

EXTENSION SERVICE

REVIEW

U S DEPARTMENT OF AGRICULTURE * APRIL 1965



SAFE AND
EFFECTIVE
USE OF
PESTICIDES

The Extension Service Review is for Extension educators—in County, State, and Federal Extension agencies—who work directly or indirectly to help people learn how to use the newest findings in agriculture and home economics research to bring about a more abundant life for themselves and their communities.

The Review offers the Extension worker, in his role of educational leader, professional guideposts, new routes and tools for speedier, more successful endeavor. Through this exchange of methods, tried and found successful by Extension agents, the Review serves as a source of ideas and useful information on how to reach people and thus help them utilize more fully their own resources, to farm more efficiently, and to make the home and community a better place to live.

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EDITORIAL

Pesticides, and particularly chemical pesticides, are prime tools in helping to assure this Nation's food and fiber supply. The following excerpts from "Farm Programs And Dynamic Forces In Agriculture" (a Congressional document issued in February of this year) bears this out:

"Although the purchases of chemical pesticides used to control diseases, pests, and weeds account for only 2 percent of farmers' cash operating expenditures, they play a vital role in maintaining or increasing production.

"Many of the most effective chemical pesticides used on farms today were not on the market 10 years ago. Some of the chemicals used 10 years ago are not manufactured today.

"Although expenditures for farm pesticides have increased two to three fold in the past 10 years, this understates their increasing importance in achieving year-to-year increases in crop and livestock production."

This issue of the *Review* covers various aspects of Extension's educational work on pesticides.—WAL

Pesticides and USDA

by NYLE C. BRADY
Director of Science and Education
U. S. Department of Agriculture

ONE OF THE most important responsibilities of the Department of Agriculture is to develop, use, and recommend safe and effective methods for controlling the pests that threaten man, animals, plants, farm and forest products, and communities and households.

Two main considerations guide us in carrying out this function—the health and well-being of the people who use pesticides and the products protected by their use; and the protection of fish, wildlife, air, soil, and water from pesticide contamination.

Research will ultimately provide pest-control weapons that are safer and more effective than those we now have. USDA is continuing to shift emphasis from studies of broad-spectrum chemical pesticides to research on non-chemical concepts of control such as the biological and sterilization techniques; selective methods of applying chemicals; non-persistent pesticides; and those that act only on the target organism.

Research has already proven the value of using proper cultural practices and good management in controlling pests, and we are developing these relatively simple yet effective techniques still further. We are also emphasizing basic research on the physiology and pathology of insects in an effort to find out how and why they function as they do, and how this knowledge can be utilized to bring about their control.

Approximately two-thirds of our work in entomology is devoted to these approaches. Chemicals, however, are still our main weapons for controlling pests. Studies are underway to develop compounds that are effective but less hazardous to use than some we have now.

As use of pesticides has increased, so have the laws surrounding them. One is the Federal Insecticide, Fungicide, and Rodenticide Act, which is administered by the Department. Under this law, we register all pesticides sold interstate.

We make certain that the pesticides being considered for registration are safe for the purpose intended, and that the label instructions for use are clear and the warnings adequate to protect the public. The Department works constantly with the State Experiment Stations and other scientific institutions to establish proof of safety and effectiveness before the pesticide is registered. Recent changes have strengthened the registration and labeling procedures and further protected consumers.

Of special interest to the States is the model legislation that USDA has drafted to regulate registration and use of pesticides within State borders. This statement was

prepared in response to requests from several States, after a study of all existing State regulations on pesticides.

State-Federal cooperation is very much in evidence in our pest control programs. We have worked together to emphasize safety by planning operations to protect the people, wildlife, and the environment in the treated area.

Recently, USDA began a program of monitoring pesticide use in these cooperative programs in order to assure high performance standards and adherence to safety measures. Each program is planned on an individual basis, because the environments in which the pesticides are used differ so greatly. USDA has contracted with many State agencies to determine the effects of spray programs on the soil and water adjacent to the treated areas, as well as on the birds, fish, game, and beneficial insects.

USDA has also begun to monitor and evaluate the effect of normal agricultural use of pesticides on the environment in the Lower Mississippi Valley. Samples of soil, silt, runoff water, crops, other plant life, and fish are taken periodically to check on residues. Monitoring is also underway in the potato and sugarbeet areas of the Red River Valley, and a program is planned for the vegetable-growing areas of Arizona. USDA is cooperating in this effort with the State Departments of Agriculture and the Departments of Interior and Health, Education, and Welfare.

USDA, Interior, and HEW recently set up an agreement to coordinate all activities relating to registration of pesticides and the establishment of tolerances. They routinely share new information on pesticides, and USDA supplies the other two with weekly lists of the applications for pesticide registrations. Many other cooperative activities among the three Departments are being planned.

Additional coordination is provided by the Federal Committee on Pest Control, formerly known as the Federal Pest Control Review Board. This Committee reviews all Government-sponsored pest-control programs and coordinates efforts in monitoring, research, and education. Serving on this group are representatives from Agriculture; Interior; Defense; and from the Public Health Service and Food and Drug Administration of Health, Education, and Welfare. Such representation insures that every important value receives proper consideration in Federal pest-control programs.

We can only go so far in developing techniques to control pests through research and in working out regulations governing pesticides. The ultimate responsibility for safety lies with the users; misuse or improper use is the chief cause of accidents. To prevent this, USDA carried on a nationwide campaign to educate people about pesticides. Our Extension farm and home specialists are planning special schools and information programs to educate users on the most effective way to use pesticides, the importance of following label instructions, and the dangers of misuse. ■

States Increase Training Programs In Pest and Plant Disease Control

by HARLAN E. SMITH, *Plant Pathologist*
and L. C. GIBBS, *Horticulturist*
Federal Extension Service

STATE Extension Services are placing increasing emphasis on training county agents, commercial applicators, farmers, dealers, and others concerned in pest and plant disease control. The last 2 years have seen advances in this type of training, particularly in the pesticide-chemicals field.

We anticipate further progress in these training programs as the States in recent months have put on additional pest and plant disease specialists. A full-time pesticide-chemicals program leader or coordinator position has also been established for most of the States.

Late last fall in order to get a current picture of the training program, a request went out to all of the States for information on what they had been doing in this field. Forty-four responded. Here are some of the answers.

Thirty of the 44 States reported statewide or area training activities for special groups. Fifty percent of this training was designated as short courses; 36 percent, conferences; 5 percent, workshops; and 9 percent fell in a miscellaneous category.

An analysis of the training indicated that 52 percent was the refresher type. Those attending received the latest research results and recommendations. Seven percent could be considered a combination of refresher and in-depth training and 10 percent was entirely in-depth training. Principles, including the *why* of pest and plant disease control were stressed. Less than 5 percent of the training was for the specific purposes of preparing the students to pass an examination necessary for licensing. Thirty percent of those reporting had not conducted training for special groups. However there is movement to nearby States that do offer training. Also, several States were planning to offer training for the first time.

The survey indicated that many different groups are involved in giving advice and supplying a pest control and plant disease service to farmers and homemakers. Those trained by State specialists at State or area meetings in-

cluded county Extension personnel, pesticide dealers, salesmen, formulators, manufacturers, other chemical industry representatives, aerial and custom applicators, agricultural consultants and technicians, canning industry representatives, and equipment dealers; also, pest control operators and exterminators, arborists, medical doctors, health officers, and vocational agriculture teachers.

Pest and plant disease control made up smaller portions of other Extension-sponsored training activities. For example the Extension plant pathologist, entomologist, or weed specialist may have participated in the training meeting for seedsmen, garden store operators, nurserymen, florists, insurance groups, bank representatives, various processor groups and many other short courses, conferences, workshops, or meetings.

Training for many groups was on an annual basis. The average duration of the training period was 2 days. Length of time spent per training period ranged from 1 to 11 days. The training was not necessarily continuous: a few in-depth activities were scheduled for 1 day per week for a span of several weeks. Thirty-three percent scheduled night training in addition to the day sessions. In 7 percent of the cases a certificate was presented to students at the end of the training.

With 33 percent of the training a fee was charged. The average fee was \$4.80 per student and ranged from \$2 to \$10.

People from many disciplines and professions served as instructors. The major workload was carried by Extension specialists in entomology, agronomy, horticulture, plant pathology, agricultural engineering, nematology, weed control, pesticide chemical program leaders, public affairs, and wildlife. Others included specialists' counterparts in experiment station and USDA research; university resident instructors; pesticide regulation personnel—both State workers; and Federal; chemical industry representatives; State Department of Health workers; pest

control operators; custom applicators; Food and Drug Administration and Public Health Service of the U. S. Department of Health, Education, and Welfare; State Department of Forestry; Federal Aviation Agency; and Plant Pest Control Division and Plant Quarantine Division of USDA. Also involved in instructing were magazine editors, sociologists, power and light company personnel, a biochemist, an attorney, insurance agents, and others.

