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# Study #275: NEW PESTICIDE ACTIVE INGREDIENT USE TRACKING FOR FIELD MONITORING IN SURFACE WATER

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## I. INTRODUCTION

The Department of Pesticide Regulation's (DPR's) Pesticide Registration Branch coordinates the registration process of new pesticide active ingredients (a.i.s) in California (CDPR, 2010a). These pesticides are either already federally registered by the U.S. Environmental Protection Agency (U.S. EPA) or under concurrent review by U.S. EPA and DPR. New a.i.s are evaluated by several branches within DPR, including the Environmental Monitoring Branch (EMB). As part of the review process, EMB evaluates an a.i.'s potential for adverse effects to nontarget aquatic organisms when used according to the product label. This is determined by assessing physical chemical properties, aquatic toxicity, runoff potential, and soil/sediment fate of the active ingredient, including how those factors compare to properties of other currently registered a.i.'s found in surface water. EMB also decides whether potential risks can be mitigated with protective label language or other use restrictions.

After registration, future regional use intensity cannot be predicted but may be a major factor contributing to off-site movement (Spurlock, 2002). When EMB evaluates an a.i. for registration, attention is focused on the registrant's proposed uses of the products. Following initial evaluation and approval of an a.i., pesticide registrants may develop more products labeled for additional sites and crops, leading to increased use. Over time this additional use may lead to more frequent detections and aquatic toxicity problems, and the eventual need for monitoring, mitigation, or reevaluation of a pesticide or class of pesticides. One example of this effect of increased use is synthetic pyrethroids. These insecticides replaced many uses of organophosphate pesticides, with subsequent toxicity observed in surface water and sediment laboratory bioassays. The use of the pyrethroid cypermethrin grew from 433 lbs in 1997 to 136,284 (lbs) in 2000 and 302,982 lbs in 2002 (CDPR, 2010b). As a result of increased use and toxicity concerns all pyrethroids are currently in reevaluation in California by DPR (Cortez, 2006).

## II. OBJECTIVE

To better identify adverse surface water quality impacts before they occur, EMB is proposing to track the use of new pesticide a.i.s. The tracking process would be a proactive tool to follow use of newly registered pesticides and establish aquatic toxicity criteria to determine if monitoring of receiving waters and sediments should occur when expanded use causes concern over potential adverse water quality impacts. Pesticides with increases in statewide and regional use will be further evaluated and potentially recommended for monitoring when a potential risk to surface water attributable to increased use or change in use pattern is identified.

## III. PERSONNEL

This study will be conducted by Environmental Scientist KayLynn Newhart under supervision of Senior Environmental Scientist Sheryl Gill and guidance of Research Scientist III Frank Spurlock.

Questions concerning this data tracking study should be directed toward KayLynn Newhart at 916-324-4190 or e-mail <knewhart@cdpr.ca.gov>.

## IV. METHODS

Appendix 1 contains a partial list of pesticides DPR registered for use from 2005-2010. The list contains insecticides, fungicides, herbicides, and approved use sites (CDPR, 2001a). This list will be the source of a.i.s evaluated initially. Additional a.i.s will be assessed as they are registered on a yearly basis.

EMB staff will assess trends in use, application type, chemical characteristics (water solubility, photolysis, Koc, Kow, DT50-soil, sediment, water, degradation), with particular attention to historical water quality problems. Dormant sprays and rice cropping are examples of widespread use which have resulted in pesticide runoff to and toxicity in adjacent aquatic areas.

Physical chemical property data sources will be European Union Pesticide Properties Database (EUFootprint 2010), and DPR's Pestchem Database (CDPR 2011c), U.S. EPA reports, and registrant studies. This data will be summarized in the annual report when it is relevant to consideration of recommending a new a.i. for possible monitoring.

