

In This Issue

Response to Action on Methyl Parathion/Azinphos-Methyl	1
Container Recycling Schedule	3
Requiem for Methyl Parathion	4
WSU TC 10th Anniversary	6
Pesticide Issues Conference	7
Sprayer Tune-Ups Pay Off	8
“Simple Change” (Good-bye to Carol Weisskopf)	10
Synthetic Chemicals: Emancipators or Emasculators?	11
Employment Opportunity	14
Potential Hazards of Compost Dust Studied	15
So Long	16
Federal Register Excerpts	16
PNN Update	18
Tolerance Info	21

Comments to: Catherine Daniels
 WSU Pesticide Information Center
 2710 University Drive
 Richland, WA 99352-1671
 Phone: 509-372-7495
 Fax: 509-372-7491
 E-mail: cdaniels@tricity.wsu.edu

The newsletter is on-line at
www2.tricity.wsu.edu/aenews,
 or via the Pesticide Information
 Center (PICOL) Web page at
<http://picol.cahe.wsu.edu>

Hard-copy subscriptions are \$15 a year. Mail check to above address, ATTN: Sally O'Neal Coates, Editor.

Response to EPA Action Methyl Parathion and Azinphos-Methyl Loss Will Impact Tree Fruit Industry

Dr. Jay F. Brunner, WSU Tree Fruit Research and Extension Center

The Environmental Protection Agency (EPA) has announced the banning of one pesticide, methyl parathion, and restrictions on use of another, azinphos-methyl. To a certain extent, this action was anticipated as a result of congressional passage of the 1996 Food Quality Protection Act (FQPA). What will these changes mean to fruit growers in Washington?

Methyl Parathion

Methyl parathion is used annually by 20 to 30% of Washington's apple growers. Pear and cherry growers do not use, or use very little, methyl parathion in their pest control programs. Methyl parathion has been used primarily as a last resort or “rescue” treatment to protect apples from the attack of pests such as leafrollers and codling moth, especially codling moth populations that have developed resistance to azinphos-methyl. If suitable alternatives are not available to protect apples, then 5 to 10% of growers would be expected to lose 1 to 2% of their crop. This would translate into a loss of \$40 to \$80 per acre or, for the apple industry of Washington, a loss of \$300,000 to \$600,000 per year.

It is unlikely that loss of methyl parathion will have a sudden and dramatic impact on most Washington apple growers. Chlorpyrifos (Lorsban®) is available as an alternative for leafroller and codling moth control in summer. Washington State University (WSU) research has demonstrated the utility of the bacterial insecticide *Bacillus thuringiensis* (Bt) for leafroller suppression. WSU research has also developed information and strategies for using newly registered insecticides such as spinosad (Success®) and tebufenozide (Confirm®) for management of leafrollers and codling moth. These newly registered insecticides are more expensive than methyl parathion or chlorpyrifos. They are also not fast acting; that is, they do not act on contact so are not good “rescue” treatments. Alternative control tactics, such as mating disruption, have also been developed to manage codling moth populations resistant to azinphos-methyl.

A real concern for Washington apple growers is what will be available to control pests like stink bugs or the lacanobia fruitworm or the next new pest that appears?

Methyl Parathion and Azinphos-Methyl loss, cont.

Dr. Jay F. Brunner, WSU Tree Fruit Research and Extension Center

The most likely outcome resulting from a loss of methyl parathion will be more expensive pest management programs and possibly higher fruit prices for the consumer.

Azinphos-Methyl

Azinphos-methyl is used in Washington fruit orchards to combat several pests. It is effective for the control of codling moth, cherry fruit fly, and grape mealybug. It is used on most (90 to 95%) of Washington's apple orchards, primarily to control codling moth. An average of three applications of azinphos-methyl are made by each grower per year. Growers use an average of three to four lbs. (active ingredient) per acre. Therefore, the action by EPA to reduce the maximum allowable annual use of azinphos-methyl from 6.0 to 4.5 lbs. (active ingredient) should impact only a few growers, those with the most severe pest problems. The restriction of azinphos-methyl should not place an extreme burden on most of Washington's apple growers.

Why has azinphos-methyl been used by fruit growers in Washington? It has been the most effective insecticide for controlling certain pests; it has allowed survival of certain biological control agents that are key parts of Washington's integrated pest management (IPM) efforts; and it has been economical. If growers have to shift to alternative products, their IPM programs will become more expensive. A single application of azinphos-methyl costs about \$15 per acre. The cost of a likely alternative, phosmet (Imidan®), would be about \$25 per application and would require one or more additional applications to achieve codling moth control equal to azinphos-methyl. Use of a newly registered insecticide, tebufenozide (Confirm®), would cost \$35 to \$40 per application, and it is not highly effective against codling moth. None of the alternative insecticides (new or old) is as effective as azinphos-methyl for codling moth control.

Have apple growers in Washington been trying new technologies in an attempt to reduce the use of products like azinphos-methyl? The answer is a definite yes! Mating disruption, a technology which confuses the codling moth with its own sex attractant, has been used since 1991. Research in Washington has shown mating disruption to be a reliable control for codling moth; however, in most situations it must be supplemented with insecticides to achieve acceptable crop protection. In 1999, Washington apple growers applied codling moth mating disruption

products on about 60,000 acres, or nearly 35% of the state's apple acreage. Use of mating disruption has reduced insecticide use in many apple orchards by one to two sprays per year. The cost of mating disruption is \$55 to \$110 per acre compared to the cost of a typical insecticide control pro-

gram of \$45 per acre. New restrictions on the use of azinphos-methyl will likely encourage more growers to adopt mating disruption as part of their codling moth management program at an increased cost of \$25 to \$75 per acre (the cost of mating disruption plus supplemental insecticides).

There is little doubt that mating disruption as a control for codling moth has been very effective in many apple orchards. However, this tactic affects only one pest, the codling moth. Other pest problems have increased in orchards using codling moth mating disruption. In particular, leafroller problems have increased. Additional controls for leafrollers have added \$15 to \$30 per year to the cost of IPM programs. New pests such as the lacanobia fruitworm and stink bugs are starting to show up in codling moth mating disruption orchards, causing crop losses as high as 10%.

The most likely scenario resulting from the EPA decision on azinphos-methyl is that Washington's apple growers will use more codling moth mating disruption and more insecticides for control of other pests, and that growers will lose more of their crop to

...continued on next page

**Growers will survive,
but costs and crop
losses will increase**

Methyl Parathion and Azinphos-Methyl loss, cont.

Dr. Jay F. Brunner, WSU Tree Fruit Research and Extension Center

secondary pests. The cost of IPM programs on apple will most likely increase by \$40 to \$100 per acre, or an annual increase of \$6 to \$16 million for Washington's apple industry. Crop damage by secondary pests is expected to increase 0.5%, meaning an additional loss of \$4 million each year.

Conclusions

Will Washington's apple growers survive this latest EPA action against methyl parathion and azinphos-methyl? Yes, they will be able to adjust their IPM programs and still protect their crops from pest attack. Will the cost of apple IPM programs increase? Yes, probably in the range of \$50 to \$75 per acre in most orchards. Will losses in apple and other crops increase? Yes, over time crop losses will be expected to rise 0.1 to 0.5% (\$0.8 to \$4 million), due primarily to activities of secondary pests. Are Washington's

fruit crops safe for people to eat? There is little doubt that they are as safe today as they will be in 2000.

EPA's action on methyl parathion and azinphos-methyl stems from requirements of the Food Quality Protection Act. Even the EPA administrator, Carol Browner, states that fruits currently treated with these "old" insecticides are safe. The regulation over pesticides prior to FQPA has provided a very high degree of safety for consumers and the environment. The FQPA seeks to reduce risks even further, especially for children, and who can argue with that? 🍏

Dr. Jay F. Brunner is an entomologist and director of the Washington State University Tree Fruit Research and Extension Center in Wenatchee. He can be reached at jfb@wsu.edu or (509) 663-8181 ext. 238.

Pesticide Container Recycling

Washington Pest Consultants Association organizes an annual series of collection dates and sites for empty pesticide containers. Dates and locations are subject to change; confirm with a telephone call to the number listed in the table before participating. For general questions, or if you are interested in hosting an event at your farm, business, or in a central location in your area, contact Clarke Brown at (509) 965-6809 or Roger Ours at (509) 930-6950.

