



Stopping the Pesticide Treadmill

California Agrarian Action Project

**"Nothing in my opinion would contribute more to the welfare
of these States, than the proper management of our Lands;
and nothing, in this State particularly, seems to be less understood.**

**The present mode of cropping practised among us is
destructive to landed property; and must, if persisted
in much longer, ultimately ruin the holders of it."**

George Washington

March 25, 1785

Mt. Vernon

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**Grateful thanks for the assistance of:
Hunger Fund, United Presbyterian Church of the U.S.A.
Coalition for Human Needs, Episcopal Church
Pacific Southwest Synod, Lutheran Church in America
United Methodist Church, Board of Higher Education and Ministry**

I. The Pesticide Treadmill

Jack Grimmer farms a broad tract of land on the west side of the Sacramento Valley. He raises field corn, rice, beans and sugar beets. Synthetic chemical pesticides have become as much a part of his farming operation as fertilizer, seed, water, or the land itself. "It's got to the point where we can't farm without them," says Grimmer. "Cut my pesticides off and I'd be dead



Jack Grimmer is a field crop farmer from the Sacramento Valley who is concerned about agriculture's growing dependence on pesticides.

Cover photo—

Independent pest management consultant Kate Burroughs checks an insect trap for codling moth, a serious pest in apples.

next year. Kind of like a dope addict we're hooked, hooked on pesticides."

"I need to spray pesticides because pests can wipe out a crop in a short period of time," he says. "It's a matter of economics." Over the 27 years he has been farming, Grimmer says he has seen the amount of pesticides used to produce crops keep on increasing. He has also seen the effectiveness of chemicals decline. "Pesticides we used in the past no longer work. We are breeding a 'superbug' that is getting harder to control," he reports.

When synthetic chemical pesticides were introduced just 35 years ago, farmers thought they had been given a miracle cure. Insects, weeds and disease have not been conquered, however. They still destroy 33% of U.S. crop production. In fact, the portion of the crop lost to insects has doubled since 1945, even though the use of chemicals designed to kill insects has increased to 10 times the 1945 level (1).

Agricultural scientists were puzzled by this increase in crop loss. They discovered that insecticides kill not only insect pests, but beneficial insects as well. Some insects are considered "beneficial" by humankind because they survive by eating or parasitizing crop pests. University of California scientists claim that 24 of the state's 25 most serious insect pests have become more serious pests because pesticides have harmed these natural enemies of pests (2).

"When you wipe out the beneficial insects, you inherit their work,"

says entomologist Carl Huffaker. More chemicals must be used to control the pests that are no longer kept in check by insect predators and parasites. The farmer is caught on a treadmill of escalating pesticide use.

Pest resistance to chemicals, and the loss of beneficial insects are problems that have kept insecticides from winning the battle against insect pests. Nowhere is this more evident than in the growing of cotton. After World War II, growers found DDT a cheap and effective way to kill pests like the boll weevil, the scourge of cotton fields in the American South. But after 10 years, a few hardy insects became resistant—they survived treatments and produced offspring not susceptible to the spray. Cotton farmers switched to new types of pesticides, but in time, these too were on longer effective.

In the Rio Grande Valley of northeastern Mexico, the pests could not be controlled. The des-