The average number of instructors per training period was 16 with the number ranging from 6 to 45 per training period. The large number of instructors included panelist members in some cases.

Subject matter presented varied considerably among the audiences. For example, information presented to custom farm applicators was quite different than that presented to lawn and shade tree sprayers. Information also varied depending on the location. Cotton insecticides may have been emphasized in a Southern State whereas corn insecticides were discussed in the North Central States. However many of the basic principles that were taught concerning insect, plant disease, and weed control were somewhat the same for many of the various audiences and locations.

In some instances students were involved in planning discussion topics and selecting instructors. Only a few States attempted to evaluate training. Students had an opportunity to fill in forms near the end of the activity indicating their feelings and judgment toward various parts of the training.

The results of the study suggest places for further strengthening of training. In-depth training probably needs to receive more emphasis in Extension teaching.

It should include how to identify pests and plant diseases, biology and life cycles and the effect of environment. Also it should include the nature, kinds, and types of pesticides available and their use in a manner to assure that persons, livestock, wildlife, fish, bees, soil, air, water,

and other values are adequately protected. Such training should be available to all interested persons.

Whenever possible, the training and supporting publications need to be designed for specific audiences. Certificates of accomplishment and other forms of recognition could be used more extensively especially for students that successfully complete the in-depth training.

Extension specialists need to coordinate their training activities with the formal courses offered in the universities. A plant protection major in the university curricula, for example, could in future years help to strengthen the overall pest and plant disease control training programs. Most universities have done a good job of training specialists such as cotton entomologists, fruit plant disease specialists, and corn weed control specialists. There is a need for universities to train general practitioners. These would be professionals with the ability to identify most of the common crop troubles and prescribe treatment.

It is suggested that Extension training needs to be coordinated with pest and plant disease regulatory efforts at the State level. Is there a need for licensing of the various people involved in pest disease control activities? If so, those that are to be licensed must recognize and understand why this is needed. With the right kind of training, Extension can help bring about this understanding. Extension can play an important role in providing training that will help prepare students to meet licensing requirements.

Where there is a lack of State Extension or resident on-campus instruction resources, several States might combine their resources on a regional basis. The annual Cornell University Extension-sponsored training is a good example of regional cooperation. Also, the interstate compacts set up to train veterinarians is a precedent that might very well be followed for training professionals in the crop pest and plant disease area.

OKLAHOMA'S COOPERATIVE APPROACH TO PESTICIDES' WILDLIFE PROBLEMS



■ The high standard of living enjoyed by most Americans today includes a big helping of free time.

In the quest for use of this spare time, two out of five people over 12 years of age are spending part of it either hunting, fishing, or both.

Oklahoma is no exception to these National figures. In 1960, 19 percent of all men, women, and children fished during the year and spent over \$42 million. That same year small game and waterfowl hunters spent an average of \$60 each for a total of almost \$9 million. Oklahoma's total fishing and hunting bill in 1960 reached an amazing \$62,762,942 which exceeds the gross value of dollar admissions in the State for all spectator sports and motion pictures for the same period of time.

A tract of land needs to be considered in a much broader context than only for food and fiber production; its recreational potential must be considered also. This is what wildlife conservationists term "multiple use," meaning the maximum degree of use to which land can be employed.

Use of agricultural chemicals became widespread in the post World War II era. As a result, many responsible individuals in government as well as sportsmen and conservationists have become concerned over the effects of their use in various wildlife habitats. Even though this is only one aspect of wildlife conservation, attention has been focused on chemical usage because of the potential hazards created where appropriate safety precautions have been overlooked in wildlife habitat areas.

Recent congressional appropriations have provided funds for intensifying public education on the safe use

Top, Quail are enormous insect consumers during certain seasons. Left, Kids are natural fishermen when they can fish in productive waters. Below, Wildlife Department personnel teach classes at several youth camps.



by R. W. (BILL) ALTMAN, *Extension Wildlife Specialist*
and NEWTON W. FLORA, *Extension Entomologist, Oklahoma*

of agricultural chemicals. This educational program will encompass many phases of chemical usage including expanded programs involving various agencies interested in wildlife conservation.

In Oklahoma, interdisciplinary agencies concerned with this problem have had a close, working relationship for many years. The Extension wildlife specialist is a member of the advisory boards of the Oklahoma Wildlife Federation and the Izaak Walton League and he is a member of the Oklahoma Outdoor Writers Association. In these capacities he has had the opportunity to promote and coordinate programs recommended by the Wildlife Conservation Department. He has also worked closely with the Oklahoma Pest Control Association and the Oklahoma Aerial Applicators Association relative to safe use of chemicals.

We have over 40,000 4-H Club members in various wildlife projects including conservation. The youth also have an excellent opportunity for lessons and demonstrations in conservation and safety practice at the 25-30 4-H camps in which the Extension wildlife specialist participates.

Foresighted individuals anticipated the need for a cooperative approach to solving problems of environmental and water contamination—affecting men and wildlife—and 2 years ago the Interagency Pesticide Usage Committee was organized. This committee is composed of representatives of Extension and the State Departments of

Health, Wildlife Conservation, and Agriculture.

At about the same time, the Oklahoma Pesticide Education Society was in the process of organization. This group consists primarily of wholesale chemical dealers but also includes a few commercial applicators and representatives from the State Department of Agriculture and Extension. Members have appeared before many civic groups and similar organizations.

They have also helped to plan short courses on safe use of agricultural chemicals which will be held in key areas of the State for chemical retailers. If the response is favorable, an expanded statewide program is planned.

The use of chemicals has expanded quite rapidly in recent years and because of this, Extension has been gradually giving more attention to the proper application and safe use of these materials. A result of the intensified program is the Extension Advisory Committee on Chemical Usage. This committee has conducted five district meetings involving the entire field staff. They discussed the existing problems and outlined in detail an overall educational approach to their solution.

Ambitious plans for further cooperation are already underway. The dedicated cooperation of the many government agencies and wildlife preservation groups will lead the way in developing the "multiple land use" concept. Biologists feel this is necessary to supply a rapidly expanding population with the food, fiber, and recreation facilities they need. ■

Below, Game rangers are the farmers' friends. They work closely with landowners to protect game, prevent hunting without permission, and to combat pollution. Right, Winter duck concentration on an Oklahoma lake.





Before treatment, this pond is an eyesore and useless.



The same pond with its value for recreation restored.

Recreation Areas, Pest Control, and Extension

by RICHARD W. BELL, *Assistant Extension Director, Michigan*

EVERY 1965 Michigan automobile license plate carries the inscription, *Water-Winter Wonderland*—not *Automobile Capital, Cherryland, or Bean Basket*, although Michigan leads all other States in annual output of these three. With its 3,200 miles of Great Lakes shoreline, 29,000 natural inland bodies of water, 36,000 miles of rivers and streams, and heavy winter snowfall, Michigan is, in fact, a water-winter wonderland. The tourist-resort-recreation business is big—one of the biggest of the State's many industries.

The latter statement is true for many States, and although the specifics differ from one region to another, those providing recreational services have a common problem—unwanted insects, rodents, weeds, and plant diseases. The problem takes the form of an occasional severe flare-up or a continuing year by year infestation of varying intensities. The resort area that has no pest problems of any kind is indeed a rarity.

To all progressive operators, pests are an anathema. Ray Gummerson, Michigan's Luce County Extension Agent, puts it this way, "Insects all become horrid creatures in the eyes of those catering to tourists and vaca-

tionists. Anything that impairs the surroundings of a resort or motel tends to detract from the whole operation, and hence has dollar significance."

Certainly one of the most common problems for which operators of recreational establishments seek answers is infestation by insects. "We are being eaten up by mosquitoes but we're afraid to spray the area because it might kill the birds and fish." How does the Extension agent answer this typical call from lakefront owners, subdivision associations, resort operators, golf course superintendents, sportsmen's clubs and others?

Obviously the best approach is elimination of nearby breeding places for these pests. For small, identifiable breeding places that cannot be eliminated, spot-spraying is usually recommended. For larger areas, licensed commercial operators usually do a safe and satisfactory job and observe correct application rates. Often, to be effective, an insect-control program must be a group action in which adjoining resorts get together and treat, by chemicals or otherwise, relatively large blocks of land.

Typical of the latter situation is one described by Lake County Agent, Fred Dostal. In this instance, a heavy

infestation of the red-humped caterpillar developed in the Big Star Lake Resort Area. Commercial facilities in the Area include a youth camp, a resort hotel, 14 resort and trailer-park units, and four service businesses—representing an annual tourist-resort income of about \$1 million—not to mention 300 summer homes and 75 year-round residences. During this particular July-August vacation season the infestation became so severe that most rental-unit reservations were cancelled. Summer residents stayed home or vacationed elsewhere. Volume of retail trade in the area took a decided drop.