CONTAINER CRITERIA:

- ◆
Rinsed—no residue
- ◆
Majority of foil seal removed from spout (small amount remaining on rim OK)
- ◆
Clean and dry, inside and out, with no apparent odor
- ◆
Hard plastic lids and slip-on lids removed
- ◆
Half-pint, pint, quart, one, and two-and-a-half gallon containers accepted whole
- ◆
Five-, 30-, and 55-gallon containers accepted whole if lids and bails removed

DATE	TIME	LOCATION	CONTACT	PHONE	OTHER
EASTERN WASHINGTON					
9/1	8am-10am	NW Wholesale, Chelan	Herb Teas	(509) 662-2141	
	11am-2pm	NW Wholesale, Orondo			
9/2	8am-Noon	Wenatchee Treefruit Station	Dale Goldy	(509) 884-0711	
9/13	8am-10am	Simplot, Bruce Dealer, Othello	Mike Garza	(509) 488-2132	
	11am-Finish	Kilmer Crop Dusting, Warden	Terry Kilmer	(509) 349-2491	cell (509) 760-0081
WESTERN WASHINGTON					
9/20	1pm-3pm	Washington Tree Service	Ron Angel	(206) 362-9100	20057 Ballinger Rd NE, Seattle
9/21	8am-Noon	Skagit County Transfer Station	Robin LaRue	(360) 336-9400	
	1pm-3pm	Tronsdal Air Service	Kevin Tronsdal	(360) 757-0333	Entrance Farm to Market Road
9/22	8am-Noon	Port Orchard-Olympic View	Niels Nicolaisen	(360) 337-5781	Industrial Park, 5551 SW Imperial Way
9/23	8am-Noon	WA State DOT & Permit Office	Randy Knutson	(253) 351-6591	11211 - 41st Ave. SW, Tacoma
			Dave Patterson	(253) 589-7255	
9/24	8am-Noon	Centralia Transfer Station	John Prigmore	(360) 740-1193	1411 South Tower

Requiem for Methyl Parathion

Dr. Allan S. Felsot, Environmental Toxicologist, WSU

Alas, poor methyl parathion (MP), we have known you well. May you rest in peace. Your use on all fruit (among many other uses) was cancelled by the Environmental Protection Agency (EPA) on August 2, 1999, in a voluntary consent agreement with your manufacturer. Since your birth in 1952, you were a long-time friend of the grower and will be missed by all who have come to love and hate pesticides. Considered by EPA and environmental advocacy groups (EAGs) as the most nefarious (i.e., toxic) of the organophosphate (OP) insecticides, your name was dragged through the mud by such venerable rags as *Consumer Reports*. Some will say that you were treated unfairly, and perhaps we should clear your name out of respect for your dear departure.

So your tortured soul will not haunt the surviving OP family members, let us review in this final dirge the facts as we now know them. EPA's risk communication document regarding the rationale for its regulatory actions stated, "Methyl parathion has been found to pose unacceptable dietary risks to children. Removing these crop uses considerably reduces risks to children through food, as well as risks to workers and the environment." The key concern here is children because the Food Quality Protection Act (FQPA) of 1996 specifically directed EPA to consider the risk to children in reassessing pesticide tolerances for re-registration.

To assess the risk from exposure, EPA's calculations fall into two types: acute dietary exposure and chronic dietary exposure. The two crops that contributed the majority of exposure were apples and peaches. For each, EPA assumed the residues were at the level of the tolerance, which was 1 ppm. Furthermore, if the crop had a registration, then it was assumed that it was treated.

Some of us, old friend, knew the truth about your perceived ubiquity. In fact, the best source of food residue data for most consumed fruits has been the United States Department of Agriculture (USDA) Pesticide Data Program summaries for the years 1994–1996, and it tells a different reality. Less than

10% of the apples and no more than 30% of the peaches were found to have your residues. More telling is the highest residue reported on apple (0.22 ppm) and on peaches (0.5 ppm). But these high values are rare events as evidenced by the distribution of residue levels reported for peaches. Ninety percent of all your residues were less than 0.069 ppm. To add insult to injury, the USDA National Agricultural Statistics Service database indicated for 1997 that only 30% and 37% of apple and peach acreage, respectively, were treated with your formulation. Thus, the probability of even encountering you in apples and peaches was rather small. So how is it that you could have been so demeaned?

The FQPA defined safety, and EPA decided how the definition would be met. In essence, when EPA calculates the exposure of any segment of the population to food residues, the sum of all exposures cannot exceed the Reference Dose (RfD). In simple language, the RfD represents the maximum daily dose of a chemical that is reasonably certain to have no harm. It is obtained from rat toxicity tests of various kinds that provide information about doses that cause no effect, whether that effect is death, tissue pathology, or simply a change in enzyme levels. Your death knell rang one time when the EPA used an acute (i.e., single dose) neurotoxicity study to define the No Observable Effects Level (NOEL) as 0.025 mg/kg. The problem with this particular study was that the next higher dose tested was 7.5 mg/kg, and as would be predicted with a compound having an acute LD₅₀ that may be as low as 4.5 mg/kg, there were some pretty nasty effects. Oh, yes, you were an active and feisty little molecule. Of course, your manufacturer could have submitted a "better" neurotoxicity study, but economics rather than the interest of science usually rules in the end. If only they had pampered you with the attention brother chlorpyrifos received.

Once the NOEL is decided upon, EPA divides it by an uncertainty factor, popularly called the 100-fold safety factor, and voilà, you have the RfD that cannot be exceeded either from a one-time exposure or an everyday exposure over a person's lifetime. But the

...continued on next page

Requiem for Methyl Parathion, cont.

Dr. Allan S. Felsot, Environmental Toxicologist, WSU

death knell rang again when EPA decided that you are much more toxic to infant rats than to adult rats on a body-weight-adjusted-dose basis. In fact, EPA's perception is supported well by the scientific literature,* but the studies still did not define the true NOEL, only what would happen at comparatively high doses. So the EPA decided that the safety factor should be 1000, not 100. Simple math then defined the safe dose as 0.000025 mg/kg for a single day's exposure. For a lifetime exposure, the NOEL from a different kind of toxicity test was used, and the RfD was a little lower, 0.000020 mg/kg. Alas, you were no lover of children.

The third piece of data that EPA garnered for its risk assessment was the database of food consumption amounts for different commodities. For acute exposure assessments, EPA wants to know what a child eats at the 99.9th percentile of consumption. Translation: EPA is concerned about the child who eats more fruit than 99.9% of all other people. For chronic exposure assessment, EPA uses average food consumption data, which is close to the 50th percentile of consumption.

Combining unrealistic residue level assumptions, an allowable maximum level of

equivalent to
 than 25
 ns (yes,
 billionths of
 per kilogram
 weight, and
 assumption
 representing
 9th percentile
 sure, your



calculated exposure to children exceeded the EPA's perception of safe limits by thousands of times. EPA tolled the bell the third time. Three strikes and you're out.

So, dear friend, as you went down in flames, EPA behaved as the diligent fireman to keep the fire from spreading to a conflagration of accusations of poisoned apples à la Alar. They said in their press release, "Yes, the food supply is safe. This action just makes it safer." Or as one astute reporter said to me as I was preparing your eulogy, "It seems that the only thing that has changed is the rules of quantification."

And there you have it, dear friend. Victimized by mathematical probabilities. MP, they may kick you while you're down, but others more vigilant than your keepers remain to guard the numbers in favor of your brethren. We know now the truth of the old saying, "garbage in, garbage out." Perhaps you were easy pickings, but the mathematical tricks will not work so easily with those that remain, as long as their manufacturers are willing to pay due attention to the data needs. 🍒

Dr. Allan S. Felsot is an Environmental Toxicologist at WSU, and counts himself among those who had the mixed pleasure of consorting with the departed. He can be reached at afelsot@tricity.wsu.edu or at (509) 372-7365.

*A recently published paper in *Toxicology and Applied Pharmacology* (1999, vol. 156, p. 186-196) supports the conclusion that neonate rats are more susceptible to methyl parathion than adult rats as evidenced by sensitive biochemical effects, but this does not hold for chlorpyrifos.

Editor's Note: Methyl parathion was canceled for children's food including all fruit and a number of vegetables. However, uses still remain for alfalfa, almonds, barley, cabbage, corn, cotton, dried beans, dried peas, grass, hops, lentils, oats, onions, pecans, rape seed (canola), rice, rye, soybeans, sugar beets, sunflower, sweet potato, walnuts, wheat, and white potatoes.

FEQL/PIC Celebrates WSU TC's 10th Anniversary

Sally O'Neal Coates, WSU Research Publications Editor

July 10, 1999, Washington State University, Tri-Cities (WSU TC), celebrated its 10th anniversary in style. Dozens of departments turned out to display their programs and provide information and entertainment for the community. Naturally, we of the Food and Environmental Quality Lab (FEQL) and Pesticide Information Center (PIC) were there.

Showing off our brand-new crimson and gray trade-show booth wasn't enough. The PIC, whose main mission is the dissemination of pesticide-related information, wanted to make sure that everyone who visited would remember our on-line information website. This site, the Pesticide Information Center On-Line, or "PICOL" (pronounced "pickle," at <http://picol.cahe.wsu.edu>), was represented by...well, a pickle! A six-foot, walking, dancing, fully animated PICOL Pickle, to be exact. And, while we're not saying *who* animated the pickle suit (actually a cucumber suit, borrowed from a local church), Catherine Daniels, Jane Thomas, Doria Monter-Rogers, Sally O'Neal Coates, and Charlee Parker each want to go on record as saying, "It wasn't me!" Curiously, our

part-time clerical assistant, Melissa Watson, was nowhere to be seen the day of the event...

From 10:00 a.m. until 2:00 p.m., the PICOL Pickle cavorted with faculty, staff, and visitors, handing out brochures describing the services found on the PICOL web page and directing children to the PIC-hosted coloring contest. (Coloring contest winners' names and their winning entries can be found via a link at the bottom of the PICOL web page. Contestants ranged in ages from 2 to...uh...45.) The FEQL/PIC booth—ably hosted by our own Doria Monter-Rogers—also provided handouts on Washington State pesticide information contacts, pesticide container recycling, PICOL FAQ's (Frequently Asked Questions), samples from the HortSense (consumer gardening) page, and other items relating to the lab and the PICOL page. Recent issues of *Agrichemical and Environmental News* were also available.