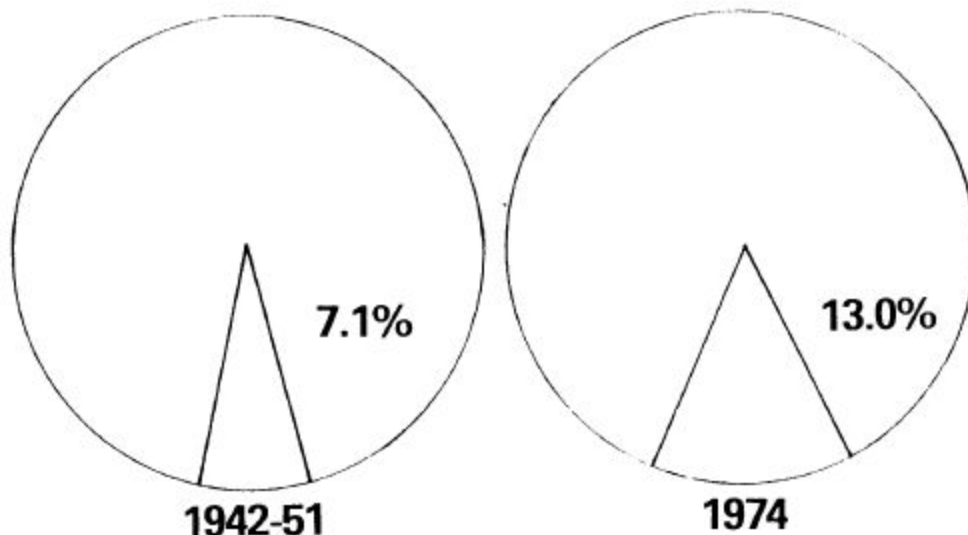
"Superbug"

After repeated sprays, insects can develop resistance to chemicals. Some crops are now plagued by "superbugs," pests resistant to a variety of pesticides.

perate farmers tried new chemicals, at higher dosages, with as many as 15 to 18 applications per season, but the cotton industry was finally wiped out. An economic

Since 1945 the portion of U.S. crop production lost to insects has doubled, even though insecticide use has increased 10 times.

U.S. Crops Losses to Insects



Source: U.S.D.A.

depression resulted (3). Heavy dependence on insecticides has caused pest control failures in other places where cotton is grown—in Peru, Central America, Australia, and in California, where cotton is the crop treated with more insecticide than any other. Today, all of the major cotton pests in the U.S. are resistant to one or more insecticides.

Pest resistance can spread rapidly. Resistant types of corn rootworm, once confined to Nebraska, have now spread to 18 states. In California, most of the state's major insect pests are resistant to one or more chemicals (4). Plant diseases are also developing resistance to pesticides. The pests are in a race with chemical technology. With our newfound dependence on chemicals, humankind may be facing a pest control failure that could threaten the world food supply.

Modern chemical methods have not conquered crop pests, and farmers are caught on a treadmill of increasing pesticide use.

California's pesticide treadmill is turning faster. California farmers apply some 250 million pounds of pesticides a year, more than twice the amount they used 10 years ago (5). Farmers' pest control costs are increasing, as are their crop losses. But beyond these problems, there are additional side effects.

Pesticide damage is the most serious problem facing the state's beekeepers. Each year they lose 1 hive in 10 to pesticides (6). This is a serious concern for farmers, too, because honeybee pollination is essential to the production of California seed, nut, fruit, and vegetable crops with an annual value of more than \$600 million (7).



The Man With The Golden Arm

Pesticide use has been likened to drug addiction because once a chemical treatment must often be followed by many more. When insecticides wipe out beneficial insects, the farmer must apply additional doses to control pests no longer kept in check by their natural insect enemies.

Drifting herbicides applied in neighboring fields is another on-farm problem. Weedkillers applied in rice fields have harmed prune trees and sugar beet fields. The chemical 2,4-D, needed by grain farmers to kill weeds, can harm grape vineyards. State officials have found cases where this herbicide has damaged vineyards 15 miles down wind from where it was applied (8).

The pesticide treadmill's biggest side effect, however, is the impact on human health. Pesticide poisoning is a serious problem in California's farm communities. The health questions raised by our intensive use of chemicals reach from the chemical factory to the fields, and ultimately into the supermarket shopping cart.



California doctors receive 14,000 requests a year to treat victims of pesticide poisoning. Photo by Calif. Dept. of Industrial Relations.

II. Pesticide Hazards

California doctors receive some 14,000 requests a year to treat pesticide poisoning (9). Most involve people exposed to pesticides in the home or garden. Many are young children.

