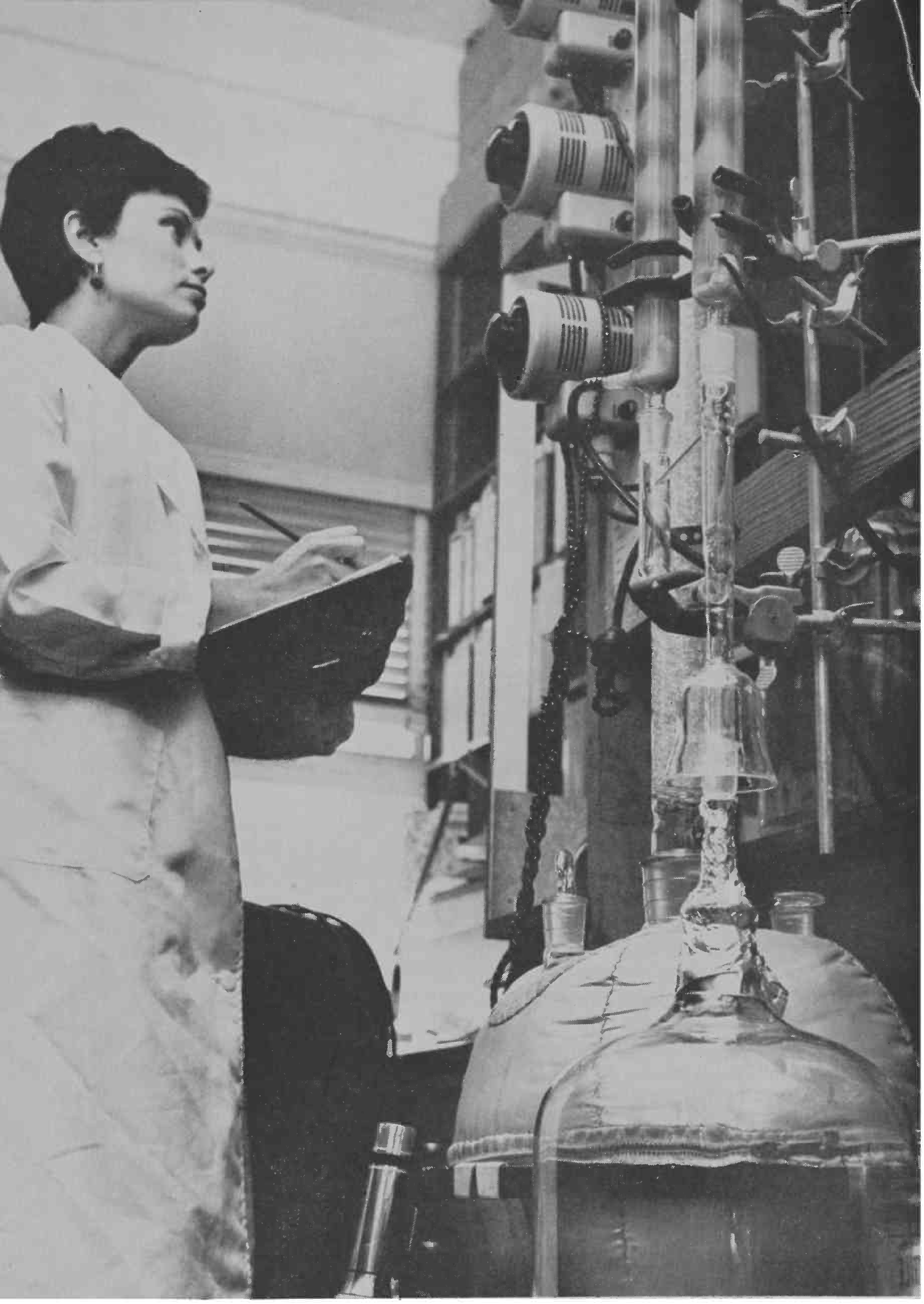
Policing Pesticides



THE INSECT TOXICOLOGY laboratory carries out extensive investigations to assure that agricultural use of insecticides does not ever pose a threat to the health of the people of Arizona. Foods are being studied carefully to make sure that recommended insect control practices do not result in a hazardous amount of insecticide remaining on the food. First step is to extract any insecticide that may be present, using a mixture of organic solvents. Then these solvents must be especially redistilled prior to use, as shown in this photo, otherwise small amounts of impurities will interfere with the detection of the minute amounts of insecticides.

James M. Witt

There has been a growing concern on the part of some segments of the public over the alleged undue exposure of the population to technological hazards resulting from technological advances. The target of much of this concern is the use of pesticide chemicals in the production of food crops. There is a fear on the part of some persons that the use of such chemicals is profligate, unwarranted, uncontrolled and of no concern to the manufacturers and users of such chemicals.

Nothing could be farther from the truth. Although pesticides are essential

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Atoms, Aspirins and Autos, Too

As mankind develops new learning he forges new tools for his use or protection. But these new inventions carry their own hazards, requiring great care in their use. This is true of nuclear energy in defense and industry, of powerful new drugs, faster automobiles and also agricultural chemicals. It is a tribute to civilization if we learn the precautions as rapidly as we learn the new uses. We have done that in the field of agricultural chemicals.