In addition to handouts and display materials explaining the PICOL site, the booth featured a poster display by FEQL's Allan Felsot and Judy Ruppert and

IAREC's (Irrigated Agriculture Research and Extension Center) Wyatt Cone and Larry Wright. "Drip Chemigation of Imidacloprid: Soil Distribution and Efficacy in Hop Yards" included color photographs and graphics sufficiently eye-catching for the event's largely non-technical audience.

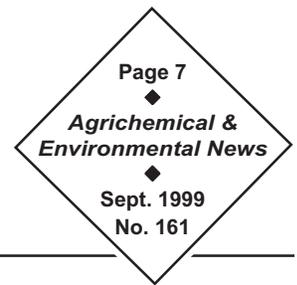
While the Pickle frolicked, parents read brochures, and kids colored, across campus Carol Weisskopf showed off the FEQL lab with family-friendly science presentations. Visitors watched colors separate as paper chromatography was employed on Kool-Aid and food extract samples. They were also able to take self-guided



Pesticide Information Center (PIC) staff, from left: PICOL Pickle, Doria Monter-Rogers, Suzanne Palmer, Catherine Daniels, Charlee Parker, Jane Thomas, Sally O'Neal Coates. Not shown: Melissa Watson.

...continued on next page

WSU TC's 10th, cont.



Sally O'Neal Coates, WSU Research Publications Editor

tours of a sample extraction and cleanup process such as those used by FEQL and other labs to analyze food for pesticide residues. The thirteen-station tour, using beet greens as a sample food, showed each step of the process from the trimming of the edible parts through chopping, dissolving, filtering, washing, and evaporation, to the final sample in its tiny vial.

Other WSU TC departments provided similar combinations of information and entertainment at the anniversary event. Families enjoyed a soap-bubble wind tunnel, fishing-for-prizes "pond," face painting, lawn games, and many other indoor and outdoor activities. Lunch was available at an outdoor barbecue, and live musical entertainment was provided.

The event commemorated the official establishment of WSU's Tri-Cities branch campus in 1989. WSU has had a presence in the Tri-Cities (Richland, Pasco, and Kennewick) since 1913, when it established the first

county extension agency in Benton County. In 1958, the Joint Center for Graduate Study was established in cooperation with the University of Washington and Oregon State University, with the first building appearing on the campus' current north Richland site in 1969. Today's WSU TC campus includes three facilities, 55 resident faculty, hundreds of adjuncts, and about 120 staff members. Courses offered include engineering, science, business, and liberal arts.

For the children visiting the campus July 10, however, the celebration probably seemed a lot like a party in a sunny park on the beautiful Columbia River, with plenty of hotdogs and hamburgers and games to play. Oh, yes, and a giant pickle dancing with Butch, the WSU Cougar mascot...



Sally O'Neal Coates is Editor of Research Publications (including AENews), and can be reached at scoates@tricity.wsu.edu or (509) 372-7378.

4th Pacific Northwest Pesticide Issues Conference

"Threatened & Endangered Species: Pesticide Science, Issues and Policy"

October 19, 1999 ♦ Yakima, Washington ♦ 8 am – 4 pm

Understanding the Science

Refresher Course: Numbers & Alphabet Soup
Water Quality Update: Eastern & Western WA
Status of Sampling & Data Gaps
Selected Risk Assessments:
Glyphosate, 2,4-D, Diazinon, Chlorpyrifos

Current Issues in the Pac NW

Impacts in Urban Environments
King County Reduced Pesticide Use
Landscape Industry's Environmental Education
Implications for Buffer Zones:
Weed Management, Plant and Insect Impacts

A View of the Evolving Policy

ESA Section VII
National Marine Fisheries Service
Environmental Protection Agency Report
WA Department of Agriculture Report
Section 18 & 24c

Conference fee of \$65 includes lunch and conference proceedings. Registration should be submitted by October 1 to Washington State University, Pesticide Issues 3305, P.O. Box 646247, Pullman, WA 99164-6247. Include name, company or organization, address, phone number, and check payable to Washington State University Pesticide Issues.

Overnight accommodations have been blocked at the Yakima Doubletree Inn, (509) 248-7850. Request the "WSU Pesticide Issues Conference" room rates (single=\$55.45; double=\$66.54, includes tax). Space is limited, deadline is September 27.

For more information or a brochure, contact Chris Eder at (509) 335-2954 or edercj@wsu.edu, or point your web browser to

<http://pep.wsu.edu/Education/Conference>

Sprayer Tune-Ups Pay Off

Myron Shenk, Susan Aldrich-Markham, and Gene Pirelli, Oregon State University Extension

Extension personnel from Oregon State University and Yamhill and Polk counties (Oregon) have been working with growers to tune up farm sprayers. During the course of this project, we conducted forty-four on-farm sprayer tune-ups. We began each session with a complete overview of the sprayer, verifying nozzle type, size, spacing, and orientation on the boom; presence of nozzle screens; boom height; and condition of hoses, fittings, and clamps. We marked a 300-foot distance and, averaging a series of runs, determined the time it took for the sprayer to travel the 300 feet at normal spraying speed. Speed was converted to miles per hour with the following calculation:

$$\text{MPH} = \frac{\text{distance (in feet)}}{\text{time (in seconds)}} \times .6818$$

With the sprayer stationary, we pressurized the system to check for leaks. Using the same engine speed as the test run and the pressure of normal field applications, we collected the discharge from each nozzle for the same amount of time as the test run. Any nozzle that varied by ten percent or more from the average discharge was replaced, and the new average calculated. Sprayer output in gallons per acre (GPA) was calculated as follows:

$$\text{GPA} = \frac{\text{water used (in gallons)} \times 43,560 \text{ ft}^2}{\text{test area (ft}^2\text{)}}$$

The test area in our case was 300 feet multiplied by the spray width. For effective spray width, multiply number of nozzles by nozzle spacing. An example calculation is shown in the *Brain Teaser* sidebar, opposite.

The final step of the sprayer tune-up was verifying the spray pattern of each nozzle by spraying onto a Spray Pattern Check. A Pattern Check consists of a plastic corrugated tray with two-inch-wide troughs that drain into clear plastic tubes (see photo, opposite page). When the Pattern Check is placed vertically, the level of the floating ball in each tube dramatically reveals whether the nozzles are applying uniformly. When the

spray pattern was poor (non-uniform) because of worn or damaged nozzles, we replaced the nozzles with new ones at wholesale cost to the grower and re-calibrated. We also checked uniformity of pressure by attaching a gauge at each end of the boom.

Some thirty-eight of the forty-four sprayers (eighty-six percent) needed one or more adjustments. The most common problem was worn nozzles; twenty-eight of the growers required nozzle replacement on the spot. Other problems included dripping or missing check valves (12), boom height too low or uneven (9), excessive pressure (8), unequal nozzle spacing or mismatched nozzles (6), end nozzles spraying the boom wheel because the boom had rotated slightly (5), faulty speedometer (5), nozzles at different heights on the boom (2), pressure variation on different sections of the boom (2), and one kinked hose that reduced flow, but not pressure.

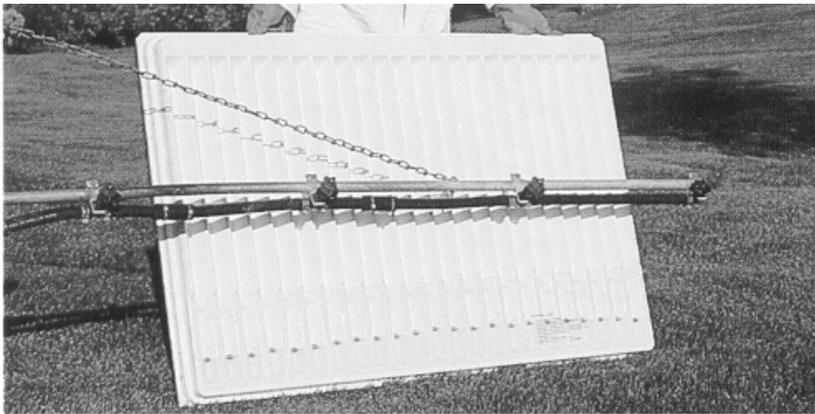
***One grower...had
been wasting
\$40,970 per year on
excess pesticide.***

Using data supplied by the thirty-eight growers who made adjustments in their sprayers, we calculated the economic impacts of pesticide misapplications. These growers farmed approximately 34,550 acres, spraying each of these acres an average of four times per year (equivalent to some 138,000 acres sprayed). We calculated that 6.7% of the total area sprayed by the participating growers had been receiving at least a 10% over-application of pesticides, and 6% received at least 10% less than the intended rate. Pesticide costs varied from \$50 to \$70 per acre for cereal crops to as high as \$100 per acre for grass-seed and vegetable crops. Extrapolating these costs, it's easy to see that the economic cost of over-application is

...continued on next page

Sprayer Tune-Ups, cont.

