

Chemically Speaking

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June 2009

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Agencies Wrangle Over Pesticides

Last year, a federal judge ordered the National Marine Fisheries Service to review 37 pesticides to determine if they harm endangered salmonid species in the Northwest. Since then, National Marine Fisheries Service (NMFS) has found that each of the six pesticides it has reviewed so far poses a jeopardy to the fish. In a November 2008 biological opinion, NMFS proposed restrictions on the use of malathion, chlorpyrifos and diazinon. A second opinion released this April proposed similar restrictions for carbaryl, carbofuran, and methomyl.



The Environmental Protection Agency (EPA) is expected to develop label regulations based on these proposed mitigation measures, but agency managers

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say they are confused about how NMFS arrived at its findings. After receiving a draft of the most recent biological opinion, EPA's director of pesticide programs, Debra Edwards, wrote a response letter criticizing NMFS' approach. "The draft biological opinion lacks a level of transparency necessary for EPA to understand NMFS' rationale for its opinion that the use of these pesticides will jeopardize the continued existence" of the endangered fish, Edwards said in the letter, dated April 10.

NMFS seemed to use "conflicting approaches" in how it compiled the biological opinion, drawing conclusions about pesticide risk from uncertain and incomplete data, Edwards said. The biological opinion also failed to explain why NMFS took certain studies into consideration but did not use other studies provided by EPA, she said. Edwards also questioned how realistic NMFS was about pesticide use in agriculture.

Farmers use less pesticides than estimated in the biological opinion, since NMFS assumed growers apply the maximum amount of chemicals permitted by law, Edwards said. "There seem to be numerous assumptions made in the draft that are not reasonably likely to occur and in fact are very unlikely to occur," she said. According to data in the biological opinion, populations of endangered fish have actually improved, but that information doesn't seem to factor into NMFS' conclusions, Edwards said. "Use of these pesticides has been going on for decades," she said. "If the threatened status of the species has not changed appreciably during this time period, it would appear to provide some indication that use of these pesticides are not appreciably reducing the likelihood of both survival and recovery."

Angela Somma, chief of NMFS' endangered program said the agency disagrees with the EPA's view that the biological opinion lacks transparency. "At this point, we have not resolved all the issues with EPA, but we certainly have conversations about it," said Somma. NMFS acknowledges in the biological opinion that some of the studies it considered were uncertain, she said. However, the Endangered Species Act and subsequent legal decisions require NMFS to consider all relevant

data when conducting a biological opinion, Somma said. "The courts have told us many times we have to look at all the information," she said. The positive fish population numbers may have been the result of habitat restoration and other efforts, and so did not figure into NMFS' findings, she said. (*Capital Press Agricultural News*, 5/7/09).

Future Farm Factories

Perceived risks regarding pesticide residues and climatic change have led to the design of some advanced horticultural systems. Near Camarillo in California between Highway 101 and the Pacific Ocean in Ventura County are two mammoth, greenhouses. The farming company behind this \$50-million complex sees it as insurance against perpetual drought, volatile fossil fuel prices and resilient pests. The facility generates its own renewable power. It stores rainwater. It hosts its own bumblebees for pollination, and it requires fewer agrichemicals than field-planted crops. The movement to grow food crops in closed, sustainable environments could become as revolutionary to farming in the 21st century as California's development of massive farms was in the 20th, agriculture experts say. "We are doing all of this not only because it will be good for our business but because it will be good for everyone else," said Casey Houweling, president of Houweling Nurseries, the Canadian farming company that is cultivating tomatoes at the facility, which is now fully operational. The son of a Dutch immigrant farmer, the 51-year-old Houweling has helped build his family's agricultural business into one of the largest greenhouse-based growers in North America.