With the help of entomology specialists from Michigan State University, Dostal positively identified the insect and settled on a recommended action—an aerial spray to be applied the following year shortly after egg hatch. At this point, representatives of the Michigan Departments of Agriculture and Conservation were cued in and consulted. Permission was obtained from the U. S. Forest Service to include their lands, as necessary, in the treatment. The Big Star Lake Resort Association staged a fund drive which netted over \$3,000 and contracted with a licensed concern to apply the spray.

By the end of June more than 3,000 acres had been aerial-treated. The 11 lakes were carefully avoided. The results? Excellent control of the pest; very little wildlife and fish damage; and hundreds of satisfied owners of summer homes, recreational facilities, and resorts.

Similar experiences in sparking collective action are reported by other Michigan agents. Frank Madaski promoted a community program to control mosquitoes and flies in parts of the scenic Keweenaw Peninsula.

In Luce County Ray Gummerson helped motel and resort operators develop a cooperative, and successful, attack on the strawberry root weevil. Folks from all parts of Menominee County have joined with agent Gail Bowers in trying to solve the woodtick problem, the growth of which seems to be associated with improved control of forest and grass fires.

In Michigan, and no doubt in most States, there has been a marked upsurge in requests for Extension help in control of aquatic weeds—occasioned in part by the rapid increase in privately-owned, newly-created bodies of water in the form of pit ponds, bypass ponds, impoundments or combinations of any of these methods. In most cases the owner has visions of attractive fishing, waterfowl, and fine swimming. It isn't long before he sees his "dream lake" choked with weeds and undesirable fish—a liability instead of an asset to the property.

This is the situation George Bartlett, Wexford County Agent found when he surveyed over 100 ponds constructed during the past 10 years in the county. Each owner (more often than not, an absentee owner) was sent a letter offering assistance from the Extension Service in solving his pond problems. Included was a returnable card asking for the exact location of the pond and dates



Treating for mosquito control.

he would be available for a visit. Seventy-five owners returned the card asking for help in weed control and fish management.

During the summer each of these landowners was visited and a management plan developed for his private body of water. This included the chemical best suited to take care of his particular weed problem, application rates, method of application, and precautionary measures. The program produced some spectacular results. Ponds 9 feet deep with 8 feet of weed growth and 1 foot of free water were cleaned out so that the original bottom became visible again.

The fish program was assisted by recommending the amount and kind of chemical needed to eradicate the fish life in his pond and suggesting more desirable species and numbers for restocking.

Winter meetings, demonstrations, and evening tours created additional interest in the use of chemicals for weed control, not only in newly-created waters but also on the frontages of natural lakes. The proper use of chemicals has restored the value of many such properties. This is important to the entire area because the enjoyment of his land will determine the number of times an owner will use it as well as the additional capital investment he is willing to make.



Fog generator for pest control.

In Southern Michigan, also, pond construction is progressing at a rapid pace. For example, in Livingston County, 50 miles northwest of downtown Detroit, 40 new ponds have been built during the past 2 years and there are now 180 such bodies of water ranging up to 5 acres in size. In addition there are numerous public and private impoundments each with a surface acreage from 50 to more than 600—plus many natural lakes.

A comparable situation exists in adjoining Oakland County, of which Pontiac is the County Seat. In 1960, calls for help with an aquatic-weed problem in the two-county area became so great that Extension agents Wayne Seifert and Hans Haugard decided that a handbook adapted to local problems was needed. The result was a cooperatively-financed, illustrated, 28-page "Aquatic Weeds and Their Control" booklet authored by technical experts from Michigan State University, the University of Michigan, Michigan Department of Conservation, and Metropolitan Authorities. In 1964 the Michigan Department of Conservation financed the printing of a revised edition in order that they might have copies available in their work.

Recognizing the need for a stronger program, the Michigan Cooperative Extension Service will soon employ its first aquatic-weed specialist. His home base will be Michigan State University's Department of Fisheries and Wildlife.

Insects and aquatic weeds, common as they are, don't begin to exhaust the list of pest problems that beset operators of recreational facilities. There are also poison ivy, weedy golf fairways and greens, swimmer's itch, starlings, "trash fish," and spiders—just to mention a few. Obviously, the Extension agent is better equipped to deal effectively with some of these problems than with others; in fact completely satisfactory answers do not yet exist for some of them. Better answers are on the way.

The question of Extension Service responsibility for helping develop the country's recreation business is be-

coming increasingly academic. Today, we recognize that a considerable part of our traditional subject matter can be adapted to the needs of operators of recreational facilities. Also, researchers continue to uncover new findings that bear directly on recreational problems.

Such information should be disseminated—all the more so because of the National need for overall economic development and the increased recreational demand. In dealing with pest control, Extension's responsibility includes not only providing technical information for achieving desired results and minimizing undesired side effects, but bringing about better public understanding of pest control and pesticide contributions as well.

Where agricultural production and recreational areas are intermingled, and even overlapping, as they are in much of Michigan, the importance of resolving conflicts—both real and latent—can hardly be overemphasized. As an unbiased educational institution, the Cooperative Extension Service makes substantial contributions in effecting improved relations and understanding between agricultural and recreational interests.

Our agents most experienced in pesticide use for recreational facilities say they put the safety consideration at the top of the list. Manistee County Agent, Norman Brown has achieved excellent results working with operators of recreational enterprises. He recently said, "The emphasis during these educational efforts (aquatic-weed control, in this instance) was on the safe use of chemical pesticides. This group had very limited experience in the use of chemicals, so it was of utmost importance to make sure they fully understood the methods and rates of application or the necessity to hire applicators if the chemical was dangerous when handled by the unskilled."

He added, "As the group used chemicals for their own benefit and understood how to use them safely and effectively they became more tolerant of others who must use chemical pesticides in producing the food and fiber for America." ■

Pests Don't Stand a Chance In Maryland Suburbia

by LINDA KAY CROWELL, *Extension Information Specialist, Maryland*

IF YOU live in or about the Nation's Capital, you can phone PO 2-5454 any time of day or night and get timely tips on spraying household bugs.

As a Baltimorean, you might be one of the 54,000 persons who each Saturday watches *Garden Living*, a popular, year-round television show.

And as a Sunday driver, you can motor from Washington, D. C., into nearby Montgomery County—one of the Nation's wealthiest—and see many pesticides demonstrated on 700 rose bushes.

These are a few examples of how the Maryland Extension Service benefits city and suburban people—beset with indoor pests or lawn and garden problems.

Educating metropolitan consumers, garden center operators, and chemical salesmen on the safe and effective use of pesticides is a primary assignment of four Extension horticulturists and an agricultural chemist—all strategically located in the Washington-Baltimore area and supported by other University of Maryland scientists.

Two horticulturists stationed in Montgomery and Prince George's Counties conduct programs planned to reach 1.3 million persons in the greater Washington area.

Around the clock, callers ring a TIP-A-PHONE and

hear a recording of Brian Finger, Montgomery County Agent, giving timely tips. His 1-minute messages, changed five times weekly, feature suggestions on insecticide use: "Always read the label . . . store in original containers . . . wash and change to clean clothing after spraying or dusting."

Finger views dealers and salesmen as important, educational links between manufacturers and users of chemical products. Each week, he mails printed TIP-A-PHONE messages to 200 nursery, garden center, and hardware store operators, informing them of his latest recommendations.

Ten thousand visitors a year flock to Finger's *Rose and Lawn Plots* 2 miles from his office. Here he shows the effects of four new spray mixtures, one dust preparation, and six fertilizers on 350 different rose varieties. Sixteen plots of turf are treated with preemergence crabgrass materials.

"Companies who produce the new insecticides and fungicides are formed of their products' efficiency," says the young agent. "All of the plants, seed, chemicals, sod, and mulches are donated, and one acre of land for plots is on loan from a local farmer."

Two Extension agents star in Baltimore's weekly TV show, Garden Living.





Above, this county agent records TIP-A-PHONE messages heard by about 50 persons each day.

Top left, Local demonstrations teach the control of insects that trouble an entire community. Left, Garden centers regularly receive pesticide information.

In neighboring Prince George's County—the country's second-fastest-growing area—horticulturist Clayton Werner works with the Board of Education, city governments, and the State Department of Forestry and Parks in developing pesticides programs on public properties.

Trees on city streets are protected through Werner's spray recommendations: Many schools benefit from his Japanese beetle spore dust program.

When a new community was troubled by sod webworms on the young lawns, the agent distributed leaflets on their control to local hardware stores and garden centers. Residents followed directions, and the insect was curbed.

Midshipmen at the U. S. Naval Academy in Annapolis are probably unaware that an Extension agent helped control hemlock scale trespassing on their grounds. But thousands of suburbanites in the Chesapeake area do know the work of Anne Arundel County horticulturist, J. Edgar Ferrell, Jr.