Myron Shenk, Susan Aldrich-Markham, and Gene Pirelli, Oregon State University Extension



Spray Pattern Check determines uniformity of spray.

very significant, both on a statewide level and for the individual growers affected.

One grower whose sprayer was improperly calibrated found that he was over-applying pesticides by 14.7% on 2500 acres. With the pesticides and rates he reported using, we calculated that he had been wasting \$40,970 per year on excess pesticide. Another grower's application rate was not uniform across his boom, and a third of the nozzles were over-applying by 12.0%. He used the sprayer for 1000 acres of grass and vegetable seed, resulting in

over-application on some 330 acres. With the pesticide costs he reported, we calculated that he had been wasting \$2,938 per year.

We are using these data and the slides we generated during our research for educational programs with pesticide applicators throughout Oregon. As a result of this program, several agrichemical distributors and two county extension offices have purchased their own Spray Pattern Checks for loaning to their clientele. Several growers have tuned their own sprayers. Our results demonstrate that growers should tune their sprayers regularly.

Myron Shenk is the Pesticide Applicator Training Coordinator for Oregon State University Extension. He can be reached at shenkm@bcc.orst.edu or (541) 737-6274. Susan Aldrich-Markham is currently Interim Staff Chair and Agricultural/Field Crops Extension Agent for the Yamhill County (Oregon) Extension Office, susan.aldrich-markham@orst.edu or (503) 434-7517. Gene Pirelli is District Livestock and Forage Extension Specialist for the Polk County (Oregon) Extension Office, gene.pirelli@orst.edu or (503) 623-8395.

BRAIN TEASER

Given the following data and the information in this Sprayer Tune-Up article, see if you're as smart as a county extension agent. Can YOU determine miles per hour (MPH) and gallons per acre (GPA)?

Time to travel 300 feet = 38 seconds.
 28 nozzles spaced 22 inches apart
 Average of 21 ounces of water per nozzle in 38 seconds

SOLUTION:

$$\text{MPH} = \frac{38 \text{ sec}}{300 \text{ ft}} \times 6818 = 5.4$$

$$\text{Total water used} = 28 \text{ nozzles} \times 21 \text{ oz} = 588 \text{ oz} \text{ (} 588 \text{ oz} / 28 \text{ oz per gal} = 21 \text{ gal)}$$

$$\text{Effective spray width} = 28 \text{ nozzles} \times 22 \text{ inches divided by } 12 \text{ inches} = 51.3 \text{ ft}$$

$$\text{Test area} = 51.3 \text{ ft} \times 300 \text{ ft} = 15,390 \text{ ft}^2$$

$$\text{GPA} = \frac{4.6 \times 43,560 \text{ ft}^2}{15,390 \text{ ft}^2} = 13$$

“Simple Change”

chemistry, alchemy, progress, growth, lapse, flux... (Roget's Thesaurus)

Dr. Catherine Daniels, Pesticide Coordinator, WSU

What do you envision when someone says the word “chemistry?” I think of spotless glassware, reagents, humming electronics, and lab notebooks that fill whole walls. Self-contained individuals with logical, one-step-at-a-time, progressional thought patterns. I should clarify things and say that’s what I used to think before Dr. Carol Weisskopf showed me what chemistry is and what chemists can be.

Does it take guts to face grinding samples? I didn’t think so—after all, how nervy do you have to be to grind up an apple? Carol is grinding up fish samples as I write this. Oops, I need to clarify that. If the blender did more than just whirl the whole fish around in a circle, she would be grinding. Right now she has to mince fish parts using a paring knife to prepare twenty-five samples. Ever try mincing the heads while they look up at you? Do that for eight hours with fish slime running down your elbows. Think these samples are for a once-in-a-career study? Carol also does research on heron puke. In an environmental study to check pesticide residues in heron food, one simply startles the chicks, which then regurgitate their food. Since they don’t chew it first, it comes out whole: frogs, mice, snakes, and all. My first reaction was ughhhh; this is alchemy, that distant cousin of chemistry. Mix some snakes and weeds and a few warts to get a potion. With nerves of steel, Carol just wrinkles her nose, slides her glasses up for a better perch, and deftly grinds the samples (ughhhh and all), mixing her modern day potions for later analysis.

Contrast this with the day I came into the lab and found her astride the mass spec vacuum pump, pliers in one hand and screwdriver in the other. She methodically took it apart, fitted the replacement pieces, and simply rebuilt it. I wouldn’t mention any swearing even if I had heard any during this process. My visions of chemistry had not conjured up stints in trade school learning wiring, plumbing, and carpentry skills. Just on-the-job training, Carol says. When she started work here, roughly one-third of the lab equipment was not working. She repaired it. This chemist has replaced more motherboards and memory chips in the Pesticide Information Center (PIC) and Food

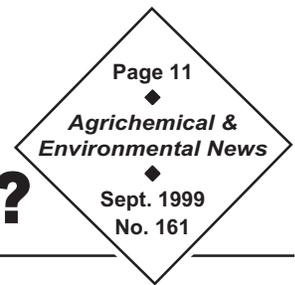
and Environmental Quality Lab (FEQL) collection of computers than our computer consultants have.

I remember more than one time seeing her grin when she rescued those floundering in over-their-heads chemistry problems. She sketched out the solution to the problem like an artist who draws caricatures, a few bold strokes here and there. The result—a brilliantly clear picture. Generous with her skills, and always pleased to talk chemistry at any level, it is small wonder that even private laboratories approached Carol asking for a few wise words. During one three-hour session over coffee and donuts, I sat listening while she effortlessly tossed out solutions to difficult extraction problems as if they were simple things, not the inventive techniques and elegant solutions that came from over twenty years of in-the-trenches experience. Did the visiting lab personnel appreciate it? You betcha. At first rapt and big-eyed over her answers to their questions, the visiting researchers later moved into a catch-me-if-you-can sort of game with Carol, throwing rapid-fire questions and switching subject matter with lightening speed. We watched her effortlessly change mental gears, and like some Porsche Carrera, streak down the road, miles ahead of the rest of us in seconds, all the while tossing solutions out over her shoulder like little gems, leaving the rest of us to gather them up in our bushel baskets. Many of these gems-of-an-answer were to questions they hadn’t yet known they needed to ask. Logical, yes, maybe even progressional—the way zero-to-60 mph in six seconds is progressional—but never, never one-step-at-a-time chemistry.

As associates, we have all had our chance to learn many things from Carol, some by osmosis, some by passive and some by active processes. Now the rest of you have the opportunity to do the same. Carol Weisskopf has left the FEQL to explore other worlds, to test their mettle.

Chemists, I have come to find, can also be conjurers, magicians. Or, at least this chemist is a congener of wizards. We wish her well...chemist, mechanic, ally, mentor, and friend. 🍷

Attack on the Male—Part II Synthetic Chemicals: Emancipators or Emasculators?



Dr. Allan S. Felsot, Environmental Toxicologist, WSU

“Macho, Macho Man” was a popular theme song nearly twenty years ago. Now it seems to be “Viva, Viagra!” In the interim, *Our Stolen Future* was published (Colborn et al. 1996), and now everyone is wondering whether synthetic chemicals have been great societal liberators or the cause of unprecedented reproductive problems that literally threaten human fertility. Some pundits point to an increasing incidence of male reproductive tract maladies as proof that we are being drastically harmed by synthetic chemicals capable of mimicking the sex hormones estrogen and testosterone.

Two particular male problems have been highlighted. First, the incidence of prostate cancer has increased rapidly over the last twenty years, even after adjusting for the increasing age of the population. Testicular cancer, although much rarer, also seems to have increased. Second, malformations of male genitals known as cryptorchidism and hypospadias have been perceived to be greater now than twenty years ago. With the first set of diseases, health effects would not show up until long past puberty. With the latter set of maladies, effects would be observed early in childhood.

Establishing Biological Plausibility

Before going into the actual statistics, we should examine how hormone mimics have been hypothesized to cause reproductive tract cancers and defects. While the chromosome complement (XY for males, XX for females) determines gender anatomy, differentiation of the gonads (genital tissue) and secondary sex glands is governed by the hormones testosterone and estrogen. The embryo actually starts off life with the gonads of both a male and a female. Under the influence of the Y chromosome, specialized cells of the immature testis, called Leydig cells, start secreting testosterone during the second month of gestation (pregnancy) (vom Saal et al. 1992). Another group of cells, called the Sertoli cells, produces Mullerian Inhibiting Substance (MIS). In males, the combination of high levels of testosterone and MIS causes any primordial female gonadal tissues to degenerate. Around the third to fourth month of gestation of the female fetus, the absence of high levels of testosterone and MIS allow the gonadal tissue to continue developing into ovaries.

Both male and female fetuses have estrogen, usually thought of as the female hormone. It is made by ovarian tissue as well as contributed by maternal circulation, but

it is also synthesized by enzymatic conversion of testosterone. So estrogen, in addition to testosterone, plays a role in fetal sexual development. In fact, what may be important is not the absolute amount of these two hormones, but the ratio of their concentrations in the fetal blood. Studies with mice, which are considered good models for studying developmental toxicity of endocrine disrupting substances (Newbold 1995), show that exposure to extra levels of estrogen during pregnancy can affect male development. One of the outcomes are changes in male prostate gland weight. Indeed it has been hypothesized that differential exposure to estrogen can affect development of specialized male tissue, the Mullerian duct, that contributes to the formation of one part of the prostate. Thus, any compound that mimics estrogen or blocks the action of testosterone could affect gonadal development.