On a recent afternoon, Houweling was eager to show visitors clusters of plump, sweet tomatoes hanging overhead from vines that reach high into the rafters. This arrangement allows the farm's 450 permanent employees to climb ladders to pick the fruit instead of stooping. The plants, which are fed individually through tubing that looks like intravenous hospital equipment, produce 20 times more fruit per acre than in conventional field

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production. Virtually nothing is wasted in this ecosystem. Workers have dug a four-acre pond to store rainwater and runoff. This water, along with condensation, is collected, filtered and recirculated back to each of the 20-acre greenhouses. That has cut water use to less than one-fifth of that required in conventional field cultivation. Fertilizer use has been reduced by half. There are no herbicides and almost no pesticides, and there is no dust. Designed by Kubo Greenhouse Projects, a Dutch company, the temperature- and humidity-controlled glass-sheeted farm is expected to produce 482 tons of tomatoes per acre, 15 percent more than Houweling's previous generation of greenhouses. The plants live far longer than field crops and are replaced every six months.



In Japan, clean room type factories have been constructed exist where everything is controlled: lighting, temperature, humidity, carbon dioxide and water. The plants are not even exposed to the air outside, nor are they exposed to any dirt or insects. These factories, such as the Ozu Corporation in Tokyo, claim to be able to meet the demands of consumers who want "safe" foods. This newer form of agriculture takes the hydroponics idea even further by producing produce that is as close to sterile as possible. Sterility and total absence of pests and hence, pesticides, are important benefits not the least of which is that the end customer does not even have to wash the vegetables. They can be eaten as is. Another benefit is that production can continue 24 hours per day, 365 days per year. This vastly improves productivity. Lettuce, for example, can be cropped up to 20 times a year. (*Los Angeles Times*, 5/14/09 & *Digital Journal*, 6/6/09).

Estrogen Exposure Linked to Lowered Fish Immunity

The effect of hormones in water has recently become a subject of concern. It has now been found that exposure to estrogen reduces production of immune-related proteins in fish. This suggests that certain compounds, known as endocrine disruptors, may make fish more susceptible to disease. The research may provide new clues for why intersex fish, fish kills and fish lesions often occur together in the Shenandoah and Potomac rivers. The tests were conducted by scientists from the U.S. Geological Survey (USGS). The study, led by USGS genomics researcher Dr. Laura Robertson, revealed that largemouth bass injected with estrogen produced lowered levels of hepcidin, an important iron-regulating hormone in mammals that is also found in fish and amphibians. This is the first published study demonstrating control of hepcidin by estrogen in any animal.

Besides being an important iron-regulating hormone, researchers also suspect that hepcidin may act as an antimicrobial peptide in mammals, fish and frogs. Antimicrobial peptides are the first line of defense against disease-causing bacteria and some fungi and viruses in vertebrate animals. "Our research suggests that estrogen-mimicking compounds may make fish more susceptible to disease by blocking production of hepcidin and other immune-related proteins that help protect fish against disease-causing bacteria," said Robertson.

Other USGS researchers have previously found intersex occurring in fish in the Potomac and Shenandoah rivers. Intersex is primarily revealed in male fish that have immature female egg cells in their testes. Because other studies have shown that estrogen and estrogen-mimicking compounds can cause intersex, the co-occurrence of fish lesions, fish kills and intersex in these two rivers suggested to USGS scientists that estrogen-mimicking compounds could be involved in the fish lesions and fish kills in addition to being a possible cause of intersex traits. That led Robertson and her colleagues to investigate how estrogen could be affecting the immune system in these fish. The study showed that largemouth bass produced two

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different hepcidin proteins. Production of the first hepcidin protein was “turned down” by estrogen. Production of the second hepcidin protein by fish exposed to bacteria was blocked by estrogen. The fact that estrogen blocked production of hepcidins in fish exposed to bacteria gives more weight to the theory that estrogen or estrogen-mimicking chemicals could be making fish more susceptible to diseases, Robertson added.

Hepcidin could protect against bacterial infection in two ways. “First,” said Robertson, hepcidin could be an antimicrobial peptide that actually kills pathogens. Or it could be more complex. To live, a microbe must have iron, so when a microbe invades a person or animal, that microbe must obtain iron from its host. To ‘fight’ the microbe, a host can ‘suck up iron’ and store it in places inaccessible to the microbe. In mammals, hepcidin is a key player in how the host takes up and stores iron.” (USGS, 6/3/09).

