

Fungicide Research Needed on Fundamental Basis

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AMERICAN AGRICULTURE is using about a half billion pounds of fungicides this year. Sulfur, lime sulfur, and copper compounds remain as the leading materials but the new organic compounds are gradually encroaching on the markets. More diseases are controlled better with less damage to the crop or hazard to the spray operator and consumer than ever before.

We have taken a conservative attitude by assuming that no more than half of plant disease loss can be controlled. However, if the time comes when we have therapeutic treatments rather than the 1950 model surface protectants, this viewpoint may be outmoded.

Today most fungicides are used as surface protective agents which must be repeated as new foliage develops and weathering proceeds. Better protection would be afforded by fungicides which would be absorbed through roots or leaves.

There is good evidence that bacterial diseases which have gone their way unhampered by chemicals for many years are going to be controlled. The bacterial blights of bean and fireblight of apple and pear have responded to treatment with streptomycin and terramycin. Now that antibiotics people have begun to open up leads, there is good reason to believe that the organic chemist may do as well or better in the synthetic field.

The great weakness in the present research program is that chemists and biologists do not know exactly how fungicides act. The only way to correct this is to study basic principles. Three types of studies are needed: the effect of chemical constitution on fungicidal action, the methods by which spores are penetrated, and the mechanism by which vital processes are destroyed.

Formulation, too, is very important and more basic knowledge is needed on the basic factors influencing the efficacy of formulations. We may be trying to exploit the most fungitoxic members of a class when what we should be doing is developing the most stable persistent molecule even though it may be somewhat less active as a fungicide.

It should be remembered that the farmer is buying protection and nothing else. It would be profitable to sacrifice

20% in toxicity, for example, if the material persisted twice as well so that the spray deposit would have to be renewed only half as often.

Fungicide research is coming of age. It is not easy to pick the right molecule and formulate it so that it will prevent disease establishment. It is even more difficult to write out the specifications so the new molecules can be synthesized for testing. Look at the requirements:

1. The choice of a basic nucleus which is relatively inexpensive to synthesize. This nucleus should be chemically reactive in its own right as in the quinones or else be capable of bearing reactive grouping such as the 4-nitroso group of the pyrazoles.

2. The toxophore grouping must be exposed so it will react with a vitally important cell constituent such as the enzymes.

3. The toxophore must be protected from excessive detoxification by cell secretions by proper substituents which regulate electron density, etc.

4. The group must be capable of penetrating the fungus spore. It may be necessary to add a lipid-solubilizing group as a strategically located substituent.

5. The lipid-solubilizing group must be selected carefully so it will not promote excessive penetration of foliage and fruit.

6. The molecule must be photostable and otherwise persistent through all sorts of weather conditions.

7. The chemical must be formulated according to its chemical attributes so it may be deposited in an economical and enduring film.

The fundamental knowledge of how fungicides act must be obtained if the industrial research man is to be used efficiently. If such fundamentals are not available and development work continues by empirical testing, the program will eventually become unprofitable as standards of performance in fungicides increase and added expenses such as extensive toxicological research are added to the cost of development. The price of conducting such fundamental research will be paid either in an orderly, planned program or in eventual inefficiency as present methods become outmoded. It is easy to find a chemical that will inhibit spore germination in the laboratory, but it is not easy to find one that will prevent disease without injuring crops. If it were easy there would be more new fungicides on the market. There is plenty of need for them and the rewards are enticing, but industry must plan beyond its immediate future if it is to realize its potentials.

FDA Interested in Allaying Public Fears

THE ONE MATTER of the most significant mutual interest to the Na-

tional Agricultural Chemicals Association and the Food and Drug Administration appears to be whether or not there should be legislation to afford better protection to the public health through the establishment of tolerances for pesticide residues on food. We agree that pesticides are essential to the continued production of abundant food crops for the American people.

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There is every reason to believe that the need for more effective pesticides will continue to increase. The constantly changing problems of production brought about by insects and plant diseases leave no doubt that more and better pesticides are essential to our basic economy if it is to be preserved and improved.

There are many areas of agreement between us. Certainly the pesticides used most not endanger the health of consumers. The agricultural chemicals industry, we are informed, is interested in allaying such public fear of pesticide residues as unquestionably does now exist. The Food and Drug Administration is also interested in this problem. For so long as the public or any important segment of it entertains serious reservations about the safety of our food, it at the same time must question the effectiveness of our operations.

One problem which presented itself in the early consideration of legislation was the question of whether or not all chemical additives should be lumped together and dealt with in the same bill. We have become convinced that separate treatment is justified for pesticides as distinguished from other types of food additives.

Chemical additives are not subject to control under the Federal Economic Poisons Act, whereas pesticides are. Obviously the two acts should be coordinated.

One guiding principle which permeates the Food, Drug, and Cosmetic Act of 1938, and which we believe is of the utmost importance in the public interest, is that poisonous substances should not be added to our food supply, in any amounts unless the substances are necessary for production of food.