The Tragedy of DES

Adding fuel to the hypothesis that environmental chemicals are harming male reproductive development is the experience with the drug diethylstilbesterol (DES). DES is a remarkably potent estrogen mimic, having biological activity that is even greater than the natural estrogen estradiol (Soto et al. 1992). DES was supposedly effective in preventing spontaneous abortion in women with a history of pregnancy loss. As many as three million pregnant women were prescribed DES during the late 1940s through the 1960s (Stillman 1982). Thus, as many as 1.5 millions males may have been exposed to DES during their fetal development. Unfortunately, the therapeutic value of DES was discovered to be nil, but instead its use was associated with increased excess of certain cancers of the female genital tract and increased incidence of male genital abnormalities, testicular cancer, and impaired reproductive function (Stillman 1982).

In studies with mice, DES caused effects identical to those observed in human males whose mothers had taken DES (Newbold 1995). Interestingly, male mice were only affected at the highest dose given to the pregnant mother—100 micrograms (μg) per kilogram (kg) of body weight. Doses ten times less or lower had no effect (Newbold 1995). Pregnant humans were prescribed as much as 10 to 12 grams of DES throughout their pregnancy (Hoover 1980). Assuming in the extreme that a woman took DES daily for the normal

...continued on next page

Emancipators or Emasculators, cont.

Dr. Allan S. Felsot, Environmental Toxicologist, WSU

270 days of pregnancy, and she weighed 60 kg, the daily dose can be estimated to be at a minimum 600 µg/kg/day. Is it any wonder, given the extraordinary potency of DES, that there have been an unusually high level of reproductive tract abnormalities in sons born to DES mothers?

But the key question about synthetic chemicals remains. Based on high-dose rat studies, a plethora of other chemicals are also considered endocrine disrupters. Should the tragedy of DES be extrapolated to environmental exposures to these other chemicals?

Prostate Problems

Frank Zappa, Bill Bixby, and General Norman Schwarzkopf are just a few of the individuals named in the media that have had or succumbed to prostate cancer. Prostate cancer is now the most prevalent cancer among men. Its overall incidence rate in 1996 was 147 per 100,000 population (Wingo et al. 1999). Between 1975 and 1985, prostate cancer increased at an annual percent change (APC) of 2.3 percent for Whites. Between 1985 and 1989, the APC shot up to 18.4%. Similar rates of increase were observed in African-Americans. With such startling trends, it would seem logical to hypothesize that there is "something in the water," so to speak.

Since 1992, however, the incidence has been decreasing for Whites and African-Americans at yearly rates of 12.8 and 14%, respectively (Hankey et al. 1999). Considering that the news is full of stories about an environment rife with hormonally active contaminants, the large observed decrease in prostate incidence rates between 1992 and 1996 seems inconsistent with the hypothesis that the APC for prostate cancer rates are related to synthetic chemicals. Furthermore, a close examination of the absolute incidence for any one ethnic group is revealing (Table 1). Why are incidence rates for Native Americans, Asians, and Hispanics so much lower than the rates for Whites and African-Americans?

If the hypothesis that increasing rates of prostate cancer are due to ubiquitous synthetic chemicals is valid, shouldn't all ethnic groups have similar incidence rates? Consider that Asians and Native Americans eat a greater proportion of fish in their diet than Whites. Fish have the highest levels of contamination of synthetic chemicals known as persistent bioaccumulative toxins

GROUP	Incidence (per 100,000)	Mortality (per 100,000)
Whites	147.3	23.7
African-Americans	222.9	54.8
Asian/Pac Islanders	91.5	10.7
Native Americans	49.6	14.3
Hispanics	102.9	16.7

REF: Wingo et al. 1998

(PBTs). Many PBTs, including DDT, PCBs (polychlorinated biphenyls), PAHs (polyaromatic hydrocarbons), and dioxins, are considered endocrine disrupters.

An alternative hypothesis has been developed and tested to explain the rapid rise and fall in prostate cancer incidence rates over the last fifteen years. Starting in the late 1980s, the prostate-specific antigen (PSA) test was increasingly used to screen for cases of suspected prostate cancer. Thus, National Cancer Institute epidemiologists have presented data and statistical models that support increased screening as a cause of the sharp increases in prostate cancer incidence (Hankey 1999). Only time will tell if prostate incidence rates will continue to decline to pre-1980 rates.

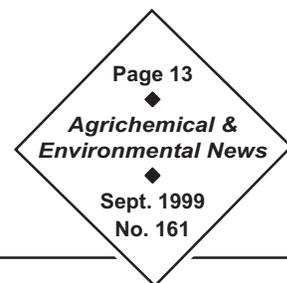
Malformed Manhood

Apparent increases in incidences of cryptorchidism and hypospadias trends have been cited frequently as "proof" that synthetic chemicals are affecting male reproductive health (Paulozzi 1999). Hypospadias refers to the displacement of the urethral opening toward the scrotum. Cryptorchidism is a condition in which one or both testicles do not descend into the scrotum. Both conditions are repairable by surgery. As mentioned earlier, such conditions have been associated with exposure of mice and humans to high doses of DES.

A recent international epidemiological survey by the Centers for Disease Control and Prevention indicates that the trends in incidence of either hypospadias or cryptorchidism are not clear cut and vary by country and city within a country (Paulozzi 1999). Furthermore the trends are not in any one direction but have tended to go

...continued on next page

Emancipators or Emasculators, cont.



Dr. Allan S. Felsot, Environmental Toxicologist, WSU

up and down over time. For example, the incidence of hypospadias cases classified as severe in California has been stable to declining since 1983. In Atlanta, Georgia, the incidence rate of severe hypospadias cases was stable from 1968 to 1982, jumped up until 1985, and has been stable since. In northern Netherlands, the case rate plummeted between 1981 and 1986, and has been stable since. In Israel, the incidence of cases in 1996 was about the same as it was in 1973, but in the interim the case rate drastically dropped (1973-1978) and then rose to the highest levels ever in 1989 and then dropped back down again to 1973 levels. Similar anomalies in trends were observed for cryptorchidism.

The broadly applied hypothesis of effects due to synthetic chemical exposures is not supported by these wild fluctuations in incidence trends. A good hypothesis for cause and effect must be able to explain the fluctuations in incidence rates.

Exposures to PBTs were greatest in the twenty years after 1950. Since then, many PBTs have been banned, therefore exposures have gone down. Unlike prostate cancer, male genital abnormalities are a health effect that appears close in time to exposure. Females are known to carry a body burden of PBTs, but this fact seems inconsistent with declining rates of disease and

with large temporal increases.

More to Come

In a newly released report on endocrine disrupting chemicals, the National Academy of Sciences (NAS) decided that in many cases of reported endocrine disrupting effects, the real mode of action was not known (NAS 1999). The various problems reported in humans and wildlife could be due to hormone effects or some other toxic effect. The overall conclusion of the report was to be expected—we need more research. To hedge its bets, the NAS decided to call the substances in question Hormonally Active Agents (HAAs).

One definitive conclusion about human health made in the executive summary of the report is that the HAAs could not be associated with male genital malformations and cancers, nor female breast cancers. Given this conclusion and the uncertainty about whether or not male reproductive maladies are even increasing, a skeptic might look at the state of the world and amusedly ponder the role of HAAs. Then he might draw in his breath and heartily conclude—HAA? HAH!

Dr. Allan S. Felsot is an Environmental Toxicologist at WSU. He can be reached at afelsot@tricity.wsu.edu or (509) 372-7365.

REFERENCES

1. Colborn, T., D. Dumanoski, and J. P. Myers. 1996. Our Stolen Future. Dutton, NY. 306 pp.
2. Hankey, B. F., E. J. Feuer, L. X. Clegg, R. B. Hayes, J. M. Legler, P. C. Prorok, L. A. Ries, R. M. Merrill, and R. S. Kaplan. 1999. Cancer surveillance series: interpreting trends in prostate cancer—Part I: Evidence of the effects of screening in recent prostate cancer incidence, mortality, and survival rates. *J. National Cancer Institute* 91(12):1017-1024.
3. Hoover, R. 1980. Association of exogenous estrogens and cancer in humans. *Estrogens in the Environment*, J. McLachlan, ed. Elsevier North Holland, Inc., New York. pp. 353-376.
4. National Academy of Sciences. 1999. *Hormonally Active Agents in the Environment*. National Academy Press, Washington, DC.
5. Newbold, R. 1995. Cellular and molecular effects of development exposure to diethylstilbestrol: implications for other environmental estrogens. *Environmental Health Perspectives* 103, supplement 7(October):83-87.
6. Paulozzi, L. J. 1999. International trends in rates of hypospadias and cryptorchidism. *Environmental Health Perspectives* 107(4):297-302.
7. Soto, A. M., T.-M. Lin, H. Justicia, R. M. Silvia, and C. Sonnenschein. 1992. An "in culture" bioassay to assess the estrogenicity of xenobiotics (E-Screen). In *Chemically-Induced Alterations in Sexual and Functional Development: The Wildlife/Human Connection*, T. Colborn and C. Clement, ed. Princeton Scientific Publishing Co., Inc., New Jersey. pp 295-309.
8. Stillman, R. J. 1982. In-utero exposure to diethylstilbestrol: adverse effects on the reproductive tract and reproductive performance in male and female offspring. *American Journal of Obstetrics and Gynecology* 142:905-921.
9. vom Saal, F. S., M. M. Montano, and M. H. Wang. 1992. Sexual differentiation in mammals. In *Chemically-Induced Alterations in Sexual and Functional Development: The Wildlife/Human Connection*, T. Colborn and C. Clement, ed. Princeton Scientific Publishing Co., Inc., New Jersey. pp. 17-83.
10. Wingo, P. A., L. A. G. Ries, G. A. Giovino, D. S. Miller, H. M. Rosenberg, D. R. Shopland, M. J. Thun, and B. K. Edwards. 1999. Annual report to the nation on the status of cancer, 1973-1996, with a special section on lung cancer and tobacco smoking. *J. National Cancer Institute* 91(8):675-690.

