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Agricultural pest control alternatives

The 1990s are destined to bring about substantial changes in the availability and use of pesticides in the California food and agricultural industries. At the national level, an accelerated re-registration process is likely to eliminate the availability of some compounds already in use. The availability of other compounds may be affected under other existing federal regulatory policies as scientific evaluation proceeds. California's environmental policies are already among the most advanced in the nation, often more restrictive than federal statutes.

Despite these regulations and the substantial — although far from complete — empirical and scientific evidence on such matters, there remain widely held perceptions that pesticide use in agriculture continues to pose unacceptable and involuntary risks to human health, water quality, wildlife habitats, and other elements of a high-quality natural environment. These perceptions will continue to encourage the development of additional regulation of pesticides. At the national level more comprehensive policies on water and air quality, food safety, and the effects of environmental toxins on human health can be anticipated. In November of this year, Californians will vote on two citizen-sponsored ballot initiatives on pesticides. One of these initiatives, the Environmental Protection Act of 1990, proposes to phase out the use of designated pesticide ingredients on food crops over a period of five to thirteen years.

How will California agriculture adjust to these more restrictive impending regulations? One obvious determinant of those adjustments is the availability of alternative pest control materials and technologies. In a series of four articles in this edition of *California Agriculture* (pages 11 through 22), UC scientists look closely at potential pesticide registration actions, currently available technologies that may serve as alternatives to the policy-targeted pesticides, and high-priority research needed to develop acceptable and effective pest control technologies for the future.

As pointed out by James Lyons and Frank Zalom in their Overview (page 11), pest management practices have evolved continuously over many years in response to new technologies and environmental and economic factors. The integrated pest management technologies pioneered by UC scientists and facilitated by UC Cooperative Extension have resulted in the use of more ecologically balanced pest management practices, and gradually reduced pesticide use in California agriculture.

Michael Stimmann and Mary Ferguson (page 12), concentrating on two existing regulatory policies and the proposed California Environmental Protection Act of 1990, provide a detailed list of pesticide ingredients that may be affected. These ingredients are formulated into fungicides, herbicides, insecticides, nematocides, and plant growth regulators.

Frank Zalom and Joyce Strand, drawing upon an extensive database under development at the University of California, conclude on the basis of detailed crop-by-crop, pesticide-by-pesticide reviews that alternatives (biological, chemical, cultural, or genetic) are currently available for many uses of the targeted pesticides (page 16). They caution, however, that use of some of these alternatives may be neither technically practical, economically feasible, nor environmentally acceptable at this time.

In the concluding article of the series (page 20), Mary Louise Flint addresses critical areas of research and extension where we can focus our attention in order to accelerate the development of environmentally acceptable integrated pest management programs for the future. She presents a lengthy list of high-priority needs ranging from the most basic research to applied research and extension education programs that can enhance biological, cultural, and chemical pest control methods.

Two important conclusions emerge:

- First, notwithstanding the progress that has been made in reducing the use of the most toxic pesticides in California agriculture, more must be achieved in the 1990s. Dubbed the "Decade of the Environment," 1990s public policy is likely to provide no alternative to such action.
- Second, although some alternative technologies for targeted pesticides do exist, the development of long-range, technically practical, economically feasible, and environmentally sensitive alternatives will require major additional investments in research — public and private — and in extension education.

The UC Division of Agriculture and Natural Resources has been on the international forefront in development and application of agriculturally related technology for the past half century. In recent years, both research and extension have increased their emphasis on natural resources and the biological and environmental sciences to reflect the changing role of agriculture in California. The Division's emphasis on biological control techniques for pest management dates from the forepart of this century. Our Integrated Pest Management Program is the largest and most advanced in the world. More recently, the Division has developed research and extension programs in sustainable agriculture designed to help develop environmentally sensitive, economically sustainable production systems. A substantial part of the Division's resources has gradually been redirected to such programs over the past few years.

Now, in the heavily urban society of California, agriculture's relationship to its natural resource base and the quality of the natural environment have assumed increasing importance and urgency for all Californians. The "biological revolution" in science offers exciting new possibilities for maintaining agricultural productivity while enhancing environmental quality.

To avail ourselves of the opportunities presented by science to maintain the productivity of California's \$17 billion agricultural sector through ecologically sound, environmentally sensitive technology — and with that a continued abundance of low-cost food and fiber — will require continued re-balancing and re-focusing of Division programs. But more is needed.

Public support of UC's research and extension budget has eroded substantially in the past decade as a result of inflation and the additional cost of keeping research and extension programs on the "cutting edge" of science. If we as a society hope to resolve such socially and economically important issues as are embodied in our current efforts to reduce pesticide use, and at the same time maintain economic growth and competitiveness for California, we have no alternative but to increase public investment in the research and education that will lead to those solutions.