. (Page 71452).

On October 21, 1999, EPA reopened the comment period on the proposed rule "Standards for Pesticide Containers and Containment" to obtain comment on four specific issues. In the December 21 Federal Register, EPA announced that it is extending the comment period, formerly scheduled to close on December 20, 1999, by 60 days. Comments will now be accepted until February 19, 2000. (Page 71368)

In the December 22 Federal Register, EPA made two announcements with respect to sulfotepp: First, that the reregistration eligibility decision (RED) document was available for review and comment (comments are due to EPA on or before February 22, 2000); and second, that EPA had received request from the manufacturers of sulfotepp products to voluntarily cancel their product registrations. (Page 71754)



# Tolerance Information

Chemical (type)	Federal Register	Tolerance (ppm)	Commodity (raw)	Time-Limited		
				Yes/No	New/Extension	Exp. Date
tetraconazole (fungicide)	12/6/99 (page 68046)	0.10	sugar beets	Yes	New	12/31/01
		6.00	sugar beet tops			
		0.20	s.b. dried pulp			
		0.30	s.b. molasses			
		0.05	milk			
		0.03	cattle, meat and meat byproducts except kidney and liver			
		0.20	cattle, kidney			
		6.00	cattle, liver			
		0.60	cattle, fat			
<p>Comment: These time-limited tolerances are being established in response to EPA generating Section 18 exemptions for the use of tetraconazole to control Cercospora leafspot in sugar beets grown in North Dakota and Minnesota.</p>						
tebufenozide (insecticide)	12/8/99 (page 68631)	2.00	soybeans	Yes	New	12/31/01
<p>Comment: This time-limited tolerance is being established in response to EPA granting a Section 18 emergency exemption for the use of tebufenozide to control fall armyworms in Louisiana soybeans.</p>						
metsulfuron methyl (herbicide)	12/16/99	0.40	sorghum grain	Yes	New	12/31/01
		0.30	sorghum forage			
		0.50	sorghum fodder			
<p>Comment: These time-limited tolerances are being established in response to EPA granting Section 18 exemptions for the use of metsulfuron methyl on sorghum for control of weeds in Kansas, Oklahoma, and Texas.</p>						

# Tolerance Information

Chemical (type)	Federal Register	Tolerance (ppm)	Commodity (raw)	Time-Limited		
				Yes/No	New/Extension	Exp. Date
bifenthrin (insecticide)	12/17/99 (page 70599)	3.00	raspberries	Yes	Extension	12/31/00
Comment: This time-limited tolerance is extended in response to EPA again granting Section 18 emergency exemptions for the use of bifenthrin to control weevils in raspberries grown in Oregon and Washington.						
myclobutanil (fungicide)	12/22/99 (page 71670)	5.00	hops	Yes	Extension	12/31/01
		1.00	caneberries			12/31/00
		2.50	peppermint and spearmint			12/31/00
Comment: These time-limited tolerances are being extended in response to EPA granting Section 18 exemptions for the use of myclobutanil to control orange rust in Oregon and Ohio caneberries; powdery mildew in Washington, Oregon, and Idaho hops; and powdery mildew and peppermint rust in Idaho and Washington mint.						
maneb (fungicide)	12/27/99 (page 72282)	0.05	walnuts	Yes	Extension	12/31/01
Comment: This time-limited tolerance is being extended in response to EPA granting a Section 18 emergency exemption for use of mneb to control blight in California walnuts.						
glufosinate ammonium (herbicide)	12/27/99 (page 72284)	4.00	sweet corn forage	Yes	Extension	12/31/01
		4.00	sweet corn (K+CWHR)			
		6.00	sweet corn stover			
Comment: These time-limited tolerances are being extended in response to EPA again granting Section 18 emergency exemptions for the use of glufosinate ammonium to control weeds in sweet corn grown in Wisconsin and Minnesota.						