Each spring in the Maryland capital, Ferrell cooperates with the YWCA to teach lawn and garden care to teenage boys and girls, preparing them for summer jobs. In

another class series, he instructed apartment dwellers in the care of indoor plants.

Keeping other Baltimore suburbs horticulturally wise is Nicholas Stephin, Baltimore County agent, who held a 2-week lawn school last fall for 80 husbands and wives. He repeatedly stacks his Courthouse bulletin rack with USDA's "Safe Use of Pesticides" and records TIP-A-PHONE pointers, too.

Together, Ferrell and Stephin produce *Garden Living*, a weekly Baltimore television program. In its sixth year, the half-hour, Saturday morning show has the highest rating of any public service program on that station.

Seasonal topics include dormant spraying, termite identification and control, fungicides for lawn diseases, and prevention of box elder bugs. Offered publications draw up to 700 requests weekly.

When the two *Garden Living* stars and Finger, spurred by a major chemicals company, held all-day classes last year for dealers and salesmen in the Baltimore and Washington areas, the turnout was gratifying. Nearly 400 participants learned about fungicides, plant materials, and grass seed.



Baltimore Sunday Sun photo, A. Aubrey Bodine



Baltimore Sunday Sun photo, A. Aubrey Bodine



Above, Cities fight scale insects on holly with a horticulturist's help. Top left, These roses show 10,000 visitors the effects of different pesticides. Left, Lawn plots intrigue suburban homeowners.

But such sessions are not always successful. One agent reports, "Bosses don't want to let salesmen attend classes during working hours, and salesmen don't like to come at night."

The Four Maryland agents also reach the public through:

Newspapers—Washington, D. C., papers used 70 by-lined articles prepared by Finger last year. A columnist for a rose magazine, he tells "How to Handle Pesticides" in this month's edition.

Radio—Agents are heard daily. One Extension worker appears 15 times weekly.

Brochures—Ferrell distributes 3,000 "hint lists" monthly, describing current home and garden jobs. Another agent mails 3,000 newsletters monthly.

Welcome Wagon—Kits on pest control are given to new area residents through this local Chamber of Commerce activity.

Community Demonstrations—Agents give lectures before neighborhood, civic, school, and adult education groups—not just garden clubs—to widen their audience. Frequently shown is a slide story revealing the USDA's

role in assuring the safety of pesticides and stressing "You can control pests safely . . . if you use pesticides the right way."

"Groups rarely ask for an entire program about pesticides," observes one agent. "But when the topic is suggested, they are eager for the presentation."

At the University of Maryland, a newly-appointed agricultural chemicals specialist will emphasize "safe and effective use" to Free Staters buying 788,500 pounds of pesticides a year.

Research on residues, plant diseases, and chemicals used on ornamentals helps Extension scientists make proper recommendations. A Pesticides Conference is held yearly by the botany, entomology, agronomy, and horticulture departments for men in government and industry.

University entomologists constantly answer questions about "beetles in table legs," "bats in the attic," termites, or bedbugs.

Squashed under tape, crushed in bits of paper, floating in vials, and even alive in pill boxes, bug samples are sent to the specialists who write and mail pamphlets on dozens of insects. ■



Mass media greatly increases the number of persons who receive pesticide safety information. Here, two Extension specialists are making a radio tape.

People, Pests, and Pesticides

by RAY R. KRINER, *Extension Entomology Specialist Rutgers, The State University*

and WILLIAM R. OBERHOLTZER, *Senior Bergen County Agent Hackensack, New Jersey*

IN NEW JERSEY the nonfarm population far exceeds the farm population. But a large percentage of the nonfarm group does have its backyard vegetable garden, its two- or three-fruit orchard, its nursery of horticultural crops, foundation plantings of shrubs and trees, and the much babied lawn area. Many home gardeners spend much time and money on chemicals and gimmicks to try to keep their collection of plants in tiptop condition. Towns, garden clubs, and local newspapers help foster this enthusiasm with "green thumb" contests.

The home gardener and homeowner is in a vulnerable position in

obtaining reliable information on disease and insect control, and the use of agricultural chemicals and pesticides. The advertising and literature pertaining to these products often exploit, for example, a person's natural inclination to control weeds with less cost and less labor. Advertising campaigns sometimes tend to oversimplify the procedure and give exaggerated encouragement about the chances of success. The language on the label sometimes needs to be reinterpreted for the consumer.

Another stumbling block is at the point of sale. The clerk in the supermarket couldn't care less what a gardener uses for crab grass or how

he should go about using it safely. For all he may know, lace bugs are on tablecloths, and "that's in the linen department at the rear of the store."

The Extension specialist must work along with the county agricultural agent to contact the homeowners and gardeners. The majority of individuals who should receive accurate safety information can be divided into five groups:

1. *Professionals*—nurserymen, food producers, greenhouse operators, florists, mosquito control commissions, landscapemen, pest control operators (exterminators), and arborists (tree surgeons).

2. *Pesticide dealers*—garden shops, hardware stores, shopping centers, drug stores, supermarkets.

3. *Home gardeners*—we have both the indoor and outdoor variety, the full-time enthusiasts and the one-shot, couldn't-care-less type.

4. *Individuals who occasionally use pesticides*—this could be almost anybody, for example, the housewife on her annual moth hunt, campers chasing mosquitoes each season, and those who must war on ants, mice, or other pests.

5. *Other individuals who request or need information on pesticide safety*—here we are likely to find public officials, teachers, health officers, and people who have to decide "if we do anything, and what should we do for the good of all concerned?"

These are the people who should be well informed. They all handle, apply and store pesticides, or are directly associated with their use.

At Rutgers, The State University, in most training programs and short courses, pesticides and their safety are a vital part.

Big city takes giant-size pesticides information program

Each year a Pesticide Dealers Conference is held at the College of Agriculture. A publication, entitled *Pesticides for New Jersey*, is given to those attending the meeting. The first section of this publication deals with safety equipment, use and care of respirators, conditions requiring gas masks, precautions, a table listing insecticides and insecticide mixes, and a list of poison control centers. A publication containing the above information is extremely helpful to dealers in the selection of their safety equipment for customers.

The use of radio and television greatly increases the number of individuals receiving pesticide safety information. The staff at Rutgers prepares tapes which are used on 13 TV stations in the Northeast. These are a network of educational stations.

Our Extension Specialist in Landscape Design, Raymond P. Korbobo, has a program, "The Compleat Gardener"—one of the most popular TV programs taped by Rutgers. This program alone has an estimated audience of 5 million viewers. All of these programs do not necessarily devote time to pesticides, but they do pass along important pesticide information.

Thirty-eight radio stations, reaching New Jersey, New York Pennsylvania, and Delaware, receive tapes prepared by specialists at Rutgers. Twenty-five percent of these programs are aimed at agriculture, while 75 percent are directed at the lay public. One station in Philadelphia handles a weekly program put out by Rutgers which reaches 175,000 people in the Philadelphia area alone. Here again pesticide information as such may not be the principal subject, but it is always worked in at the appropriate time.

When answering letters to the general public in which control recommendations with insecticides are given

we enclose a copy of USDA PA594, *Homemakers and Home Gardeners—Use Pesticides Safely*, or USDA PA589, *Safe Use of Pesticides—in the Home—in the Garden*. People are usually impressed when they read official information.

All the concern about pesticides in recent years gave birth to the Food Facts Committee at Rutgers. Made up of members from various departments of the College of Agriculture, the committee acts as advisor to the Dean of the college of Agriculture and to the Director of Extension. The committee's primary goal is to provide a continuing flow of basic factual information on foods to the college staff and "communicators" in New Jersey and the metropolitan areas of New York City and Philadelphia.

One of the first projects was an article, *We Must Choose*, written by Dr. Bailey Pepper, Chairman of Rutgers University's Department of Entomology. Several thousand copies were printed. Copies were sent to the National Agricultural Association,

which reprinted the article in their magazine received by agents all over the United States.

This was followed by a very simple, clearly written, easy-to-understand-at-a-glance pamphlet, *People, Pesticides, Progress*. Twenty-five thousand copies were originally printed and later another 25,000. There are less than 500 left at this writing. County agents and county home economists made about 60 percent of the distribution; the others were used to fill requests received at the State office. A considerable number of requests were received from local health officers and school teachers.

A year ago we began issuing a monthly newsletter, *Food Facts from Rutgers*. Issue Number 3 dealt with the positive approach, "The Case For Pesticides." As of January 1, 1965, *Food Facts* had a mailing list of 1,545. (These people asked to be on the mailing list.) Thirteen hundred of the recipients are in the New Jersey and metropolitan areas of New

Author William Oberholtzer gives an illustrated lecture to a garden club.



York City and Philadelphia. Included in the group are 8 syndicated news services, 50 nationally distributed magazines, 9 television stations, 27 radio stations, and most of the newspapers in the tri-State area. Also included are home economics teachers, home economists in business, dietitians, PTA's, The League of Women Voters, Extension (State and Federal), Rutgers staff and advisors.