People who live and work in farm communities are also frequent victims of pesticide poisoning. Exposure to pesticides makes farm work one of California's most hazardous occupations. Agriculture has a higher rate of injury due to toxic chemicals than any other industry, accounting for 75% of the more than 1,000 occupational poisonings reported each year (10). Those who mix and apply pesticides are the most frequently poisoned.

Richard Trujillo sprayed pesticides in the vegetable fields of the

Salinas Valley. "When you're driving a spray-rig, sometimes the drift catches up to you," says Trujillo. The constant exposure led to his first poisoning. "I was in a continual sweat, my eyes were twitching, I had stomach cramps, and I kept vomiting," he says. Defective spray equipment and lack of protective clothing made his job dangerous.

Field workers are occasionally made sick by drifting pesticides, or by entering fields or orchards too soon after they have been treated. Though waiting periods for entering sprayed areas have been established, they are not always enforced. Every season there are dramatic episodes of entire work crews being poisoned. In the summer of 1980, 54 workers were poisoned in a vineyard near Dinu-

ba, and 20 cauliflower harvest workers were poisoned in Salinas.



Richard Trujillo was poisoned when he drove a pesticide spray rig in Salinas Valley vegetable fields.

State health officials believe that very few field worker poisonings are ever reported (11). "Officially we hear of only a small fraction, possibly as little as one percent, of the pesticide illnesses in field workers," says Dr. Ephraim Kahn of the Calif. Dept. of Health Services (12). One reason is that poisonings are reported when workers file for benefits under workers' compensation insurance. A survey found that 90% of farm workers are unaware that they are covered by the insurance program, which pays doctor bills and gives benefits to workers made sick by their job (13).

Pesticide poisoning is not limited to agricultural workers. Firefighters and police must deal with chemicals in emergency situations. When a tanker containing 1200 gallons of a soil fumigant overturned on a highway in Sutter County in October, 1975, five highway patrolmen and three firemen called to the

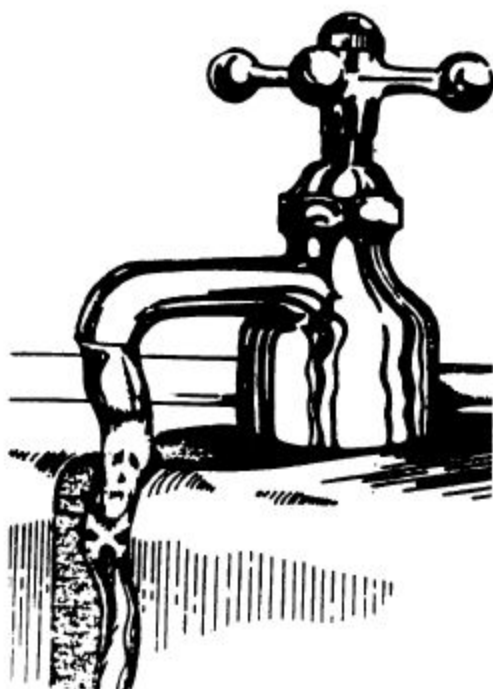
accident were poisoned and sent to the hospital. The firefighters had recurring respiratory problems and headaches for months after the accident.

Pesticide poisoning is a serious health problem in rural California.

That same year in the Imperial Valley a fire broke out in a building where pesticides were stored, causing the midnight evacuation of 1200 people from the town of Calipatria. Eighty-seven people were treated at the hospital for exposure to chemical fumes.

Workers exposed to low concentrations of certain chemicals over a long period of time have also had health problems. In August, 1977, men employed at the Occidental Chemical plant in Lathrop, near Stockton, discovered that they were not having children. A medical study showed that the men had been sterilized by exposure to minute amounts of the pesticide DBCP in the air inside the factory (14). Neighbors of the Occidental plant had their drinking water tested, and found that discharges from the factory had contaminated their well with DBCP.

Alerted to the hazard, state health officials began testing wells in areas where DBCP had been used to fumigate soil. They discovered the drinking water of 155,000 people was contaminated with unsafe levels of the chemical (15). Though more than 40 polluted wells have been shut down, some valley communities have no alternate water supplies. The towns of Parlier, Kingsburg, and Dinuba have sent notices to residents advising them to drink bottled water.