### Pesticide Use Data

DPR's Pesticide Use Reporting Database (CDPR, Annual) will be the main data source to be utilized for the tracking. Pesticides where use exceeds 5,000 lbs in a calendar year will be further assessed for toxicity utilizing existing data of environmental fate. Comparisons of chemical characteristics and environmental fate of other pesticides that have resulted in surface water contamination will be used if increased use of an a.i. and/or a change in use pattern are

identified, further analysis will be done to determine if the use is wide-spread or regional, and if the use has a high risk for runoff to surface water. The 5,000 lb figure was selected as a conservative cut-off for a.i.s that could cause potential surface water problems.

Some new a.i.s have been omitted from consideration because their use patterns are considered low risk to surface water. Examples include pheromones, biofungicides, plant growth regulators, antimicrobials, insect repellants, bioinsecticides (manufacturing use), stored fruit fungicides, egg viability reducers, bactericides, vertebrate repellants, beehive miticides, or fly/wasp attractants.

**Aquatic Toxicity**

Acute and chronic toxicity data from registrants, the U.S. EPA EcoTox Database (U.S. EPA, 2011), U.S. EPA reports, EUFootprint (EUFootprint, 2011), and peer reviewed scientific articles will be used to assess the potential for toxicity to aquatic organisms. *Daphnia magna, Daphnia pulex, Hyallela azteca, Mysidopsis bahia, Onchoryncus mykiss, Lepomis macrochirus, and Selanastrum capricornutum* will be key species to assess.

Determination of acute aquatic toxicity risk will follow the guidelines established by E. Zucker (1985) and consist of the following criteria:

| **$LC_{50}$ ($EC_{50}$) ppm** | **Category Description** |
|---|---|
| <0.1 | very highly toxic |
| 0.1-1.0 | highly toxic |
| >1.0 < 10.0 | moderately toxic |
| >10.0 <100 | slightly toxic |
| >100 | practically non-toxic |

In addition to these criteria chronic risk, bioaccumulation, and sediment effects will be assessed as part of overall aquatic toxicity threat if individual species information is available. U.S. EPA Level of Concern and other aquatic benchmark information will be referred to when available from U.S. EPA reports. Transport modeling may also be used to assess potential impacts.

**IV. TIMETABLE**

A summary report and recommendations based on the evaluation of new a.i.s from 2005-2010 will be completed by September 2011. A memorandum of annual data results will be provided by January 31st following finalization of Pesticide Use Reporting data that is released at the end of each calendar year. After the completion of the annual memorandum Environmental Monitoring Surface Water Program management staff will make decisions on monitoring recommendations.

**Appendix 1. New a.i.s registered by DPR from 2005 through 2010.**

| 2005 | | |
|---|---|---|
| **A.I. Registered** | **Pesticide Type** | **Crop Use** |
| Famoxadone | Fungicide | Cucurbits, lettuce, peppers, potatoes, and tomatoes |
| Flonicamid | Insecticide | Greenhouse and outdoor ornamentals |
| Fluroxypyr | Herbicide (broadleaf) | Turf and noncrop area |
| Fluroxypyr, 1-methylheptyl ester | Herbicide (broadleaf, grasses) | Commercial turf, sod farms, and Golf courses |
| Foramsulfuron | Herbicide (grass) | Turf |
| Gamma-cyhalothrin | Insecticide | Alfalfa, field grown and row vegetables, tree nuts, stone fruits, tomatoes, and wheat |
| Imazapic, ammonium salt | Herbicide (non-selective) | Turf |
| Imazapyr | Herbicide (broadleaf) | Noncrop areas |
| Orthosulfamuron | Herbicide (nonselective) | Rice |
| Penoxsulam | Herbicide (nonselective) | Rice |
| Sodium carbonate peroxyhydrate | Fungicide/algicide | Golf course turf |
| Spiromesifen | Insecticide/miticide | Field grown vegetables, greenhouse ornamentals, and landscape ornamentals |
| Thiacloprid | Insecticide | Pome fruits |
| Tralkoyxdim | Herbicide | Barley and wheat |
| Trifloxysulturon-sodium | Herbicide (nonselective) | Almonds, citrus, cotton, golf courses, ornamental turf, and sod farms |
| **2006** | | |
| **A.I. Registered** | **Pesticide Type** | **Crop Use** |
| Aminopyralid, triisopropanolamine salt | Herbicide (broadleaf) | Rangeland, pastures, and noncropland |
| Dimethenamid-P | Pre-emergent herbicide | Broadleaf and grassy weeds |
| Flumiclorac-pentyl | Herbicide (broadleaf) | Corn and soybeans |
| Imazapic | Herbicide | Broadleaf and grassy weeds |
| Sulfentrazone | Herbicide (broadleaf) | Lawns and turf areas |
| Propamocarb hydrochloride | Fungicide | Potatoes |
| **2007** | | |