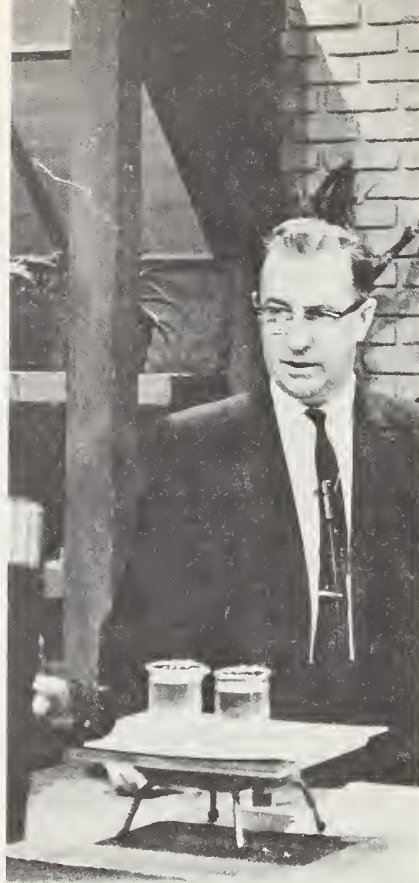
In Bergen County (one of the most urban counties in northern New Jersey) there is a good working relationship with the nonfarm community as well as with agriculture. A newsletter, *Round-up*, is sent weekly to producers, dealers, and nurserymen. This is a catchall of pertinent information, some of which finds its way to the consumer.

Each year sees a few more farmers "selling out." However, there are still many roadside farm stands. Here the agents set up bulletin boards displaying State and Federal publications including pesticide information.

All the county Extension Staff work in an intensive public relations program, trying to reach the urban population. The following are some of their more interesting activities.

For the past 8 years Bergen County agricultural agents have sponsored a very successful *Farm Open-House Weekend*. In October, just a few days before the planned weekend, the local newspapers carry a story inviting the public to attend and tour about four farms during certain hours; general directions are included.

With 4-H Club members as guides, the visitors are taken on a tour, encouraged to ask questions, and given literature to take with them, such as: *Your Food Is Good Food, Our Nation's Agriculture, Better Eating for Better Health, People, Pesticides, Progress*. A sunny weekend brings out 7,000 to 8,000 people, and about half as many come if it rains. Everyone has a good time and the newspapers give excellent coverage creating a better understanding of the farm and agriculture.



A network of 13 educational television stations in the Northeast uses tapes made by the staff at Rutgers.

For the past 7 years during the month of August, the agents have conducted a lawn demonstration and clinic in a county park. The demonstration includes pest control, correct applications of herbicides, and proper use and care of equipment.

Plans are well under way to launch a new spring demonstration. A Garden Clinic will be held in a county park. Transplanting, pruning, and pest control techniques will be shown.

In late winter the agents hold an Annual Garden Supply Dealers Meeting. A portion of the program is devoted to agricultural chemicals and their safety aspects. This year's program featured pesticide safety equipment for the home gardener. This is a new program in the county and efforts are being made to convince dealers to stock safety equipment and

to encourage the public to use it.

From March to December the county agent supplies the only daily newspaper in the county (circulation approximately 130,000) with a garden column for its Friday garden page. This may contain helpful photos, periodically includes information on pesticides, and stresses safety aspects. The same column goes to 30 other newspaper outlets, including two leading dailies in New York City. The agents have also done feature news stories where information about pesticides was included.

At this same time of year the Bergen County Extension Service provides a 1-minute automatic telephone message, nicknamed "Tip-O-Phone." On some weekends they receive over a thousand calls. Pesticide information is included when necessary to meet the needs of the season.

The agents work closely with county officials—freeholders, legislators, and others. In an attempt to keep them up to date, they are sent publications, such as *Food Facts and News and Views* (a publication of our Bureau of Conservation and Environmental Science). Material is available to the agents that public officials might not have the opportunity to see, the officials are glad to get this material. Public officials do receive questions about pesticides and now they know where to turn for help. At the annual Freeholders Luncheon the opportunity again presents itself to keep these people up to date in a capsule sort of way.

As with all agents everywhere, meetings are a way of life. Garden club activity is high in the Bergen County area. There are well over 100 organizations in the county having a major interest in gardening. In talks before these groups the agents use the slide series "Safe Use of Pesticides," developed by the Federal Extension Service. These slides are geared to lay people. There are many groups that could be approached, and the potential for working through existing groups is limitless. ■

4-H'ers Learn Pesticide Safety

by F. H. TITLOW, JR., Associate Extension Editor (News), Virginia

“EVERY time Virginia 4-H Club groups are taught entomology, the safe use of pesticides is stressed,” says Dr. J. O. Rowell, Extension entomologist at Virginia Polytechnic Institute.

He estimates that he and John M. Amos, the other Virginia Extension entomologist, directly reach more than 1,000 4-H Club members every year. In addition, the two entomologists conduct training schools for county Extension agents, and these agents carry the information to hundreds more 4-H Clubbers.

Rowell and Amos, along with specialists from Extension Plant Pathology and Physiology, have just completed a series of six agent training schools on pesticides in different parts of the State. They were successful in reaching nearly all of the county agents, home agents, and assistant agents. In these training schools, too, pesticide safety was one of the very important topics covered.

“Safe use of pesticides has been receiving much more attention during the past 3 years,” says Rowell.

From time to time throughout the year, Rowell and Amos teach the safe use of pesticides to junior and senior 4-H Club groups at club meetings and special sessions in the counties.

Every June, when the Annual State 4-H Short Course is held at VPI, the two entomologists have another opportunity to reach many of the 1,200 outstanding 4-H'ers and volunteer adult leaders who attend the week-long session.

During the summer, Rowell and Amos are able to accomplish some of their most effective work. They teach four entomology classes a day over a 4-day period at each of from

five to eight 4-H Club summer camps in the State.

They are also able to reach other 4-H club groups during the summer at the State 4-H Conservation Camp at Virginia Beach. One entomologist spends a week at this important 4-H Club activity.

The effectiveness of this teaching is evidenced in the case of Stephen Whitt, a 17-year-old Newport News 4-H Club member who was chosen to speak on “Use Insecticides Safely” at the annual convention of the Entomological Society of America in Philadelphia last winter. Stephen was one of three 4-H youths from throughout the Nation selected to talk at the ESA gathering, which was attended by more than 1,500 persons, most of whom are professional entomologists in industry, research, teaching, and Extension.

The illustrated talk-demonstration was well received at the meeting. In fact, Stephen also presented it over two Philadelphia television stations.

As teaching aids, Rowell and Amos use motion pictures; color slide presentations, accompanied by taped scripts; prepared lectures using color slides and charts; and an unusual teaching aid, Insect-Tac-Too.

The film “Safe Use of Pesticides” is shown regularly to the groups the entomologists teach, as is another very important color-slide presentation entitled “Pesticides—Boon to Mankind.”

The colored slide presentations feature such titles as “What’s on the Label?” and “Use Pesticides Safely.” A chart presentation is also entitled “What’s on the Label?” while another shows the “Range of Insecticide Toxicities.”

The visual and teaching aid invented by Rowell—“Insect-Tac-Too”—has enjoyed a very good reception, and it is now being used also in several other States. Patterned after “tick-tack-toe,” but played on a giant display panel, the game features questions on insect control and safe use of pesticides. Everyone present can participate in the game.

Several pieces of literature have also been made available to all 4-H members. This literature was distributed by Virginia 4-H Club members last year as they cooperated with various organizations in their communities in helping to tell the story of the safe use of pesticides. In fact, Katherine Roach, National 4-H representative from Buckingham County; and Nels Ackerson, National FFA president from Indiana; made a series of radio and television shows in Washington, D. C. last year. The programs, sponsored by the National Agricultural Chemical Association and the National Safety Council, were broadcast all over the country.

“As we have stepped up our emphasis on the safe use of pesticides we have gotten a very enthusiastic reception from our 4-H members and leaders,” says Rowell. “In line with the State’s expanded program, we intend to continue stressing this subject.”

A National 4-H Entomology Awards Program was established in 1952. In the intervening 13 years of this program, under the leadership of Rowell and Amos, Virginia has captured seven National awards in entomology. This is a tribute to the effectiveness of the entomology instruction in the 4-H Club program for the State. ■

Florida Chemical Education Groups

by F. E. MYERS, Assistant Extension Director, Florida

OVER 90 percent of Florida's 67 counties have local Chemical Education Groups for developing 1965 programs.

Objectives of these coordinated efforts include:

—improving identification of problems and developing solutions.

—stimulating educational efforts on a local basis around local people.

—accelerating procurement and use of educational aids, programs, personnel, and activities.