III. Pesticides in Food

We are all exposed to extremely small amounts of pesticide residue found in our food. Many of these chemicals are known to cause cancer, birth defects, and other health problems. Government standards have been set to limit the amount of pesticides in food. Congressional investigations and two government audits have supported the criticisms of consumers who claim that the standards are in error, and that they are poorly enforced.

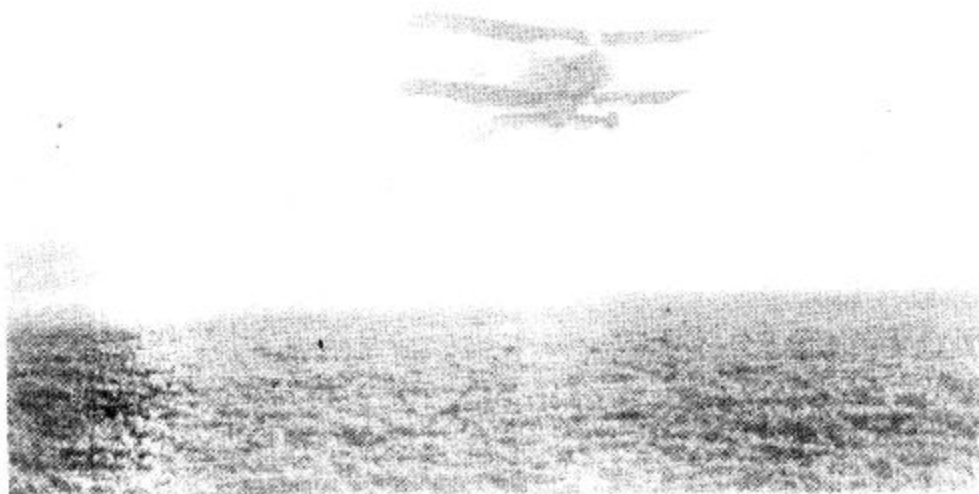
California's Department of Food and Agriculture says that it does a good job of protecting the public from pesticides in food. "We take about 7,800 fruit and vegetable samples a year and test them for pesticides," says Richard De Vol, Chief of the Pesticide Enforcement Unit. The samples are checked to see that they do not contain more pesticide residue than is allowed

under the standards set by the U.S. Environmental Protection Agency. These limits, called tolerances, are set at 1% of the level of pesticide shown to be safe in animal feeding studies. When illegal residues are discovered, the Department can order produce destroyed, as it did with 200,000 pounds of San Diego County tomatoes in October, 1979.

But does this program really work? Diane Koenigshofer asked this question when she was pregnant with her second child. "I was trying to be careful about what I eat," she says. "I was worried about food additives." She read a report on cancer-causing chemicals in food, prepared by a Congressional oversight committee chaired by John Moss (D-Sacramento). The report, she says, made her realize that the pesticides in food are a more serious question than food additives.

The Moss committee conducted an extensive 10 month investigation (16). It discovered that pesticide tolerance levels are based on incorrect assumptions about the American diet, that no studies have been done on the safety of many widely used pesticides, and that government agencies have no way of detecting many toxic substances known to occur in food.

Diane Koenigshofer's concerns are mirrored in a lawsuit two state legislators and a coalition of consumer and health groups filed against the state Department of Food and Agriculture. "The Department is conducting a giant experiment with our health by allowing our food to contain pesticides which may cause cancer, mutations, birth defects, and reproductive disorders," says Maria Arevalo, one of the attorneys who filed the suit. The



A spray plane pilot applies some of the 250 million pounds of pesticide used each year on California farm land.

plaintiffs want tougher standards that lower the amount of pesticides permitted in food.

At the center of the dispute is the yet unresolved scientific question of whether or not long-term exposure to low doses of pesticides is hazardous to human health. Chemical manufacturers are required to register their pesticides with state and federal authorities. They must submit proof that their products are safe. This proof consists of experiments where animals are fed pesticides in their food, and the effects on health noted. The health impacts that are evaluated include both short-term (acute) sickness and long-term effects such as development of tumors, cancer, birth defects and reproductive disorders.