Notice of Vacancy

FEQL Seeks Analytical Chemist

Washington State University

Description: Tenure track, twelve-month appointment, research/extension (80/20) position in the Department of Entomology. Assistant/associate professor rank; salary commensurate with experience and qualifications. Effective date July 2000.

General Information: The mission of the Food and Environmental Quality Lab (FEQL) is to (a) analyze pesticide residues in the environment and on crops, (b) investigate the environmental chemistry and toxicology of pesticides, and (c) provide environmental information about pesticides and pest control to the private and public sector. The FEQL analytical laboratory is located at the WSU Tri-Cities Branch Campus, and is one of several research and teaching laboratories. The facility is equipped with a benchtop GC-MS/MS, GC/LC-MS, and several GCs and HPLCs. There is also instrumentation for radiochemical and ELISA assays. The lab operates under a set of Standard Operating Procedures developed according to FIFRA GLP guidelines.

The successful applicant will be a team member of the FEQL Program and will work collaboratively with an environmental toxicologist, environmental/agrichemical education specialist, pesticide impact assessment program liaison, and pesticide education coordinator. FEQL team members collaborate with several state agencies, including agriculture, health, ecology, and labor. The person hired will work closely with the national and regional IR-4 programs and private laboratories. Interactions are encouraged with other faculty in the Department of Entomology as well as with crop protection specialists throughout the state, including those stationed at the WSU Research and Extension Centers in Prosser, Puyallup, Vancouver, Mt. Vernon and Wenatchee. Opportunities also exist for interactions with scientists at the Department of Energy's Battelle Pacific Northwest Laboratories in Richland.

Duties/Responsibilities: The person hired will develop a research program to study residues of agricultural chemicals in foods and the environment. In collaboration with IR-4, FEQL, and other WSU personnel, the successful candidate will be responsible for:

- developing analytical methods for detecting conventional, alternative, and biorational chemical residues in agricultural commodities and the environment;
- providing federal and state agencies and clientele groups residue data required for registration and re-registration of conventional, alternative, and biorational pesticides critical to crop production with emphasis on minor crops as part of the IR-4 program; and
- mentoring and supporting graduate student training.

The person hired will develop an extension program and be responsible for:

- providing outreach on issues related to agricultural chemical residues in foods and the environment to federal and state agencies, and agricultural commodity groups, food processors, and other clientele groups; and
- participating on the editorial board and contributing to *Agrichemical and Environmental News*, a monthly newsletter.

Education and Experience

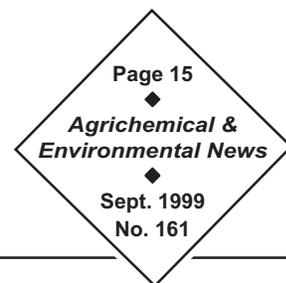
Required Qualifications: A Doctorate Degree in analytical chemistry, biochemistry, environmental chemistry, or relevant field; knowledge and experience in the development of analytical methods and analysis of chemical residues in foods, especially pesticides; experience and ability to operate and maintain laboratory instrumentation, including gas and high pressure liquid chromatographs and bench-top mass spectrometry systems; demonstrated ability in written and oral communications; demonstrated ability to effectively interact with diverse clientele groups.

Desired Qualifications: Knowledge of FDA and EPA analytical methods and GLP regulations; ability to acquire external funding; familiarity with agricultural systems and food processing; experience with graduate student or intern training; experience in supervising personnel; experience working on team projects; ability to develop and meet timelines/deadlines; experience with handling producer and public concerns about pesticide-related issues; and experience with handling budgets.

Screening & Application: Screening of applications will begin November 15, 1999, and will continue until a suitable candidate is found. Submit a letter of application addressing specific required and desired qualifications and research interests, current transcripts and vitae, and have three letters of reference sent to Carol Ramsay, Chair, Analytical Chemist Search Committee, Department of Entomology, PO Box 646382, Washington State University, Pullman, WA 99164-6382; ramsay@wsu.edu, 509-335-5504, fax 509-335-1009.

WSU is an equal opportunity/affirmative action educator and employer. Members of ethnic minorities, women, Vietnam-era or disabled veterans, persons of disability and/or persons age 40 and over are encouraged to apply. WSU employs only U.S. citizens and lawfully authorized non-U.S. citizens. All new employees must show employment eligibility verification as required by the U.S. Immigration and Naturalization Service. Accommodations for applicants who qualify under the Americans with Disabilities Act are available upon request.

Potential Hazards of Compost Dust Studied



Norm Herdrich, PNASH Outreach Coordinator

Compost facility workers may be exposed to elevated levels of organic dust during the composting of organic solid wastes. The high concentrations of bacteria, fungi, and associated toxic products in the dust may lead to a variety of respiratory diseases, including mucous membrane irritation, organic dust toxic syndrome, hypersensitivity pneumonitis, occupational asthma, and airways obstruction, as well as to allergic dermatitis.

Project Underway

A project funded in part by the Pacific Northwest Agricultural Safety and Health Center (PNASH) has been evaluating the extent to which dust from organic solid waste composting facilities can affect workers. This project is part of a larger study funded by the National Institute for Occupational Safety and Health (NIOSH) and was awarded to Dr. Noah Seixas, Associate Professor with the University of Washington's Department of Environmental Health. The study was designed to quantify exposure to organic dust and its constituents and to assess respiratory outcomes in a cross-section of Pacific Northwest composting facilities.

Methodology in Brief

Study investigators have enrolled ten facilities to participate in the project. Air samples are being collected during the summer and winter months to evaluate employee exposure to total dust, fungi, bacteria, endotoxin, and ammonia during different seasons. Universities in the United States, Canada, and the Netherlands have cooperated in analyzing samples collected during this study. Both personal breathing zone and general area air samples were collected at each facility throughout full work shifts. Samples were analyzed at the University of Washington, then forwarded to the University of British Columbia where specific target components were extracted. A portion of the extract was analyzed for endotoxin and the remainder was sent to the University of Wageningen in the Netherlands to be analyzed for chemical indicators of fungi. A set of area samples was also sent to the Harvard School of Public Health for culture and analysis of viable bacteria and fungi. Personal breathing zone samples for ammonia were collected using passive dosimeters; these were analyzed at the University of Washington.

Medical evaluations of employees are also being conducted at these ten composting plants. Researchers are assessing the respiratory health of subjects primarily

through an extensive health survey that includes questions about current, past, and chronic symptoms associated with respiratory illness. In addition, simple spirometry and a brief physical exam were conducted to obtain objective outcome data.

Next Steps

The field work portion of this study concludes this month and data analysis is underway. Preliminary results indicate that compost workers can be exposed to high levels of organic dust, especially during certain processes and conditions. At times these exposures may be sufficiently high to cause certain health effects. However, because there are a limited number of individuals in the study so far, and a control (comparison) group has not yet been studied, the actual relationship between these exposures and effects has not been established. Workers who experience respiratory or flu-like symptoms after exposure to composting dusts should take care to avoid high exposure situations or wear effective personal protection during exposure episodes.

This pilot project is part of a larger study funded by Centers for Disease Control and Prevention/NIOSH through a general research grant. The Principal Investigator is Dr. Noah Seixas in the Department of Environmental Health at the University of Washington (UW). Kate Durand, also located at the UW Department of Environmental Health, is the Project Manager and Industrial Hygienist on the study. Collaborators include Harriet Burge at the Harvard School of Public Health, Dick Heederik at the University of Wageningen in The Netherlands, and Karen Bartlett at the University of British Columbia. For questions regarding this study, please contact Dr. Seixas at (206) 685-7189. 

The Pacific Northwest Agricultural Safety and Health Center, funded by CDC/NIOSH, is one of nine such centers in the United States. The Center's mandate is to study occupational health and safety issues in farming, forestry and fishing in Idaho, Washington, Oregon and Alaska. Dr. Richard Fenske is the Center Director, Dr. Matthew Keifer is Co-Director, and Sharon Morris is Associate Director. Adrienne Hidy is the Center's Administrator, and Marcy White is the Program Coordinator. Norm Herdrich is PNASH Outreach Coordinator. To obtain additional information regarding the Center, he can be contacted at (509) 926-1704, or e-mail him at normh@u.washington.edu.

So Long, and...