—increasing awareness and understanding on the part of the public, organizations, interests, etc.

—directing emphasis to specific audiences or situations including the positive side of chemicals and precautions.

The county Groups represent a cooperative effort with many individuals and organizations, guided by Extension's Chemical Information Center and county Extension agents.

In the summer of 1964 the University of Florida and related industry sponsored DARE (Developing Agricultural Resources Effectively). They projected trends, problem areas, and solutions needed. Florida seems destined to make phenomenal growth in the next 10 years. Pesticides, of course, are essential to quality and production, and also provide valuable tools related to public health and outdoor and indoor living.

Preliminary DARE projections showed that increased use of agricultural chemicals will take place: fungicide use will increase 40 percent, insecticides 75 percent, herbicides 339 percent, and fumigant use will increase 392 percent. Final projections were even greater, based on thriving agricultural developments. Improvements related to home use

also will likely take place. The chemical additives field is moving at an exceptionally fast pace.

In November 1964 the Florida Agricultural Extension Service, State Board of Health, State Department of Agriculture, Vocational Agricultural Research Institute each designated representatives in all counties. This nucleus group enlists assistance of others to examine the situation, develops solutions, and acts as the focal point for this effort.

Florida's prominent role in supplying the Nation's food, its desirable climate, and rapidly expanding number of homes, for many years has kept Extension faced with a direct need for continuous efforts in the chemicals area.

Basic research data were developed by the Florida Agricultural Experiment Stations in the 40's and early 50's. Much of this was used in hearings related to the 1955 Miller Pesticide Amendment to the Federal Food, Drug, and Cosmetic Act.

Concurrently, Extension specialists incorporated tolerances, residue data, minimum days last application to harvest, and related information as standard topics in recommendations. Extension was very active during this period establishing a sound research and educational base in vegetable crops and other areas affected.

Florida Extension's more intensified chemical education efforts have been underway since 1960. First steps were to establish an overall Chemical Tolerance Committee, a Chemical Information Center, and the release, *Chemically Speaking*. (See *Extension Service Review*, September 1961, "Design For A Central Information Point.")

Some major Extension emphasis

over the past 4 years has been on area pesticide schools, producer meetings on specific problems, and a training guide—*Safety Kit for Agricultural Chemicals*. The guide was developed for agricultural teachers but also has been useful to county health departments and Extension. Emphasis in 1965 is toward further development of local programs by the county educational groups. A strengthened program in the chemical additives area is planned for 1965-66.

Organizational meetings for Groups at the county level have included as a minimum: agricultural agents, home economics agents, county health representatives, agricultural teachers, inspectors, and industry designees. This means at least a 6-member nucleus in each county, and they are involving others from many local sources of key leadership.

The county Chemical Education Groups are identifying their own local problems needing attention in 1965, and developing the action program they will carry out. As they go about this, they also consider ways to recognize and strengthen their long-term needs and resources.

Extension's Information Center and the cooperating organizations provide additional assistance on request from these local groups. Better liaison and understanding between the many interests involved with chemicals has been evident throughout the meetings. Many excellent ideas and approaches have resulted from individual county programs and will be circulated statewide. Sounder awareness and general stimulation of efforts is taking place in many areas for a better use of total resources available.

County agents, Florida's county Extension chairmen, have again provided the necessary leadership for a dynamic program in agricultural chemicals education. Home economists, joining with them to extend the effectiveness into homes can do much to strengthen the overall chemicals program. ■

Extension Education on Pesticide Safety

by HAROLD GUNDERSON, *Extension Entomologist, Iowa*

IT IS DIFFICULT to attract an audience—and hold it—with an article about safe use of insecticides.

However, one *can* draw an audience with a specific topic dealing with the control of an insect pest. Safe use of insecticides then simply becomes a part of the control program.

Let's use the educational program involving the western corn rootworm in Iowa as an example.

An unexpected rapid increase in populations of the western corn rootworm occurred in 1963 in the western third of the State. The insect caused a loss of at least \$30 million worth of corn in that area.

Compounding the problem was the fact that the western corn rootworm had developed resistance to aldrin and heptachlor. This necessitated the use of organophosphorus insecticides to control the insect. These materials are extremely hazardous unless handled with care.

A program was initiated during the winter to educate farm operators in the cultural and chemical control of the insect. Special emphasis was placed on the protection of persons applying these insecticides.

Extension entomologists at Iowa State University told the story of the western corn rootworm in a leaflet which was made available to all farm

operators throughout the State.

For nearly 20 years, Extension entomologists and weed control specialists have conducted pest control clinics throughout Iowa to discuss current insect and weed problems. During the fall of 1963, clinics held in the western half of the State were devoted almost entirely to the western corn rootworm.

Extension specialists and information personnel prepared stories about the western corn rootworm problem for release to radio and television station, newspapers, and farm magazines. These articles included warnings concerning the potential hazards involved in applying the insecticides.

Chemical company salesmen called on dealers to explain methods of handling the insecticides safely. Dealers, in turn, informed their customers.

Extension specialists conducted training schools for pest control specialists in industry. Instruction in proper use of pesticides was included as a normal part of the training.

The Iowa Farm Safety Council was alerted to possible problems involving use of the new insecticides.

Extension entomologists conducted five training schools on rootworm evaluation during June. More than 260 persons, including county Extension directors, area agronomists,

and insecticide and equipment dealers were trained in recognition of rootworms and rootworm damage. Research entomologists at the Iowa Experiment Station had developed a technique to apply organophosphorus insecticides during lay by cultivation to prevent loss in infested fields not treated at planting time.

County Extension directors and area agronomists conducted meetings in rootworm infested cornfields to familiarize farmers with the insect and its destructive capabilities and to help them decide on the need for chemical treatment.

The Institute of Agricultural Medicine at the State University of Iowa sent brochures describing symptoms and emergency treatment of organophosphorus poisoning to all physicians in Iowa.

A physician from the Institute interviewed doctors and patients in several rumored cases of poisoning. His findings were negative.

Application of organophosphorus insecticides during 1964 would have been profitable on approximately 2 million acres of farm land in western Iowa. Between 1.25 and 1.5 million acres were treated.

The effectiveness of the insect-control program is borne out by the fact that loss due to western corn rootworm damage in the western *half* of Iowa in 1964 did not exceed \$15 million. This was approximately half the loss suffered in the western *third* of the State the preceding year.

The success of the program is even more impressive when viewed in light of the safety in handling the insecticides. More than 10,000 farmers applied these chemicals for the first time during 1964. Approximately 10 million pounds of insecticides were used. Not one authenticated case of poisoning or ill-effect was reported.

Proper use of insecticides is *safe* use. Through Extension education, more than 10,000 Iowa farmers learned to apply these chemicals safely to control the western corn rootworm. ■

A late-planted Iowa cornfield showing damage from western corn rootworm.





The sampling machine operates like a vacuum cleaner, the tube sucks insects into a removable nylon bag. Samples thus bagged in the field are transported to the laboratory, anaesthetized, and removed for counting.

careful research and cooperation among all concerned, it can be put into wider use for the benefit of our agricultural economy.

The development of integrated control for alfalfa insects is an example of how proper selection, dosage and timing of chemicals can be used with biological control and cultural practices to achieve better control than could be obtained by any single method. The spotted alfalfa aphid moved into California during the mid-1950's free of the parasites and predators that kept this pest under control in its native area.

Research and Extension workers first developed and demonstrated effective chemical control measures without which the grower was unable to produce a marketable crop and frequently suffered severe stand reduction. Though helpful, the chemical control program did not assure growers of "pre-aphid" hay quality and it greatly increased production costs and aggravated other insect problems. Exploration by our entomologists in areas native to the aphid resulted in the introduction of at least three parasites into infested areas of California and other States. Field research utilizing new sampling techniques established treatment levels of the aphid in relation to parasite and predator population levels. Selective dosage rates of certain organophosphate materials were developed that decreased the aphid and other damaging insect populations while preserving the beneficial complex.

Agricultural Extension Service personnel conducted demonstrations pointing out the requirements and methods of integrating selective chemical control with parasites, predators, and insect pathogens. Ultimately, new alfalfa varieties, resistant to the aphid were developed and again Agricultural Extension personnel played an important role by demonstrating the production potential of these new varieties in various areas of California. Integrated control of alfalfa pests including the spotted alfalfa aphid, the alfalfa caterpillar, leafminers, pea aphids, and armyworms has been successfully used in California since 1958.