Audits of these registration studies by the U.S. General Accounting Office and the California Audi-

tor General found that complete safety studies have not been submitted for many pesticides (17). An investigation by the Senate Subcommittee on Administrative Practice, chaired by Ted Kennedy (D-Massachusetts), concluded, "The pesticide registration program is in a state of chaos, and the American people cannot be reasonably assured that the Federal Government is protecting them from pesticides that pose a serious threat to their health."

Even when safety studies are submitted, the public has not been allowed to look at them. The chemical industry argues that their registration studies are protected as "trade secrets." Despite laws that classify the studies as public records, government officials have ruled in favor of the chemical industry, and the studies remain closed, even to doctors.

This ruling is one example of the influence of the chemical industry on pesticide regulatory programs. This influence is exerted by paid lobbyists and gifts to government decision makers. The industry contributed about \$2 million to the 1978 and 1980 U.S. Congressional campaigns. In California, Dow Chemical Co. alone spent \$200,000 in the last year lobbying state officials and contributing to election campaigns (18).

California state senator Jim Nielsen (R-Woodland), who has

Registration studies on the health effects of pesticides remain closed to the public, even to doctors.

opposed the disclosure of pesticide registration studies, works as a paid consultant to the Roy Riegels Chemical Company. He receives more than \$10,000 a year from Riegels, and has accepted campaign contributions from at least four other pesticide companies.

This pattern of financial ties between the chemical industry and decision makers is repeated in tax supported farm institutions. University farm advisors and professors are seen by growers as a neutral source of information.

Though most research expenses are paid by the taxpayer, scientists go outside the University for additional support. The chemical industry gave some 420 grants worth \$689,000 in 1979 to these scientists at the University of California (19). Since the gifts come with specifications on how they may be used, they influence the way in which many millions of dollars worth of tax funded research is conducted. The chemical industry also provides University scientists with travel expenses, paid vacations, and free liquor.

Critics ask if scientists stay neutral when they receive so much from chemical companies. A group of sterile chemical workers filed a million dollar lawsuit against University of California professor Charles Hine. Hine tested DBCP in the late 1950's, and found that the chemical causes rats' testicles to shrink. He reported his findings to the Shell Chemical Company--on a confidential basis.

The study was not publicized until the chemical workers discovered that DBCP had made them sterile. Charles Hine has received \$400,000 in grants from Shell, which manufactured the chemical. He also is employed by Shell as a private consultant (20).

IV. Alternatives in Pest Control

Kate Burroughs makes her living advising Sonoma County farmers on how to manage their pests in vineyards and orchards. She travels a circuit, from farm to farm, using the tools of her trade—a sweep net, a magnifying glass, insect hormone scented sticky traps, and other devices designed to help her monitor insects, weeds

and disease.

"I follow the season, and the life cycle of the pests," says Burroughs. "In grape vineyards we're worried about cutworms at the beginning of the year, then thrips. Later in the season grape leafhoppers are the big problem."

She meets with her farmer clients, and recommends pest

control tactics. "A lot of it is just keeping an eye on the insects and plant disease, and telling the farmer he doesn't need to spray; that there is not any high level of pest that's going to cause economic damage and he can skip spraying until next week," she says. She recommends that grape growers plant blackberry bushes near their vineyards, because they provide a refuge for the natural enemy of the grape leafhopper, a beneficial

**Integrated Pest Management
has helped some farmers cut
pesticide use and do a better
job of controlling crop pests.**

insect called **Anagrus epos**.

Burroughs is a proponent of Integrated Pest Management (IPM), a system of pest control that combines regular monitoring of pest populations with a broad variety of pest control tactics. A key concept of IPM is the "control action threshold"—a scientifically set level of pest infestation that is injurious enough to require pesticide treatment. By spraying only when this threshold is reached, the farmer can cut costs and preserve beneficial insects.