| A.I. Registered | Pesticide Type | Crop Use |
|---|---|---|
| Chlorhexidine gluconate | Antimicrobial | Hard, nonporous surfaces |
| Copper citrate chelate | Algaecide | Potable water, reservoirs, ponds, and canals |
| Copper gluconate chelate | Algaecide | Potable water, reservoirs, ponds, and canals |
| Cyazofamid | Agricultural fungicide | Cucurbits, potatoes, and tomatoes |
| Flonicamid | Insecticide | Cotton, potatoes, pome fruit, and stone fruit |
| Metaflumizone | Insecticide | Fireants in turf and ornamentals |
| Potassium silicate | Insecticide, miticide, fungicide | Agricultural crops, ornamentals, and turf |
| Spinetoram | Insecticide | Berries, corn, pome fruit, bulb vegetables, vegetables, tree fruits, and ornamentals |
| Spirodiclofen | Miticide | Citrus, grapes, pome fruit, stone fruit, and tree nuts |
| Sulfosulfuron | Herbicide | Wheat,soybeans, potatoes, and turf |
| Triallate | Herbicide | Wheat |
| **2008** | | |
| **A.I. Registered** | **Pesticide Type** | **Crop Use** |
| Chlorantraniliprole | Insecticide | Tree fruits, ornamentals, cotton, grapes, potatoes, and field crops |
| Flubendiamide | Insecticide | Eggplant, cucumbers, cabbage, almonds, peaches, and cotton |
| Fluopicolide | Fungicide | Cucumbers, bell peppers, and celery |
| Glyphosate, dimethylamine salt | Herbicide (nonselective) | Agricultural/Industrial |
| Mandipropamid | Fungicide | Leafy vegetables, cucurbits, and fruiting vegetables |
| Orthosulfamuron | Herbicide (broadleaf) | Rice |
| Paecilomyces lilacinus strain 252 | Nematicide | Tree fruits, nuts, leafy vegetables, and turf |
| **2009** | | |
| **A.I. Registered** | **Pesticide Type** | **Crop Use** |
| Tribenuron-methyl | Herbicide (technical) | Wheat, barley, sunflower |
| Fluoxastrobin | Fungicide | Turf, potatoes, peanuts, and tuberous vegetables |

| | | |
|---|---|---|
| Ipconazole | Fungicide | Beets, amaranth, cotton, and broccoli, sorghum |
| Metconazole | Fungicide | Stone fruits, tree nuts, peanuts, turf, and ornamentals |
| Sorbitol octanoate | Insecticide | Fruits, vegetables, and Christmas trees |
| Tetraconazole | Fungicide | Grapes, and sugarbeets |
| Triticonazole | Fungicide | Turf |
| **2010** | | |
| **A.I. Registered** | **Pesticide Type** | **Crop Use** |
| Fosthiazate | Nematicide | Tomatoes |
| Iron HEDTA | Algaecide/Herbicide | Turf |
| Methyl Iodide | Fumigant (preplant) | Strawberries |
| Metrafenone | Fungicide | Grapes |
| Pinoxaden | Herbicide | Wheat and barley |
| Saflufenacil | Herbicide | Fruits and nuts |

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