Other problems are under investigation and results show promise of the possibility of effective integrated control programs on several crops. For example, studies of pest control problems on grapes have shown that populations of a very effective egg parasite of the grape leafhopper may be increased by planting blackberries within or along the margins of vineyards. The blackberry provides host material for another leafhopper which serves as an overwintering host of the egg parasite. The blackberry-grape association was found to explain the early appearance of the egg parasite in certain grape vineyards and also why this parasite effectively controls the grape leafhopper in

Integrated Insect Control

by VERNON E. BURTON, *Extension Entomologist*
University of California, Davis Campus

and ANDREW S. DEAL, *Extension Entomologist*
University of California, Riverside Campus

INTEGRATED control means combining chemical, biological cultural control methods into a single unified program. It has been demonstrated to be a practical and effective approach to the solution of some of our most serious pest problems. By utilizing chemicals less frequently but more judiciously, production costs may be lowered, but more important the pesticide hazard to man, domestic animals and wildlife will be reduced. Further, decreased exposure of pest populations to chemicals will delay the development of resistance, thus prolonging the useful life of certain pesticides. Integrated control has limitations, it cannot be applied immediately to all crops and may never find use on some crops. However, with

certain limited areas of California. In the absence of blackberry, the parasite is rare to nonexistent.

Field studies have established population levels of leafhoppers and parasites for use as a basis for treatment in an integrated control program utilizing chemicals and timing procedures that are least detrimental to the parasite population. County Extension personnel are establishing experimental plantings of blackberries to further test and demonstrate the importance of this practice to the efficient control of grape pests.

Investigations in orange groves of coastal southern California have demonstrated the possibility of integrated control programs on citrus crops. Studies in untreated test areas of groves revealed that many potentially important citrus pests were present, but often did not reach the damaging levels expected because of natural enemies. An exception was purple scale which in spite of the presence of a parasite, often reached economic proportions. Ants, which interfered with natural enemies of many of the citrus pests, were also found to be present.

Entomologists studying this situation applied insecticides to the ground beneath the trees thus controlling the ants, but causing no harm to the parasites and predators in the trees above. The groves were then systematically mapped and oil spray treatments applied only to alternate pairs of rows or strips for control of purple scale. This system of strip-treating always left an untreated row of trees next to a treated row. Since oil sprays do not leave a persistent toxic residue and the drift hazard to natural enemies is low, the beneficial species soon moved back into treated rows. Twelve months later the pairs of rows or strips left untreated in the previous spraying were oil sprayed while those treated before were skipped. This procedure was continued for several years.

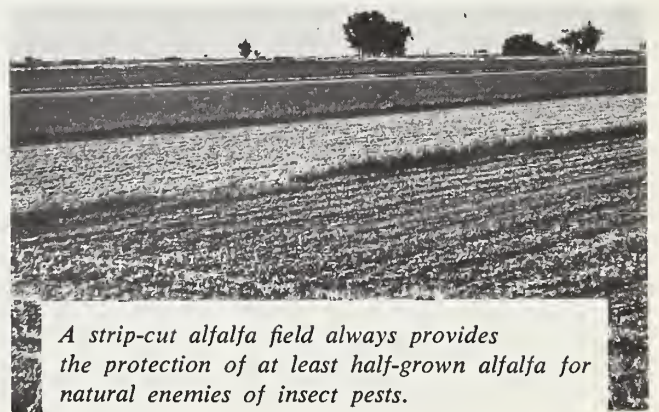
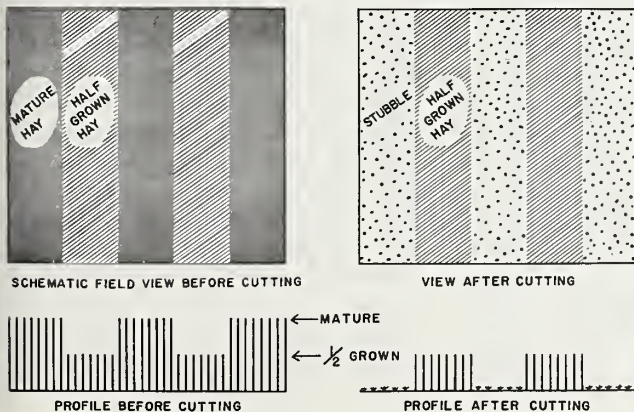
It was soon evident that the strip-treatments of oil plus the activity of parasites was sufficient to control the purple scale. It was also evident that natural enemies unharmed by the selective oil sprays and in the absence of the ants held many other citrus pests below the damaging level.

Strip cutting of alfalfa has demonstrated a promising technique for reducing insect problems, primarily lygus bugs, in crops adjacent to alfalfa. In addition, such a program creates a "preserve area" for many beneficial insects. By cutting alternate strips of the field (each strip being 100 to 200 feet wide) the lygus population is "herded" from the cut to uncut strips; thus, most of the lygus remain in the field.

A strip-cut program may drastically reduce early season lygus control treatments on crops such as cotton where such early treatments frequently increase spider mite and bollworm problems later in the season. The greater preservation of beneficial species in alfalfa hay, by maintaining a refuge during the entire season, will enhance the integrated control program in alfalfa and possibly add to the beneficial insect complex.

The development of integrated control programs requires close and consistent cooperation of Research and Extension personnel. The research phrases are, of necessity, under the leadership of the Experiment Station. During this stage Extension representatives learn the fundamental techniques, aid in applying them in early field studies and play a larger role in demonstrating the techniques as a program approaches grower use. The establishment of the alfalfa program would have been impossible with the absence of either phase of the program.

Frequently, growers and agricultural chemical representatives must completely change their thinking on insect control before they can adopt integrated control. They must tolerate the presence of a certain number of insects in their fields and accept a lower degree of control from chemical applications. They must recognize beneficial species. They must evaluate pest populations in relation to beneficial populations. They must be willing to accept new plant varieties and adjust to new management practices. These changes will be brought about only through reeducation. County Extension personnel are charged with the responsibility of this reeducation. Only through constant association with the program during the developing stages can they be equipped for this task. ■



A strip-cut alfalfa field always provides the protection of at least half-grown alfalfa for natural enemies of insect pests.

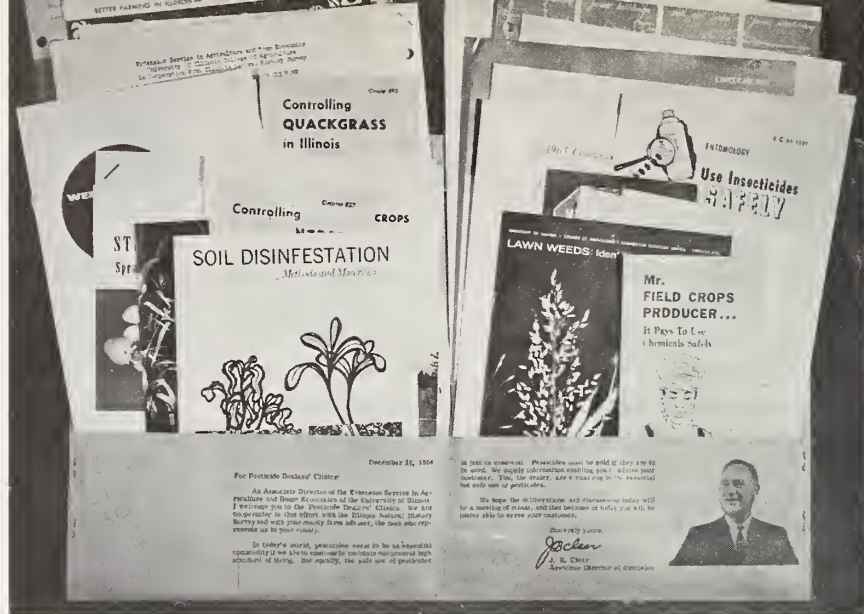
ILLINOIS farmers have long known that proper cultivation and use of clean seed are basic to a sound farm weed control program. They also know that barn sanitation and screens are necessary to control flies and that resistant varieties, adjusted planting dates, clean plowing, use of fertilizers, and other cultural practices help control insects and diseases.

But during the past 20 years many farmers have also learned that they can no longer gamble on these cultural practices for effective weed, insect, and plant disease control. Farmers must protect their high investments in land, taxes, machinery, seed, fertilizer, and labor, by preventing insects, plant diseases, and weeds from cutting yields and profits.

Farmers now know that drilled corn can out produce cross-checked corn but weeds such as giant foxtail cannot be cultivated out of the drilled corn. Weeds that come up with the crop nullify this yield advantage. This is the reason that Illinois farmers applied preemergence herbicides to one-fourth of their soybeans and corn in 1964—five times more than in 1960. Nearly all seed corn is treated with a fungicide to prevent rotting before germination.

Four of every 10 fields of corn in 1964 received a soil insecticide to prevent deprivations of cutworms, wireworms, rootworms, white grubs, and many other corn soil pests. Some fields require foliar applications to prevent damage from insects that attack the plant above ground. Pesticides, used where needed, protect the farmer from losses which would average between \$750 and \$1,000 per farm. This is above the cost of treatment and is in addition to the savings provided by cultural and mechanical control of pests.