Integrated Pest Management utilizes many tactics that control pests without chemicals. Some of these methods have been used by farmers for decades, such as careful cultivation and field sanitation to control weeds. Destruction of field trash eliminates a refuge of diseases and insects. Crop rotation and adjustments in planting, irrigation and harvest schedules are other pest control tools.

Certain varieties of crops resist

pest attack. Introduction of resistant types of wheat in the 1940's successfully eliminated the Hessian fly as a pest. Special root stocks are preventing soil borne disease and nematodes from attacking thousands of acres of vineyards and orchards.

Non-chemical "selective" pesticides are another alternative to toxic sprays. The microbe *Bacillus thuringiensis* is sprayed on some 2½ million acres of California vegetables, grapes, oranges, cotton, walnuts and other crops. These bacteria kill caterpillars without harm to people and beneficial insects.

The science of Integrated Pest Management uses all available pest control tactics, including chemicals. It differs from the more conventional pest control program in its understanding that the population of pests is connected to other plants and animals in a complex web of natural relationships, a web easily disrupted by pesticide over-use.

In grape vineyards and cotton fields, IPM protects the crops. Growers who use IPM in California pear orchards have cut pesticide use an average of 30%, with cost savings of up to \$49 an acre (21).

An important facet of IPM is the use of a trained entomologist, like Kate Burroughs, who operates independently of a chemical sales company. More than 100 of these independent consultants advise the growers of 45 different California crops. The advisor charges a fee for every acre of crop monitored and evaluated. Most growers who use the advisor save enough money on pesticides that it more than compensates for this per acre fee.

Despite the success of IPM, farm

practices have been slow to change. IPM systems have been developed for relatively few crops. Even where the technology has been developed, growers do not get all the information they need. A recent survey found that most farmers receive their pest control advice from chemical companies (22). The farmers surveyed received an average of 38 visits a year from chemical company representatives, and only one contact a year from the University farm advisor.

Many chemical salesmen are professional entomologists, and give unbiased advice. But many others are recommending overuse of pesticides. A five-year study of pest control advice was prepared by agricultural economist Darwin Hall at the University of California. Hall found that growers who use independent pest control advisors use less pesticides than those who rely on chemical salespeople, demonstrating "that salesmen have a conflict of interest between profit maximization and the social goal of reduced pesticide use" (23).

The Office of Technology Assessment of the U.S. Congress reported that a number of other obstacles

Many pesticide salesmen are recommending overuse of pesticides.

stand in the way of IPM, including a lack of research and poor information distribution. Even so, the report estimates that a national commitment to IPM could "reduce pesticide use up to 75%, reduce pre-harvest pest caused losses by 50%, and reduce total pest control costs by a significant amount" (24).

Such optimistic projections are reflected in a boom in the industries that offer pest control alterna-



John Dach raises 200 acres of fruits and vegetables without using any synthetic chemical pesticides. He relies on alternative pest control methods and improved soil fertility to protect crops from pests.

tives. An insectary in Merced is raising beneficial insects including lacewings, Trichogramma wasps, fly parasites, and alfalfa leafcutter bees. Called California Green Lacewing, the firm ships insects all over the U.S. and to foreign countries as well, where they protect cotton, tomatoes and walnuts, and help to reduce the fly menace in dairies and cattle feedlots.

Some farmers have stopped using synthetic chemical pesticides altogether. One of them is John Dach, who grows 200 acres of apples, grapes, and mixed vegetables for the commercial market. "When we talk with people about alternatives, we always get swayed into talking about the good and bad

bugs," says Dach. "Really our whole push here is soil fertility," he says. "A healthy soil is absolutely imperative to have a healthy plant." Healthy plants are less susceptible to pest attack, Dach feels. He builds the soil by adding compost and manure.

The U.S. Department of Agriculture recently released a report that found that the net returns to the organic farmer are comparable to those of conventional farmers. While organic farms are generally smaller in scale, some are as big as 1,500 acres (25). The report found that 30% of these farmers sell their products as "organic" to consumers who wish to buy food grown without synthetic chemicals. The rest sell to conventional markets.

