

## AGRICULTURE

# 'Cides on Every Side

Scientists look for better weapons to use against the insects, weeds, rodents and fungi that destroy crops and endanger both man's health and the health of livestock.

**See Front Cover****By BENITA TALL**

► THE "'CIDES", insecticides, herbicides, rodenticides and fungicides, are here to stay. They have become an important part of everyone's life, including the white collar worker as well as the farmer.

Because of the pesticides, as these chemical compounds are collectively called, millions of human lives have been saved, bigger crops are being grown by fewer farmers on less land, and livestock is more productive.

Many persons are unaware of the use of pesticides, and the problems entailed in their use, until there is an uproar such as the controversial imported fire ant and gypsy moth eradicating campaigns now being conducted by the Federal Government with state cooperation.

Two decisions were made in waging these campaigns. First, for example, in the case of the gypsy moth program, it was decided that the insect could be eradicated rather than controlled. Second, it was decided that DDT spraying of infested areas would be the most effective treatment.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows the gypsy moth caterpillars or larvae as they feed voraciously on tree foliage. As soon as it turns warm in spring the larvae hatch from eggs laid the previous summer.

Neither the fire ant nor the gypsy moth are native to this country. This means there are no widespread natural controls such as predatory insects, diseases or resistant plants. Insecticides become the only weapon if an immediate eradication program is desired.

**War on Pests**

Both decisions have been argued by scientists, conservationists and others concerned in the gypsy moth program. Past eradication programs have been successful, yet some experts doubt if the moth can be completely wiped out.

Others claim that widespread use of DDT in as strong concentrations as are being applied endangers human beings as well as wildlife. Evidence has been presented of mass wildlife killing traceable to the insecticide. However, in the absence of a better way to combat the gypsy moth now, the Government's program continues.

At the same time scientists in both Government and industry continue to add to the pesticide armaments that are so important to the American economy. The controversy has made necessary more, as well as safer and better, insecticides.

A whole new range of pesticides were introduced beginning in the 1940's. Actually the large scale use of DDT—1,1,1-Trichloro-2,2-bis (p-chlorophenyl) ethane—at the time could be considered the beginning of what is today a multimillion dollar chemical industry producing literally thousands of pesticides. From "Aldrin" to "Ziram" there is now a compound to combat many of the pests that cost the American economy \$9,000,000,000 a year.

There are many different ways a pesticide does its work. Some are tailor-made for use on particular crops or against particular insects. Others have a wide range of application.

Generally, the pesticides can be classified on the basis of how they kill. For example, a compound may destroy harmful insects in one of four ways: by putting a poisonous coating on the food on which it feeds (stomach poisons); by direct application of the poison through dusts or sprays (contact poisons); by toxic compounds applied to the soil or plant itself that are taken up by the plant on which the insect feeds; and attractants.

**Chemical Attractant**

This last group, the attractants, are chemical sirens that work by attracting the insect pest to its doom. A desirable characteristic of these insecticides is their specificity: usually there is a particular odor that will attract the one harmful insect, thus reducing danger of poisoning useful insects.

Herbicides have been formulated that are quite selective. Grasses, cereals and related plants, for example, are not injured by applications of the now widely used 2,4-D. Many harmful weeds are killed, however. Other selective herbicides kill only woody plants and brambles. Strange as it may seem, there is a place for non-selective herbicides or compounds that destroy all forms of plant life. Sending men out to weed roadways or railway beds would be extremely expensive and inefficient; an application of sodium arsenate, one non-selective herbicide, to the overgrown land answers the problem.

The agricultural gains traceable to the use of pesticides approach the unbelievable. Milk production showed a marked increase with the appearance of a new insecticide in the mid-1940's. About the same time insecticides for pests affecting tomatoes and snap beans appeared and there was a phenomenal rise, about a 15% increase, in production of both these vegetables.

In terms of human disease, the pesticides have accounted for the gains made against insect-carried diseases such as malaria, typhus fever, trachoma and dysentery. Some

5,000,000 lives have been saved and 100,000,000 illnesses prevented in the United States since 1942, the U. S. Public Health Service estimates, by the use of insecticides.

As recently as 1945 there were 49,966 cases of malaria reported in 14 southern states. In cooperation with the Public Health Service the states began an intensive house spraying program in 1947. By 1948, the number of reported malaria cases had dropped to 9,356. Today the disease is considered "eradicated" in the United States.

Still more diseases, sleeping sickness, dengue and urban yellow fever, are probably subject to control by insecticides, U. S. Public Health experts agree.

Through international agencies such as the World Health Organization, the results of American studies of disease control through insect control are made available to other nations.

With every new use of a pesticide, as well as with every new pesticide, the question of toxicity arises. Chemical compounds powerful enough to kill insects and plants may harm man. This is one phase of the toxicity problem. The other concerns the complex problem of upsetting the delicate balance of nature and of causing possible harm to wildlife.

Much has been done and is being done to safeguard persons against pesticide poisonings.

The pesticide chemical industry estimates that, on the average, toxicity tests of a new compound take two or three years, accounting for almost half of the \$1,500,000 spent in developing just one pesticide chemical. These tests are designed to point out dangers in handling the prospective pesticide, indicate the effectiveness of various formulations, whether powder, spray or grains, and to set limits as to safe residues on food products. In addition, short term and long range tests, both in the laboratory and field, are conducted to discover what biological changes occur in an animal due to the pesticide.