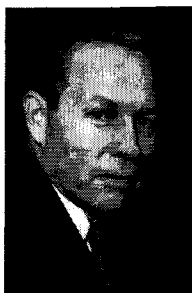
In our discussions with representatives of the pesticide industry they have expressed the view point that scientific advisory committees are an essential part of sound legislation dealing with pesti-

cides. Such committees, from the National Research Council for example, have been of great value in some of our most difficult problems. We have had no part in choosing the membership of these committees. They have been selected by the NRC, but our administrative actions have repeatedly been guided by their scientific conclusions. We believe that an independent scientific group is better for this advisory work, than a scientific arbitration committee.

Research Needed to Reduce Unit Costs

J. Earl Coke

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MANY OF US in the Department of Agriculture are giving much thought these days to developing an improved farm program. Secretary Benson has asked the farm people for their opinions on the question.

This does not mean that we are scrapping existing farm programs. But there are some programs which need to be altered or eliminated to do the job for which they were intended. There are three basic long range needs of American agriculture: to reduce costs of farm operations and farm products, to improve the quality of the farm products, and to expand agricultural markets at home and overseas. The only sound approach to these problems is thorough research and education. Secretary Benson has stated: "Inefficiency should not be subsidized in agriculture or in any other segment of our economy."

Sometimes people ask if we need to expand research when we already have surpluses in several commodities. My answer is yes. We want to give farmers all the help we can to help them produce efficiently. This is the surest way to cut the costs of production.

In less than one generation agricultural chemicals have become a vital production necessity on American farms. In looking ahead to the next 20 years, our greatest concern should be that we have enough foods, fibers, and other farm products.

Every new product that helps to reduce the heavy toll of insects or pushes back the weeds or brush which threaten to take over millions of acres of cropland is a major contribution to meet the challenge of the next 20 years. A population of close to 200 million will make it imperative that we increase efficiency in

production and take better care of what we produce.

Safety Is Basic Consideration

R. O. White

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ONE OF THE PURPOSES of the Federal Insecticide, Fungicide, and Rodenticide Act is the protection of the public through sound labeling requirements. Fundamentally the law requires that a product should be labeled so that the user will know what he is using and how to use it safely and effectively.

Safety to man and useful animals is the basic consideration in the use of pesticides. The data required to evaluate a chemical from the standpoint of safety will vary with the end use of the product. There are three general categories of such end use: field or garden use on nonfood crops, household or interior use, use on food crops.

In the first two categories the primary evaluation is operator hazard. This involves determining of degree of danger from skin absorption and inhalation.

Poisons to be used on food crops are also subject to stringent examination for the protection of the user, and in addition must be checked for possible detrimental effects if residues are left on the food.

Closely related to the subject of hazards involved in the use of pesticides is the problem of adequate precautionary labeling. This matter is complicated for such labeling must be clear brief, and yet informative enough to guard the ultimate user. In considering labeling the ultimate user must be kept in mind. From a regulatory standpoint we must recognize that the unrestricted distribution of a product will probably place it in the hands of those quite unfamiliar with chemicals and the hazards of their use. Precautionary labeling must be aimed at advising this group.

Another problem which has developed rather rapidly since last Spring has been that of insecticide-fertilizer mixtures. The addition of the insecticide makes the product subject to registration and other provisions of the Federal Economic Poisons Act. The labeling requirements for these mixtures are, in general, the same as for other economic poisons.

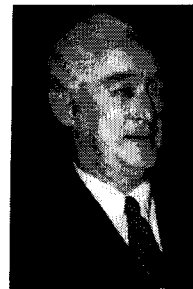
Regulations for the re-registration of pesticides at the end of the initial five-year period were published last December. The process of re-registration has begun and it appears to be progressing

without any major difficulties. There is one point which might be emphasized. If a product has been discontinued from manufacture, but if there are stocks on hand which might enter into interstate commerce, the registration of that product should be continued as long as there is any chance of the interstate movement.

Trade Association Excellent Example of Cooperation

Joseph F. Battley

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MANY of our national trade associations are excellent examples of the cooperative efforts which are characteristic of so many segments of American life. They not only promote the best interests of an industry through better understanding of mutual problems among the members of that industry, but they also demonstrate how industries, through their trade associations, can cooperate with government agencies for the welfare of both.

Your association and the National Paint, Varnish, and Lacquer Association have common objectives: the promotion of the best interests of its members by creating favorable public acceptance, protection against unfair or discriminatory governmental action, maintenance of standards of products and ethics, and the expansion of markets.

The National Paint, Varnish, and Lacquer Association has what is considered by public relations experts a well-balanced and effective public information program embracing publicity, promotion, and public relations. We are now conducting a comprehensive program to educate users of paints in the problems caused by excessive moisture in homes. For this, we have prepared two traveling exhibits for showing at state fairs, home shows, and other large meetings throughout the country. A slide presentation has also been prepared for showing before builders, financial groups, and others in the industry. In addition, we have a color motion picture and two booklets on this subject.

In routine activities, the public information division works through many different channels, providing a short-item or filler service and "how to" information for householders. Material is especially prepared for specific audiences, for schools and colleges, extension workers, and women's clubs.