To provide consumers with a guarantee that the produce they buy as "organic" has not been grown with synthetic pesticides, growers like John Dach have joined

an association called California Certified Organic Farmers. The association's strict standards make its "Certified Organic" label the consumer's best assurance that produce is free of synthetic chemical residues. The California legislature recently passed a law requiring that all produce advertised as "Organic" be grown without synthetic chemicals.

Consumers concerned about chemical residues in food have discovered that they can buy produce grown with fewer pesticides. The Koenigshofer's and over five hundred other Sacramento families shop at the Sacramento Natural Foods Co-op, a consumer owned and operated grocery store. "I just live around the corner from the Co-op," says Diane Koenigshofer. "I can go in there any time of the year and buy any type of organic vegetable that I like, organically grown grains, even eggs produced without chemicals," she explains. "There are alternatives, we don't have to just sit back and say 'let big brother take care of us,' we can start taking care of ourselves."

Alternatives such as IPM, organic farming, biological control and organic food distribution are being supported by educational and political efforts. The California Agrarian Action Project is conducting community forums and seminars on the hazards of pesticides and the availability of alternatives in pest control. Based in Davis, in the Sacramento Valley, this political organization includes farmers, beekeepers, farmworkers and other rural residents directly affected by the pesticide problem. They are building a grassroots campaign to balance the influence that the chemical industry has over government and farm institutions.



The California Certified Organic Farmers' logo assures consumers that the product they are purchasing has been grown without the use of synthetic pesticides.



More than 1,000 people attended this August, 1979 rally at the state Capitol in Sacramento to lobby for better pesticide regulations. The event was organized by a coalition that included the Coordinating Committee on Pesticides and the California Agrarian Action Project.

C.A.A.P. members have met with local agricultural officials, seeking better enforcement of pesticide laws. They filed suit against the University of California, seeking to break the influence that gifts from private industry have over farm research. They wrote letters to their state legislators to help defeat a bill that would have exempted pesticides from the Environmental Quality Act, and circulated petitions to make registration data on the health effects of pesticides open to the public.

In the Salinas Valley, the Monterey County Pesticide Coalition is educating workers and pressing for

reforms. Workers like Richard Trujillo are now standing up in government hearings and asking to be heard.

A coalition of labor unions, consumer groups, health organizations and rural people has also been formed. Called the Coordinating Committee on Pesticides, this coalition has been active in the state capitol, and in educating urban residents about pesticides.

These groups are a part of a larger movement of farmers, workers, pest control specialists, rural residents and consumers. They are working together to stop the pesticide treadmill.

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Stopping the Pesticide Treadmill

To help stop the pesticide treadmill, contact one of the following organizations:

California Agrarian Action Project
433 Russell Blvd., Davis, CA 95616
Box 464 Davis, CA 95617 (916) 756-8518

Coordinating Committee on Pesticides

1057 Solano Ave, Room 106 Albany, CA 94706 (415) 526-7141

Monterey County Pesticide Coalition

P.O. Box 1145 Salinas, CA 93902 (408) 757-5221

California Certified Organic Farmers

Central Coast Chapter: P.O. Box 1143 Freedom CA 95019 (408) 724-2994

North Coast Chapter: 407 Furlong Rd. Sebastopol, CA 95472 (707) 823-0650

Californians for Alternatives to Toxic Sprays

P.O. Box 117 Goodyears Bar, CA 95944

Group for Organic Alternatives to Toxic Sprays

1091 H St. Arcata, CA 95521

Citizen organizations opposing the aerial spraying of herbicides in their communities.

John Muir Institute for Environmental Studies, Inc.

1010 Grayson St. Berkeley, CA 94710 (415) 524-8404

Publishes a monthly newsletter on IPM, and provides information on alternatives to pesticides.

University of California Division of Biological Control

1050 San Pablo Ave. Albany, CA 94706 (415) 642-7191

Conducts research on biological control as a method of pest control.