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for the protection of most food crops, the public is largely unaware of the research, legal safeguards and precautionary practices involved in the protection of our population from the improper use of pesticides.

Strict Tests and Controls

No insecticide, or other pesticide, can be used in this country until (a) the U. S. Department of Agriculture has shown that it is *useful* and (b) the U. S. Food and Drug Administration has been shown that such use will not in any way constitute a threat to the safety of the consumer.

These requirements are not mere platitudes, but are regulations which require a great many experiments proving that there is a safe level for insecticides on food crops, and that the proposed use will result in only 1/10th or 1/100th of this safe amount. This fraction of the safe amount is established as the maximum legal amount of the insecticide permitted on the crop and is called the "tolerance."

The Department of Entomology is carrying on a program to make certain that any of the insecticide treatments which are recommended by The University of Arizona for use on Arizona crops will result in insecticide residues at harvest which are below the tolerances established by the Food and Drug Administration. This guarantee of safety to the public is very much the concern of every entomologist, as well as of growers and pesticide manufacturers.

Extensive Trials by UA

Before recommending a particular insecticide for use on a crop, University of Arizona entomologists conduct extensive experiments to show that the treatment will result in effective control of a particular pest and that this treatment will not result in an unwanted side effect.

Efficient control of the target pest is only one of three legs on which an insect control recommendation must stand. It must also produce minimal ecological disturbances and must result in a harvest residue of the insecticide which is below the legally established safe amount. Two or three years of experiments are usually necessary in order to adequately establish all these points.

It is possible to use essential pesticides and still produce crops with harvest residues below the prescribed legal tolerances because of the tendency for most pesticides to quickly disappear, due to volatility, weathering, mechanical loss, growth dilution, and degradation reactions. Ninety per cent of most organic pesticides, including the so-called persistent ones such as DDT, will disappear from crops in less than two weeks. Figure I shows the rapid rate at which DDT disappears from a crop such as lettuce. As a general rule, half of the pesticide material will disappear from the crop every three or four days.

FURTHER CHEMICAL purification steps are necessary to separate the plant or animal fats and waxes from the insecticide. A final purification step, shown in the photo above, to remove the last traces of fats and waxes, is to pass the extract through a special sand in a chromatography column with organic solvents designed to carry through the insecticide, but leave behind all other materials. After this process the purified insecticide which was extracted from the food is injected into a microcoulometric gas chromatogram designed to detect and identify as little as a three hundred-millionth of an ounce of insecticide.

Is Dissipated Quickly

At an ordinary rate of use (1.5 pounds per acre) the DDT residues on the lettuce fell to below the tolerance of seven parts per million in less than a week. Even at a much higher dosage rate (five pounds per acre) than is necessary, recommended or registered, the residue fell below the seven parts per million tolerance within three weeks. In order to provide a large margin of safety, in case of some unusual behavior, registration regulations require the DDT must not be applied to lettuce any closer to harvest than the seedling stage — eight to 12 weeks before harvest.

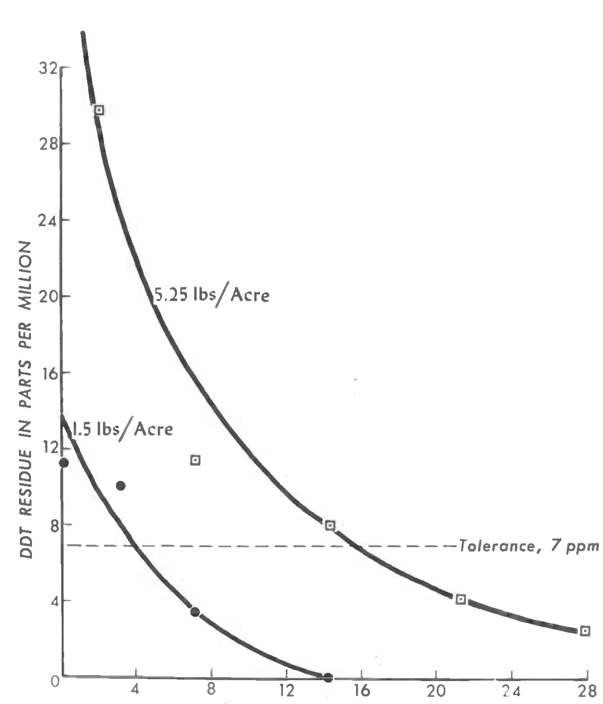

FIGURE I — Rate of disappearance of DDT from lettuce in Arizona.

The legal tolerance applies to the entire lettuce head as it is shipped to market. However, it should also be noted (Figure II) that most of the insecticide residue which does remain on a head of lettuce is on the outside, or "wrapper," leaves which are thrown away after shipping. Thus, an ever increasing margin of safety is constantly applied for the protection of the public.