Dr. Carol Pilz Weisskopf, Chemist at Large

Some of you (my fans, or *fan* as the case may be—I have the *AENews* sent to my sister) may have noticed that I have been absent from these pages of late. This was prompted first by my decision to leave Washington State University and then by yet another surgery. I couldn't presume to say it nearly so well as Charles Dickens did in *A Tale of Two Cities*:

"It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, we had everything before us, we had nothing before us, we were all going direct to Heaven, we were all going direct the other way – "

As I write, I am wrapping up my final project: analysis of juvenile sturgeon for organophosphate and carbamate insecticides. Today I placed one of my final orders: a meat grinder, so I wouldn't have to look at their little eyeballs as I chopped them up with my knife. While at the FEQL I lost a lot of things (including miscellaneous innards through too many surgeries), but so far I've avoided losing my lunch.

One "best of times" was that spent in these pages. So I say (despite the mix not only of books but of genres), as the dolphins did when they left the earth in the fourth book of the Douglas Adams trilogy *Hitchhiker's Guide to the Galaxy*—

...Thanks for All the Fish.

Federal Register Excerpts

Jane M. Thomas, Pesticide Notification Network Coordinator

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

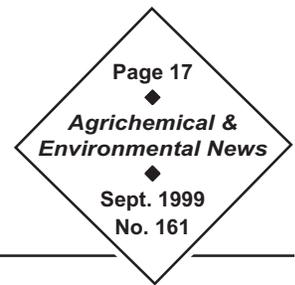
In the July 7 Federal Register, EPA announced the availability of the revised risk assessment documents for one organophosphate pesticide, cadusafos. Electronic copies of the revised risk assessment and related documents are available on URL: <http://www.epa.gov/pesticides/op/status.htm>. (Page 36683)

In the July 8 Federal Register, EPA announced it is soliciting comments on four policy papers:

- ◆ "Toxicology Data Requirements for Assessing Risks of Pesticide Exposure to Children's Health,"
- ◆ "Exposure Data Requirement for Assessing Risks of Pesticide Exposure to Children,"
- ◆ "The Office of Pesticide Programs' Policy on Determination of the Appropriate FQPA Safety Factor(s) for Use in the Tolerance-Setting Process," and
- ◆ "Standard Operating Procedures (SOP) for Determining the Appropriate FQPA Safety Factor(s) for Use in Tolerance Assessment."

...continued on next page

Federal Register Excerpts, cont.



Jane M. Thomas, Pesticide Notification Network Coordinator

Electronic copies of the policy papers announced in this notice are available on the following URL: <http://www.epa.gov/oppfead1/trac/science/#10-fold>. (Page 37001)

In the July 14 Federal Register, EPA announced that it is soliciting comments on a draft science policy paper entitled "The Role of Use-Related Information in Pesticide Risk Assessment and Risk Management" Electronic copies of this document and the draft science policy paper are available on the following URL: <http://www.epa.gov/oppfead1/trac/science/#additional>. (Page 37977)

In the July 14 Federal Register, EPA announced that the revised risk assessments and related documents for one organophosphate pesticide, ethion was available for review and comment. Copies of these documents are available electronically on the following URL: <http://www.epa.gov/oppsrrd1/op/ethion.htm>. (Page 37967)

In the July 21 Federal Register, EPA issued a final rule revoking specific tolerances for the herbicides bentazon, diquat, oxadiazon, picloram, prometryn, and trifluralin; the plant growth regulator ethephon; and the insecticide dicrotophos. EPA is revoking these tolerances because EPA has canceled the food uses associated with them. These tolerance revocations become effective October 19, 1999. The revocations relevant to the Pacific Northwest are

- ◆ Bentazo - beans, lima (succulent); and mint, spent hay.
- ◆ Diquat - water, potable.
- ◆ Ethephon - filberts.
- ◆ Picloram - flax, seed and flax, straw.
- ◆ Trifluralin - barley, fodder. (Page 39078)

In the July 21 Federal Register, EPA published a final rule revoking specific tolerances and/or exemptions for residues of several herbicides, fungicides and insecticides. These tolerance revocations become effective October 19, 1999. The revocations announced in this action are

- ◆ Captafol - apples; apricots; blueberries; cherries, sour; cherries, sweet; citrus fruits; corn, fresh (inc sweet K+CWHR); cranberries; cucumbers; macadamia nuts; melons; nectarines; peanuts, meats (hulls removed); peaches; pineapples; plums (fresh prunes); and taro (corm).
- ◆ Chlorobenzilate - cattle, fat; cattle, mby; cattle, meat; citrus fruits; sheep, fat; sheep, mby; and sheep, meat.
- ◆ Sulfur dioxide - this action revokes the exemptions in 40 CFR 180.1013(a) for sulfur dioxide residues in or on barley; buckwheat; corn; oats; popcorn; rice; rye; sorghum, grain (milo); wheat; and corn (for feed use).
- ◆ 2-Chloro-1-(2,4,5-trichlorophenyl) vinyl dimethyl phosphate - apples; cherries; corn, field, fodder; corn, field, forage; corn, fresh (inc. sweet K+CWHR); corn, grain; corn, pop, fodder; corn, pop, forage; corn, sweet, fodder; corn, sweet, forage; cranberries; peaches; pears; and tomatoes.
- ◆ Terbutryn - barley, fodder; barley, grain; barley, green; barley, straw; sorghum, grain; wheat, fodder; wheat, grain; wheat, green; and wheat, straw.
- ◆ Biphenyl - fruits, citrus (and hybrids thereof).
- ◆ Calcium cyanide - barley, grain (POST-H); buckwheat, grain (POST-H); corn, grain (POST-H); cucumbers; lettuce; oats, grain (POST-H); radishes; rice, grain (POST-H); rye, grain (POST-H); sorghum, grain (POST-H); tomatoes; and wheat, grain (POST-H).
- ◆ 2-Chloro-N,N-diallylacetamide - beans, dried; beans, lima; beans, lima, forage; beans, snap; beans, snap, forage; cabbage; castor beans; celery; corn, field, fodder; corn, field, forage; corn, fresh (inc sweet K+ CWHR); corn, grain (inc popcorn); corn, pop, fodder; corn, pop, forage; corn, sweet, fodder; corn, sweet, forage; onions; peas; peas, forage; potatoes; sorghum, forage; sorghum, grain; soybeans; soybeans, forage; sugarcane; sweet potatoes; and tomatoes.
- ◆ Chlorosulfamic acid - asparagus (POST-H); carrots (POST-H); cauliflower (POST-H); celery (POST-H); potatoes (POST-H); and radishes (POST-H).
- ◆ Chloroxuron - carrots; celery; onions (dry bulb); soybeans; soybeans, forage; and strawberries.

...continued on next page

Federal Register Excerpts, cont.

Jane M. Thomas, Pesticide Notification Network Coordinator

◆ Diethatyl-ethyl - red beet, roots; red beet, tops; spinach; sugar beets, roots; and sugar beets, tops. (Page 39049)

In the July 21 Federal Register, EPA announced the revocation of tolerances for residues of the pesticides listed below. Also, this action revokes the tolerance for residues of the nematicide and insecticide ethoprop in or on mushrooms; and the food additive tolerance for residues of the fungicide paraformaldehyde in maple syrup. These revocations become effective October 19, 1999.

◆ Coumaphos - eggs; poultry, fat; poultry, mby; and poultry, meat.

◆ Fonofos - Although EPA will still revoke 30 of these tolerances, the tolerances for residues of fonofos on the commodities in 40 CFR 180.221 will not expire until December 31, 2002, with the following exceptions: The tolerances for peppermint, hay; spearmint, hay; beans, forage; beans, vine hay; corn, pop, forage; and peanuts, forage are revoked effective 90 days following this action.

◆ Hydrogen Cyanide - all tolerances other than citrus fruit.

◆ N,N-dimethylpiperidinium chloride - cottonseed meal, cotton forage, eggs; milk; poultry, fat; poultry, mby; poultry, meat.

Paraquat - rye grain, oat grain, bean, straw; hops, fresh; hop vines; lentil hay; peanut vines; poultry fat; poultry meat; poultry meat byproducts; and sunflower seed hulls.

◆ Dalapon, Fluchloralin, Metobromuron, Sesone, Basic Zinc Sulfate, Glyodin, Manganous Dimethyldithiocarbamate, and Ethyl Formate - all tolerances. (Page 39072)

In the July 21 Federal Register, EPA announced that it was revoking tolerances for residues of the pesticide propargite in or on the following commodities: apples; apricots; beans, succulent; cranberries; figs; figs, dried; peaches; pears; plums (fresh prunes); and strawberries. EPA is revoking these tolerances because these uses have been canceled voluntarily from propargite labels by Uniroyal Chemical Company. Uniroyal has deleted the uses to address dietary risk concerns raised by EPA. (Page 39068)



PNN Update

Jane M. Thomas, Pesticide Notification Network Coordinator

The PNN is operated by WSU's Pesticide Information Center for the Washington State Commission on Pesticide Registration. The PNN system is designed to distribute pesticide registration and label change information to groups representing Washington's pesticide users. The material below is a summary of the information distributed on the PNN in June.

Our office operates a web page called PICOL (Pesticide Information Center On-Line). This provides a label database, status on registrations and other related information. PICOL can be accessed on URL <http://picol.cahe.wsu.edu> or call our office, (509) 372-7492, for more information.

