Protecting Human Health and the Environment Through California's Agricultural Pesticide Regulatory System

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Problem Statement:

The relationship of humankind to the environment is one that is still developing, and one in which problems associated with achieving and maintaining equilibria have never been completely solved. Over much of recorded history, human population appears to have been limited by food shortage, disease, and the disruptive influence of war, and problems of food supply have persisted in some regions to the modern era (Dronin and Bellinger, 2005).

A determinant of population size has been agriculture, and within agriculture management of pests has been a primary objective, and with it the hope of an assured food supply. Improvement in pest management via agrochemicals is a relatively recent development. Only 150 years ago repeated epidemics of late blight caused failure of the Irish potato crop, resulting in famine and emigration from that country. Although inorganic chemicals were effective in some pest situations, organic synthesis became much more advanced in the 1930's, and chlorinated hydrocarbon and organophosphate pesticides were subsequently introduced—without full appreciation of potential deleterious effects on the environment and human health. In the latter 20^{th} century, agriculture has seen steady replacement of older higher-risk pesticides with newer materials, which must pass a battery of toxicity and environmental tests prior to use in the U.S., the EU, and other parts of the world. Despite decreases in application rate per acre, persistence, bioconcentration, and toxicological properties toward humans, concern remains (Cremlyn, 1991).

Pest management is a key determinant of agricultural yield. For example, almond growers in California customarily apply a protective fungicide at bloom. In a randomized, replicated field experiment in Kern County, California, several fungicides were compared for efficacy and an

untreated control was included. At harvest, the yields of almond meats were 588 kg per ha in untreated trees compared to 1990 kg per ha for the mean of treated trees (Viveros, 1986).

The U.S. EPA is responsible for setting tolerances on food crops, and the food supply is monitored continually (Francis, 1993; Minyard and Roberts, 1991). Despite development of a national and state regulatory structure, qualitative and quantitative concerns persist regarding pesticide residues in foods.

Objectives:

At this time, pesticides represent a small but a real and quantifiable risk. A large margin of safety exists, especially when actual residue levels are considered (Archibald and Winter, 1989). However, although pesticides are regulated in the U.S. by USEPA, which evaluates toxicological information and approves labels giving directions for use, California strives to provide additional assurance of food, human, and environmental safety through a multistep process. We want to describe the administrative structure and mechanics of that process, as well as the data available, since aspects of the approach of California may be useful elsewhere. Our focus is from a local perspective, that of Kern County, CA, located in the southern San Joaquin Valley. Kern is about 200 x 100 km in size, about a third of which is suitable for agriculture. Agricultural crop production was $US 4.1 billion in 2007, placing Kern as the third highest ranking agricultural production county in California (http://www.nass.usda.gov/Statistics_by_State/California/Publications/AgComm/200708cavtb00.pdf).

Procedures:

In California additional review occurs at the state level to further evaluate and adjust label instructions for the cropping, environmental and social conditions unique to California. Each county government includes an office of an Agricultural Commissioner, who is responsible for local regulatory oversight and enforcement of certain agricultural practices, particularly those related to pesticide application. To apply pesticides, commercial growers must apply to the county Agricultural Commissioner for an annual permit delineating crop areas that may subsequently be treated. Data are incorporated into geographic information systems in some counties. For certain pesticides deemed to pose higher risk to people or the environment, a

notice-of-intent must be submitted by the grower or applicator and approved by the Commissioner's office prior to pesticide application. Personnel involved with pesticide application have licensing, education, and training requirements, enforced through inspections and investigations conducted by Commissioner's representatives.

An important component of environmental management and compliance assurance is California's total reporting requirement, under which growers must report application amount, location, and pesticide product identity and concentration for all applications to the Commissioner. The laws governing pesticide use reporting are found at http://www.cdpr.ca.gov/docs/pur/purmain.htm. An overview of the system can be found at http://www.cdpr.ca.gov/docs/pur/purovrvw/ovr52000.pdf , so it is not our intent to recapitulate that information, but rather to provide perspective at the local level.

Every pesticide-related accident and illness reported to the county Agricultural Commissioner is thoroughly investigated by specially-trained staff members. These inspectors review permits, notices-of-intent, interview those who may have applied or been exposed to a chemical, sample clothing, plant material, and other objects for residue, and compile detailed reports of any suspected pesticide exposure. The Agricultural Commissioner has the authority to levy fines and suspend/revoke an applicator's license if he is found to be at fault in one of these incidents. In some instances cases are referred to the District Attorney's office for criminal prosecution.

Results:

In Kern County, for example, 13.6 million kg of pesticide active ingredients were applied in 2006.Data are accumulated by the County Ag Commissioners and sent to the State, where data are collated and may be used for regulatory decisions. It is possible to view data via the Internet, http://www.cdpr.ca.gov/docs/pur/purmain.htm, by year of interest and county. Within the county data, pesticide active ingredients indexed by crop or indexed by pesticide active ingredient. Lists of top five and top 100 pesticides used by mass, and crops with greatest pesticide use, are also available.

Reporting allows authorities to improve and implement regulations. A steady reduction in pesticide-related illnesses has occurred in California, and data for these are also available; for example, at http://www.cdpr.ca.gov/docs/whs/pdf/hs1872.pdf for 2006 data also including retrospective summaries including summaries for pesticide related illnesses found at http://www.cdpr.ca.gov/docs/whs/pdf/hs1872.pdf.

Conclusions:

Reporting allows authorities to improve and implement regulations. A steady reduction in pesticide-related illnesses has occurred in California. Availability of data via the Internet allows anyone with an interest in this subject to view the amounts and types of chemicals applied to agricultural crops.

References:

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