Sweetening Flossie

Chewing her cud on a recent sunny morning, Libby, a 1,400-pound Holstein, paused to do her part in the battle against global warming, emitting a fragrant burp. Libby, age 6, and the 74 other dairy cows on Guy Choiniere’s farm here are at the heart of an experiment to determine whether a change in diet will help them belch less methane, a potent heat-trapping gas that has been linked to climate change. Since January, cows at 15 farms across Vermont have had their grain feed adjusted to include more plants like alfalfa and flaxseed - forages that, unlike corn or soybean, mimic the spring grasses that the animals evolved long ago to eat. As of the last reading in mid-May, the methane output of Mr. Choiniere’s herd had dropped 18 percent. Meanwhile, milk production has held its own.

The program was initiated by Stonyfield Farm, the yogurt manufacturer, at the Vermont farms that supply it with organic milk. Mr. Choiniere, a third-generation dairy herder who went organic in 2003, said he had sensed that the outcome would be good even before he got the results. “They are healthier,”

he said of his cows. “Their coats are shinier, and the breath is sweet.” Sweetening cow breath is a matter of some urgency, climate scientists say. Cows have digestive bacteria in their stomachs that cause them to belch methane. Although it is far less common in the atmosphere than carbon dioxide, it has 20 times the heat-trapping ability.



Frank Mitloehner, a University of California, Davis, professor who places cows in air-tight tent enclosures and measures what he calls their “eruptions,” says the average cow expels - through burps mostly, but some flatulence - 200 to 400 pounds of methane a year. More broadly, with worldwide production of milk and beef expected to double in the next 30 years, the United Nations has called livestock one of the most serious near-term threats to the global climate. In a 2006 report that looked at the environmental impact of cows worldwide, including forest-clearing activity to create pasture land, it estimated that cows might be more dangerous to Earth’s atmosphere than trucks and cars combined. (*New York Times*, 6/5/09).

GM Crops Add to Sustainability

A UK study shows that biotech crops have delivered significant global economic and environmental benefits and are making important contributions to global food production and security. “Since 1996, biotech crop adoption has contributed to reducing the release of greenhouse gas emissions from agriculture, decreased pesticide spraying and significantly boosted farmers’ incomes,” said Graham Brookes, director of PG Economics, co-author of the report. “The technology has also made important contributions to increasing the yields of many farmers, reducing

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production risks, improving productivity and raising global production of key crops. The combination of economic and environmental benefit delivery is therefore making a valuable contribution to improving the sustainability of global agriculture, with these benefits and improvements being greatest in developing countries.” Biotech crops have contributed to significantly reducing the release of greenhouse gas emissions from agricultural practices. This results from less fuel use and additional soil carbon storage from reduced tillage with biotech crops. In 2007, this was equivalent to removing 14.2 billion kg of carbon dioxide from the atmosphere or equal to removing nearly 6.3 million cars from the road for one year.

Biotech crops have reduced pesticide spraying (1996-2007) by 359 million kg (equivalent to about 125 percent of the annual volume of pesticide active ingredient applied to arable crops in the European Union) and as a result decreased the environmental impact associated with herbicide and insecticide use on the area planted to biotech crops. Herbicide tolerant biotech crops have facilitated the adoption of no/reduced tillage production systems in many regions, especially South America.

Farm income gains in 2007 were equivalent to adding 4.4 percent to the value of global production of the four main biotech crops of soybean, corn, canola and cotton. Of the total farm income benefit, 46.5 percent (\$20.5 billion) has been due to yield gains, with the balance arising from reductions in the cost of production. Two thirds of the yield gain was derived from adoption of insect resistant crops and the balance from herbicide tolerant crops. Farmers in developing countries obtained the largest share of the farm income gains in 2007 (58 percent) and over the twelve year period obtained 50 percent of the total (\$44.1 billion) gains.