The Pesticide Residue Laboratory in the Department of Entomology is constantly carrying out studies, such as those illustrated in Figure I and II, in coordination with the insect control experiments conducted by research entomologists under field conditions, to make sure that

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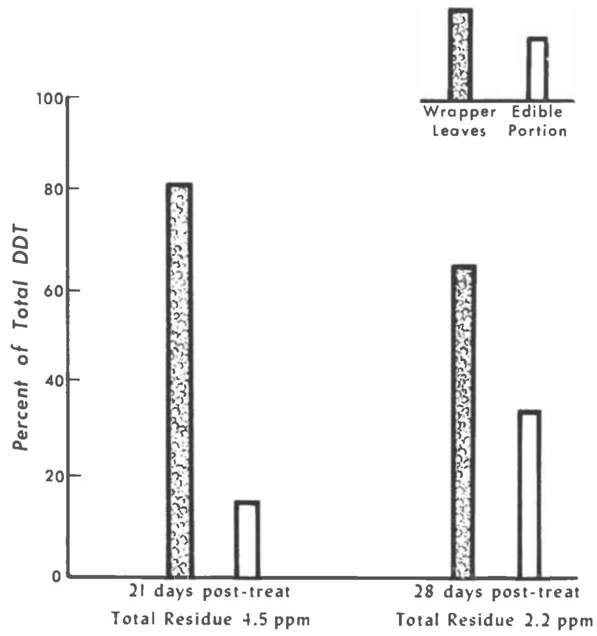

FIGURE II — Distribution of DDT residue within the lettuce head.

University of Arizona insect control recommendations will not result in pesticide residues at harvest higher than the legal tolerances.

It's Nationwide Effort

The work of The University of Arizona laboratory represents a small part of a nationwide effort by entomologists, chemists, public officials, and manufacturers, to make pesticides both useful and safe. The introduction of effective insecticides and the development of safe methods for their use has permitted man to manipulate nature for his own great benefit. Progress has been slow, as each pesticide is carefully studied before being approved and recommended for use, in order that every possibility of adverse side effects may be understood and eliminated.

The quality and quantity of our food have been increased, untold lives have been saved by the eradication or control of disease vectors, and modern living has been made better in many other ways. If man were as carefully protected against all hazards of modern living as he is against the hazards from improper use of pesticides, "the world around us" would surely be almost perfect.

Flood Control on Frye Creek

Frye Creek in Graham County is like an old farm horse most of the year, but when the floods come this old horse kicks up its heels — or did until the Soil Conservation Service fashioned a harness.

That harness is a flood control dam near Thatcher, where flood waters can be held and gradually released into a flowway which carries these waters to the Gila River. Above, a group of foreign visitors to the U. S. stands by the outlet of Frye Creek dam, and at left is the partially-completed channel which carries outlet waters to the Gila River.

Dr. Fred Turner, superintendent of the Safford Branch Experiment Station, part of The University of Arizona's College of Agriculture, took the above picture.

87 Beef Bulls Entered In Test-Gain Trials

The University of Arizona's second annual bull testing program is now going on at the River Road Farm, north of Tucson, where the Arizona Beef Cattle Improvement Station is located.

E. Ray Cowden, first vice-president of the Arizona Cattle Growers' Association, is chairman of the advisory board. Dr. Bruce Taylor of The U of A is in charge of the program.

Eighty-seven bulls in seven different breeds, and from 26 different registered herds throughout Arizona, are on a 130-day test. Four bulls came 10 days earlier to comply with Performance Registry International standards.

There are 60 Herefords, 4 Polled Herefords, 9 Brangus, 6 Santa Gertrudis, 4 Charolais, 2 Angus, and 2 Shorthorn.

The ages of the bulls run from December 1, 1961, to March 31, 1962, and their weight varies from the 408 pound smallest to a 911 pound animal. Herds represented:

Angus Cattle

The University of Arizona, Tucson

Brangus Cattle

Bruce Church Ranches, Inc., Yuma
Empirita Ranch, Benson
Yuma Valley Cattle Company, Yuma

Charbray Cattle

Van Horn Ranch, Ehrenberg

Hereford Herds

Apache Tribal Enterprises, San Carlos
Bar T Bar, Flagstaff
R. F. Burnett & Son, Elfrida
Cowden Livestock Co., Phoenix
Elgin Hereford Ranch, Elgin
Hooper Hereford Ranch, Springerville
I V Bar Ranch, Douglas
Jay Six Ranch, Benson
Las Vegas Ranch, Prescott
Long Meadow Ranch, Prescott
Lucky Draw Hereford Ranch, Snowflake
Merry Meadows Ranch, Tucson
Rancho Sacatal, Dos Cabazas
Smoke Tree Ranch, Kirkland
Swinging H Ranch, Elgin
Heady-Ashburn Ranch, Patagonia
Las Delicias Ranch, Tucson
The University of Arizona, Tucson

Polled Herefords

W Diamond Ranch, Skull Valley

Santa Gertrudis Herds

Ki-He-Kah, Tumacacori
San Cayetano, Tumacacori

Short Horn Herds

Heiden & Son, Buckeye

The test will close Feb. 21. Those bulls will be awarded "diplomas" that gained an average of 2.3 pounds per day for the 130-day period, plus maintaining a required rating.