Jane M. Thomas, Pesticide Notification Network Coordinator

Federal Issues

Manufacturers' Product Cancellations

◆ In the July 14 Federal Register, EPA announced that it had received a request from DuPont to cancel the registration for its herbicide Lexone DF. Unless the request is withdrawn by January 10, 2000, EPA will issue orders canceling this registration. It is assumed that this action will also lead to the cancellation of the associated SLN (WA-960001) for use on green peas.

◆ In the July 14 Federal Register, EPA announced that it had received a request from Monsanto to cancel the registration for its herbicide Bronco. Unless this request is withdrawn by January 10, 2000, EPA will issue orders canceling this registration.

◆ In the July 14 Federal Register, EPA announced that it had received a request from Pursell Industries to cancel the registration for its insecticide Vertagreen Lindane. While this product itself is not registered for use in Washington, MicroFlo does carry a subregistration for it under the name Lindane 20EC. The action being taken by Pursell will result in the cancellation of this subregistration. Unless this request is withdrawn by January 10, 2000, EPA will issue orders canceling this registration.

Section 18 Specific Exemptions

◆ On July 1 EPA issued a Section 18 specific exemption (file symbol 99-WA-36) for the use of Elf Atochem's Pennstyl 5F to control twospotted spider mites on hops. The exemption allows for:

- ◆ application after burr formation or after July 15,
- ◆ two applications,
- ◆ a 21-day PHI,
- ◆ treating a maximum of 26,000 acres in Benton and Yakima counties, and
- ◆ an expiration date of 9/20/99.

Miscellaneous Regulatory Information

◆ In the June 16 Federal Register, EPA announced that the revised risk assessment documents were

available for bensulide. These documents are available electronically on URL: <http://www.epa.gov/pesticides/op/status.htm>. In Washington, bensulide is the active ingredient in both commercial and homeowner products and is marketed as: Bensumec, Pre-San, Prefar, Proturf, and Super Pax. Via main labels, supplemental, and an SLN, bensulide is labeled for use on the following sites: broccoli, Brussels sprouts, bulb, cabbage, cauliflower, celery, Chinese broccoli, cabbage and mustard, collard, conifer, cucurbit, dandelion, deciduous/shade tree, dry bulb onion, endive, evergreen tree, fennel, flower, golf course, grass seed, kale, kohlrabi, lawn, lettuce, mustard, ornamentals, parsley, parsnip, pepper, rape, recreation area, shrub, Swiss chard, tomato, and turf.

◆ In the June 30 Federal Register, EPA announced that the revised risk assessment documents were available for sulfotepp. These documents are available electronically on URL: <http://www.epa.gov/pesticides/op/status.htm>. In Washington, sulfotepp is the active ingredient in Fulex Dithio Smoke and Plantfume 103 and is labeled for use on the following sites: greenhouse, greenhouse flower, greenhouse rose, and greenhouse ornamental.

◆ In the July 14 Federal Register, EPA announced that the revised risk assessment documents were available for ethion. These documents are available electronically on URL: <http://www.epa.gov/pesticides/op/status.htm>. In Washington, ethion is the active ingredient in both Commando and Commando Defense System ear tags.

State Issues

New Registrations

◆ WSDA has registered Thermo Trilogy's product Trilogy Broad Spectrum Fungicide/Miticide. This product is labeled for use on nearly 100 crops.

◆ WSDA has registered Thermo Trilogy's Neemazad 0.25EC Botanical Insecticide. This product is labeled for use on greenhouse ornamental, indoor landscape

...continued on next page

Jane M. Thomas, Pesticide Notification Network Coordinator

plant, nursery, ornamental, rose, flower, ornamental tree, and shrub.

Section 18 Crisis Exemptions

◆ On July 2 WSDA issued a Section 18 crisis exemption for the use of American Cyanamid's Raptor Herbicide to control hairy nightshade on dry beans. The exemption allows for:

- ◆ one application per season,
- ◆ a 60-day PHI,
- ◆ water howellia protection restrictions in Spokane county,
- ◆ treating a maximum of 20,000 acres in counties east of the Cascades, and
- ◆ an expiration date of 8/15/99.

Section 24c Registrations

◆ On July 7 WSDA issued an SLN, WA-990028, to Amvac for the use of its Dibrom 8 Emulsive to control lygus and thrips in alfalfa grown for seed. Amvac has taken over dibrom from Valent and this SLN will

eventually replace WA-890019, an equivalent SLN issued for the use of Valent's product. This SLN expires 12/31/04.

Section 24c Cancellations

◆ On July 14 WSDA issued a letter canceling SLNs WA-950008 and WA-950024. Both SLNs (WA-950008 for Dual Herbicide and WA-950024 for Dual 8E) had previously been issued to Novartis for use of their Dual products on radish seed crops. Novartis has requested these cancellations as they are phasing out these products in favor of Dual Magnum herbicide. SLN WA-990005 provides for the use of Dual Magnum on radish seed crops.

Section 24c Revisions

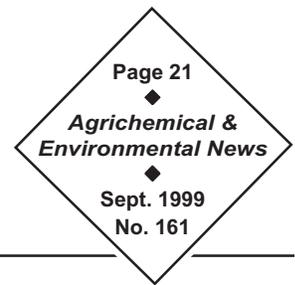
◆ On July 8 WSDA issued a revision to SLN WA-980016. This SLN had previously been issued to FMC for the use of its Thiodan 3EC to control spotted alfalfa aphids and lygus bugs on alfalfa seed crops. The revision adds an aquatic toxicity statement and changes the expiration date to 12/31/04. 🍎

Subscription Reminder

Agrichemical and Environmental News (AENews), in addition to being available at no charge on the Internet monthly at <http://wsu2.tricity.wsu.edu/aenews>, is available in a hard-copy (paper) subscription format. The hard-copy version of the newsletter is delivered at the beginning of each month, and includes everything in the electronic version except the Federal Register Excerpts, Tolerance Information, and PNN Updates. Subscriptions run on a calendar-year basis. To subscribe for the year 2000, send a check for \$15.00 (US funds), plus your name and delivery address, to:

Sally O'Neal Coates, Editor
Agrichemical & Environmental News
Pesticide Information Center
Washington State University, Tri-Cities
2710 University Drive
Richland, WA 99352-1671

Tolerance Information



Jane M. Thomas, Pesticide Notification Network Coordinator

Tolerance Information						
Chemical (type)	Federal Register	Tolerance (ppm)	Commodity (raw)	Time-Limited		
				Yes/No	New/Extension	Expiration Date
fosetyl-al (fungicide)	7/8/99 page 36794	40.00	blueberries 10.00 grapes	No	N/A	N/A
bentazon (herbicide)	7/14/99 page 37861	3.00	succulent peas	Yes	Extension	12/31/00
Canada thistle in succulent peas grown in Minnesota and Wisconsin.						
fosetyl-al (fungicide)	7/14/99 page 37870	1.00	succulent peas	Yes	New	9/31/00
Comment: This time-limited tolerance is being established in response to EPA granting Section 18 exemptions for the use of fosetyl-al to control downy mildew in succulent peas in Washington and Idaho.						
imazamox (herbicide)	7/14/99 page 37855	0.05	canola 0.05 dry peas	Yes	New	7/15/01
Comment: These time-limited tolerances are being established in response to EPA granting Section 18 exemptions for the use of imazamox to control nightshade in dry beans in Washington, Minnesota, North Dakota, Wyoming, Montana, and Colorado and mustard in canola in Minnesota and North Dakota.						
tebufenozide (insecticide)	7/14/99 page 37863	0.50	kiwifruit	No	N/A	N/A
imidacloprid (insecticide)	7/21/99 page 39041	1.00	blueberries 0.50 cranberries	Yes	New	6/1/01
Comment: These time-limited tolerances are being established in response to EPA granting Section 18 exemptions for the use of imidacloprid in blueberries to control blueberry aphids and oriental beetles and in cranberries to control rootworms in New Jersey crops.						
spinosad (insecticide)	7/21/99 page 39053	0.02	see comment	Yes	New	12/1/02
indigenous, fruit fly species, where a separate higher tolerance is not already established.						
tebufenozide (fungicide)	7/21/99 page 39060	1.50	pome fruit	No	N/A	N/A
		3.00	apple pomace			
		0.04	milk			
		0.08	meat of cattle, goats, hogs, horses, and sheep			
		0.10	fat of cattle, goats, hogs, horses, and sheep			
		0.08	mbp of cattle, goats, hogs, horses, and sheep			
zinc phosphide (rodenticide)	7/28/99 page 40769	0.10	timothy	Yes	Extension	8/1/01
		0.10	alfalfa			
		0.10	clover			
Comment: This time-limited tolerance is being extended in response to EPA again granting Section 18 exemption for use of control voles in crops in Nevada and Washington.						
propiconazole (fungicide)	7/30/99 page 41294	1.00	blueberries	Yes	Extension	12/31/00
		1.00	cranberries			7/31/00
		1.00	raspberries			12/31/00
Comment: These time-limited tolerances are being extended in response to EPA again granting Section 18 exemptions for the use of propiconazole to control diseases in berry crops grown in various states.						