The cost farmers paid for accessing GM technology in 2007 was equal to 24 percent of the total technology gains. For farmers in developing countries the total cost of accessing the technology in 2007 was equal to about 14 percent of total technology gains, whilst for farmers in developed countries the cost was 34 percent of the total technology gains. (PG Economics, 5/20/09).

Pesticide Registrations and Actions

Food Related Actions

- On May 21, the Florida Department of Agriculture and Consumer Services (FDACS) approved the Special Local Needs registration EPA SLN FL-090009 for Delegate® (spinetoram) use in citrus at low volume to manage Asian citrus psyllid. (FDACS PREC Agenda, 6/4/09).
- The FDACS has approved the use of Sumagic® plant growth regulator (uniconazole) use on fruiting vegetable transplants. The EPA Reg. No. for the Valent U.S.A. Corporation product is 59639-37. (FDACS PREC Agenda, 6/4/09).
- The EPA has approved time-limited tolerances for the insecticide novaluron (Rimon®) on strawberry. The tolerance expires at the end of 2011. (*Federal Register*, 5/6/09).



- The EPA has approved tolerances for the systemic activator acibenzolar (Actigard®) and its metabolites on brassica vegetables (group 5), fruiting vegetables (group 8), leafy vegetables (group 4), cucurbit vegetables (group 9), and bulb onion. (*Federal Register*, 5/26/09).
- The EPA has approved tolerances for the miticide etoxazole (Zeal®). Tolerances of importance to Florida include cucumber and tomato. (*Federal Register*, 5/27/09).

Non-food Related Actions

- On May 20, the FDACS approved Syngenta’s experimental use permit (EUP) for

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use of Monument® (trifloxysulfuron) herbicide to control hydrilla in retention and non-flowing ponds. The permit is EUP No. FL09-EUP-01 and expires at the end of the year. (FDACS letter of 5/20/09).

Other Actions

- On June 8, the 6th Circuit Court of Appeals agreed to a 2-year stay in the case of *Cotton Council v. EPA* (see *April Chemically Speaking*). The rehearing requested by several stakeholders was not addressed in the announcement, leading to speculation that it will not be heard *en banc*. (EPA email, 6/8/09).



- The EPA is accepting comments on the proposed restricted entry interval (REI) modifications to endosulfan insecticide products. The REIs are being lengthened from 2 or 3 days for crops such as cucumber, watermelon, and squash, to 18- to 22-days. Affected stakeholders should contact the PIO for assistance or information regarding the comments.
- On May 15, the EPA issued a final rule revoking all the tolerances for the insecticide carbofuran (Furadan®). Tolerances of include sweet corn, cotton seed, cucumber, melon, pepper, potato, rice, sorghum, strawberry, squash, and sugarcane, will expire/are revoked at the end of 2009. (*Federal Register*, 5/15/09).
- Pasteuria Bioscience in Alachua FL announced that it has received registration from the EPA for the nematicidal fungi *Pasteuria*

usgae. Pasteuria Bioscience has developed a technology that allows the rapid and cost-effective growth of multiple strains of *Pasteuria* manufactured through traditional fermentation methods. The first product that will target sting nematode in the golf and sports turf markets should be available later in the year. Products for agricultural crops will soon follow. (Pasteuria Press Release, 6/8/09).

Pesticide Potpourri

- Many people like to eat with clean hands. However, in a restaurant getting from the bathroom to your table can be a feat of extraordinary dexterity as you try to turn off the water, leave the bathroom and dispose of the paper towel without contaminating your freshly washed hands. A Fort Myers restaurant has made this good hygiene practice easy for its diners. Sitting next to the salt, pepper and packets of sweeteners, customers at the Oasis Restaurant will also find a dispenser of antibacterial sanitizing gel. "Maybe I'm just a cleanliness nut, but I think it's a good idea," said Gerry Ryder, a former nurse who lives in Fort Myers and dines at Oasis. "Especially with everything going on today." Oasis owner Bonnie Grunberg has said she had wanted to put hand sanitizer on the tables years ago. So three weeks ago, at the height the swine flu pandemic scare, she seized the opportunity. "I've never been thanked so much," Grunberg said, especially from women customers - although men use the gel too, she said. (The News-Press.com, 5/27/09).
- Australia's Gene Technology Regulator has received a license application from BSES Ltd for the limited and controlled release of up to 12,500 GM sugarcane lines. The sugarcane plants were genetically modified for altered plant growth and sucrose accumulation, enhanced drought tolerance and nitrogen use efficiency, and improved cellulosic ethanol production from sugarcane biomass. The trial, which will take place on six BSES stations in