Fruit and vegetable growers are even more dependent upon pesticides to produce a market-acceptable crop. One orchardist in northern Illinois carefully followed cultural practices; he sprayed for codling moth, curculio, scab, and other diseases, but



Make Pesticides Work FOR You

by H. B. PETTY, *Extension Entomologist, Illinois*

overlooked the apple maggot and lost his entire crop. Timely apple maggot sprays would have meant a near-perfect crop. Sweet corn unprotected by sprays is often rejected on the market because of earworm infestations. Canning sweet corn, broccoli, cabbage, potatoes, peaches, cherries, all have their specific problems.

Controlling farm pests to meet today's high market standards is not an easy task. The Cooperative Extension Service must use every available educational resource if it is to maintain its major role of providing education on proper and safe use of pesticides, both on the farm and in the home. Many avenues can be used, but the local leader is a starting point and this system has proved to be effective. The pesticide dealer is the natural local leader—he already knows something about pesticides and usually has an excellent grasp of the problem. Ordinarily he is anxious to increase his working knowledge of the product he sells to improve his service to his customer. Extension is in an excellent position to help him do this.

Each farm adviser in Illinois has compiled a list of pesticide dealers in his county—2,500 dealers for the State, (not including many of the grocery and drug stores handling a few aerosol bombs). We prepare and send to these 2,500 dealers eight or more "Insecticide Dealers' Newsletters" annually, giving the best information we have on insect control but stressing particularly pesticide safety information. These newsletters are sent to the adviser who mails them, with a covering letter, to the dealers in his county.

Specialists from Extension agricultural engineering, agronomy, entomology, and plant pathology annually hold area pesticide dealers' clinics, giving county advisers an opportunity to bring in their dealers for information. Subjects range from homeowner pesticides through farm application equipment and what a dealer's pesticide inventory should be. Each person is presented a folder containing abstracts of the discussions and a wide variety of reference materials (this year a total of 50).

Unique or suitable circulars are sometimes purchased from other States and are supplied along with USDA and Illinois leaflets.

Perry County Farm Advisor, C. R. Howell, conducts a pesticide school for dealers and leading farmers. He requires advance enrollment and limits attendance to 20 persons. He holds 5 weekly night meetings during February and a calibration field meeting in late April. Howell presents a different phase each night, from recommendations for control through pest identification to safety.

The emphasis is on the dealer—he of all people will be in direct contact with the ultimate user. In a single individual effort he can point to the label, tell the customer to read it, give instructions and answer questions. We in Extension must recognize his potential and work with him to further good, sound usage.

This year we held the 17th Illinois Custom Spray Operators' Training School, sponsored by the Cooperative Extension Service and the Illinois Natural History Survey. Those attending were given a 175-page booklet containing pesticide recommendations, abstracts of discussions, and latest research findings. Illinois Extension and Research personnel planned and presented a program, which included subject-matter specialists from USDA; the Universities of Missouri, Michigan State, and Iowa State; and the Illinois Department of Agriculture.

This school, originally designed just for applicators, rapidly developed into a school for anyone interested in the wise and judicious use of pesticides. Of the 1,034 persons attending this year, 503 were representatives of industry (including dealers, salesmen, researchers, and advertising specialists); there were also 135 farmers, 110 representatives of canning and seed companies, 95 commercial ground applicators, 23 aerial applicators, 36 county agents, 23 farm managers, 37 State and Federal employees, 9 representatives of the

press, and 63 University of Illinois students and faculty attending. We have found this school to be an excellent method of providing our information to the leaders in the pesticide sales and application industry.

In addition we conduct each year upon request, several salesmen training schools for pesticide formulators and distributors.

Timely reports on the pest situation greatly influence pesticide use. For over 25 years orchardists have received the Spray Service Report, a cooperative effort on the part of orchardists, entomologists, pathologists, and horticulturists in Indiana, Kentucky, and Missouri.

The weekly Illinois Insect Survey Bulletin, started in the early 1950's, is a companion publication covering insect pests of field crops, livestock, and ornamentals. About 2,000 copies are sent to subscribers, farm advisers, radio and TV stations, daily newspapers, and cooperators. It provides up-to-the-minute reports on the insect situation and advises what to do, what not to do, when to treat or if it is too late to treat, along with warnings against incorrect use of pesticides. This bulletin has saved farmers from spending thousands of dollars on treatment that is not needed or that is too late to do any good. The information contained in this weekly release is based on insect abundance reports received from farm advisers, research, survey, and Extension entomologists.

Keeping the dairymen aware of the changing pesticide recommendations and regulations is not always easy. For years our DHIA Newsletter has carried items on insect control, but this year some issues of the Insecticide Dealers' Newsletters are titled "An Insecticide Report to Dairymen." This note is supplied to 14 milk producers' associations as well as to the DHIA Newsletter.

Regular news releases, TV appearances, radio tapes, magazine articles, circulars, and county meetings and demonstrations are a part of our di-

rect-to-the-people program. Thus, in addition to reaching the farmer directly through his newspaper, his magazines, radio and TV, county meetings, and his county farm adviser, we also reach him indirectly through his dealer, his custom applicator, and the chemical salesman.

The farmer who protects his crops receives all the benefits from fertilizers, better varieties, better harvesting equipment, and marketing facilities. All these advantages are passed on to the consumer through lower food prices.

While pesticides are helping to produce cheaper food, they also enable the average citizen to lead a more enjoyable life with a minimum of swatting and scratching due to better mosquito, fly, flea, tick, and louse control, but even more important has been the lowering of the incidence of human diseases carried by these pests. Structural pests as termites, which conservatively have, are now, or will attack at least 10 percent of the homes in the southern half of Illinois can be controlled. Pesticides are on hand to protect items of aesthetic value also.

A home safety pesticide score sheet was given to some 50,000 interested people who attended the Chicago World Flower and Garden Show in late March. Since pesticide accidents occur more commonly in the home than on the farm, these people were asked to score their own homes. Another 250,000 persons viewed our pesticide safety exhibit but did not pick up literature. And this summer a farm exhibit in Chicago's Lincoln Park Zoo will show the urbanite the role agricultural chemicals play in food production.

The salesmen, dealers, applicators, farmers, homeowners, urbanites, and suburbanites—all have an interest in safe, efficient, and wise use of pesticides. Extension has the knowledge and the tools with which to further this objective. But to get the job done we must supply the information available to interested persons. ■

From The Administrator's Desk

As this issue of the *Extension Service Review* goes to press, many Extension workers have become acquainted with a study of the field operations of the Department of Agriculture conducted by the Commission on Civil Rights entitled "Equal Opportunity in Farm Programs." The report is based on information obtained by the Civil Rights Commission in Washington and in several States during the last year.

In a letter to Secretary Freeman, President Johnson said: "Based on its study and review of the material available to it, the Commission concluded that Negro families have not participated equally in those programs designed to assist our rural population. These programs so essential to our continued welfare and economic growth must reach all in our rural areas if they are to be effective in lifting those areas to full economic self-sufficiency."

"The new emphasis which the Civil Rights Act of 1964 gives to equal treatment for all persons provides the basis for assuring that the benefits of these efforts will be available to all. Equality of opportunity is essential if we are to achieve the rural renaissance which you so vigorously champion."

When we started this series, I indicated that from time to time I would briefly discuss things that seem important to us as Extension workers from a National point of view. One of the most important events of the last year affecting us in our programs is the passage of the Civil Rights Act of 1964. I am sure that over the last few months all Extension workers have become acquainted with this Act and its implication to us. There is nothing more important to all of us in the Extension Service than to make our programs consistent with the Civil Rights Act if these program services are to continue to be available to the American people and particularly to those who need them most.

Section 601 of the Civil Rights Act says that "no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to

discrimination under any program or activity receiving Federal financial assistance. . . ."

The regulations approved by the President of the United States further interpret and define the application of the law. In defining the discriminatory actions prohibited by Section 601, the regulations list:

"Deny an individual any service . . . provided under the program."

"Provide any service . . . which is different, or is provided in a different manner, from that provided to others under the program."

"Subject an individual to segregation or separate treatment in any matter related to his receipt of any service. . . ."

"Restrict an individual in any way in the enjoyment of any advantage. . . ."

"Treat an individual differently from others in determining whether he satisfies any admission, enrollment, quota, eligibility, membership, or other requirement. . . ."

"Deny an individual an opportunity to participate . . . or afford him an opportunity to do so which is different. . . ."

All these apply when race, color, or national origin is the basis for such differences in treatment.

The Civil Rights Act is the law of the land and all Extension workers have accepted their responsibilities under it. The report of the Civil Rights Commission emphasizes the very great responsibility we have and the very high level of significance this has to us and our organization.

Recent conversations with State Extension directors and others indicate that Extension workers throughout the country are taking this responsibility seriously. Our information indicates that Extension workers are making adjustments to necessary changes required by the law in a sound and constructive manner. We look with pride on the good work you are doing and look forward to future reports of accomplishment.—*Lloyd H. Davis*