**Two-Way Protection**

The Federal Government protects the individual against the dangers of pesticide poisoning in two ways: through tests and research conducted by the U. S. Department of Agriculture; and by means of standards enforced by the Food and Drug Administration.

In 1954 the Pesticide Chemicals Amendment to the Federal Food, Drug, and Cosmetic Act became law. Under this law, commonly known as the Miller Bill, tolerance levels have been set for many pesticides. Setting these tolerances, the minimum amount of pesticides that may safely appear on or in a food product, means knowing what happens chemically when, for example, a pesticide is exposed to weather-

ing or when two "safe" compounds are applied to one crop or what happens biologically when a cow eats sprayed forage crops.

A good example of the care taken to protect against pesticide poisoning is the minimum tolerance set for milk: zero.

If there is the remotest possibility that a compound could injure human beings, no trace of it is permitted in milk. Recently a zero tolerance was set for methoxychlor and malathion. The establishment of the "no residue" ruling for milk for these widely used compounds focuses attention on a relatively new kind of 'cide: "natural" killers.

### Natural Safe 'Cides

Pyrethrum is perhaps the best known of the botanical insecticides which leave no residue. A plant product, it has been approved for uses where other compounds cannot be used because of the residue danger.

Biological warfare against insects, while still in its infancy, is expected to eliminate effectively specific insects without doing other harm.

Scientists working on this problem have found viruses and other disease-causing organisms such as nematodes that are specific for particular insects. Treatment of crops or protection against insect invasion by means of biological controls is also inexpensive. It costs only a few cents to spray a field or a forest with a water solution containing an insect virus. Already, effective control of some diseases affecting forest trees has been brought about through biological controls.

For the foreseeable future, however, chemistry will continue to provide the compounds that have helped assure a growing food supply, protection against some diseases, and leafy forests.

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### ZOOLOGY

## 700-Legged Millipede Discovered in Panama

► A MILLIPEDE that comes close to really being a "thousand-legs" has been discovered living in a Panama valley.

A grand total of 700 legs keep the animal's wormlike body in action. Its body consists of 175 segments, strung one after the other, each with four legs. Each set of legs can act more or less independently of the others.

H. F. Loomis of Miami, Fla., an expert on millipedes, discovered the new species while investigating this class of invertebrates at Barro Colorado Island, the Smithsonian Institution's tropical-life preserve in the Panama Canal Zone.

He also found more specimens of a new family of millipedes, one with only 20 segments and 80 legs, that are capable of rolling themselves into very tight and very small balls.

Millipedes, Mr. Loomis says, are different from centipedes in many ways other than their number of legs. While centipedes feed on small insects and lower forms of animal life, millipedes are vegetarians.

Their favorite food is decaying vegetable matter and they are sometimes found living under rotting logs.

Even though the millipede is probably one of the least aggressive animals, Mr. Loomis warns that some species are poisonous. There seems to be a poison gland in most segments of these millipedes. They are able to coordinate the glands' action, sending out a spray of a highly caustic substance. Mr. Loomis reports being temporarily blinded in one eye, and part of his face temporarily paralyzed, when he "got in the way" of this poison spray.

The newly discovered millipede has the second largest number of legs yet known. Some years ago, Mr. Loomis discovered an American species with 190 four-legged segments, more than 750 legs.

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### MEDICINE

## Alcoholics Classify Selves Into Different Types

► ALCOHOLICS classify themselves into two groups: the solitary or the sociable drinking alcoholic.

The solitary drinker recognizes himself as such and prefers complete solitude in which to engage in drinking.

The sociable drinking alcoholic, on the other hand, feels uncomfortable alone, both when sober or drunk, and will go to extremes to find at least one person to drink with him. He prefers, however, to do his drinking with a crowd of friends.

This is revealed by a study of 245 white male alcoholics made by Dr. Joan K. Jackson of the University of Washington School of Medicine and the Firland Sanatorium, Seattle.

The study also showed the following characteristics of alcoholics:

1. Sociable alcoholics had been heavy drinkers for a median of 17.5 years, while the median for solitary alcoholics was only 15.3 years.

2. The solitary alcoholic experienced anxiety about having enough to drink, gulping drinks and needing more alcohol to get the same effect, more frequently than the sociable alcoholic. The solitary alcoholics seem more anxious about morning drinking and protecting the supply of alcohol than do the sociable alcoholics.

3. The solitary exceeded the sociable alcoholics in justifying their neglect of family responsibilities, feeling that others should show them more consideration and suspecting that others felt pity or contempt for them.

4. More solitary than sociable alcoholics came from the middle class. The pattern of all-male drinking in bars tends to be most characteristic of lower class groups. The middle class emphasis on respectability, self-control and achievement may influence the solitary alcoholic to withdraw from social participation when drinking.

The common belief that periodic alcoholics will eventually become steady alcoholics was not substantiated by this study, Dr. Jackson reports in the *Quarterly Journal of Studies on Alcohol* (June).

Science News Letter, July 19, 1958

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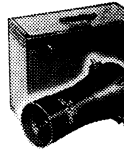


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