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Queensland from June 2009-2015, aims to evaluate agronomic properties of the GM sugarcane lines grown under field conditions. The GM sugarcane lines contain one or more genes or gene fragments from 22 genes derived from a range of plant and bacterial species. The GM plant materials will not be used for human food or animal feed. The comprehensive Risk Assessment and Risk Management Plan for the application concludes that the release poses negligible risk to people and the environment. BSES Ltd is bound to adopt certain measures to restrict the dissemination of GM plant materials, such as surrounding the trial site with a pollen trap and postharvest monitoring of fields. (Crop Biotech Update, 5/22/09).

- On May 12, five potato farmers rang the bell of the New York Stock Exchange, kicking off a marketing campaign that is trying to position the nation's best-selling brand of potato chips as local food. Five different advertisement spots will highlight farmers who grow some of the two billion pounds of starchy chipping potatoes the Frito-Lay company uses each year. One is Steve Singleton, who tends 800 acres in Hastings, FL. "We grow potatoes in Florida, and Lays makes potato chips in Florida," he says in the ad. "It's a pretty good fit." Mr. Singleton's ad and the other four will be shown only in the farmer's home state. A national spot featuring all five potato farmers was soon to follow. Frito-Lay is one of several big companies that, along with some large-scale farming concerns, are embracing a broad interpretation of what eating locally means. "Local for us has two appeals," said Aurora Gonzalez, director of public relations for Frito-Lay North America, which is owned by PepsiCo. "We are interested in quality and quickness because we want consumers to get the freshest product possible, but we have a fairly significant sustainability program, and local is part of that. We want to do business more efficiently, but do it in a more environmentally conscious way." ConAgra recently began a marketing campaign to highlight its Hunt's canned tomatoes, most of which are grown within 120 miles of its Oakdale, CA processing plant. Of course, the tomatoes would be local

only to people in the area. But if the company can show consumers its tomatoes are grown near the plant that processes them, shoppers who want to know where their food comes from might be more apt to buy them. (*New York Times*, 5/13/09).

- Grimmway Enterprises Inc. is suing Fernando and Yvonne Iturriria for \$230,059.34 in damages, plus attorneys fees. The carrot giant alleges the Iturririas allowed an "unknown number" of sheep to graze on two acres of carrots at the outset of harvest season, after which the sheep defecated on the crops, the lawsuit says. Both sides declined to comment. Sheep are high-risk carriers of *E. coli* bacteria, so the original two acres of carrots and the adjoining 74 acres were destroyed to prevent food poisoning, according to the lawsuit. (*Bakersfield Californian*, 5/27/09).



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- The Vernon (BC, Canada) council instructed city staff in May to proceed with a bylaw that would ban cosmetic pesticides on public land in 2010 and on private property in 2012. “This is the way the world wants to go,” said Councillor Patrick Nicol. Possible impacts from chemical use fueled Councillor Buffy Baumbrough’s support for a bylaw. “We heard concerns about the health and environmental potential and the susceptibility of children to pesticides,” she said. “We may not understand the impacts until years later.” Chemicals would still be used to control noxious weeds or for agricultural activities. Opposition to a bylaw came from Councillors Mary-Jo O’Keefe and Shawn Lee. “This whole thing sounds good but we’re saying we don’t have confidence in Health Canada (regulations) and we don’t believe local citizens can follow directions,” said Lee. (*Vernon Morning Star*, 5/27/09).

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