

opportunity for future expansion if we proceed on a sound economic basis.

Supplementing these broad types of problems, we have a new administration in Washington and the policies set by some of the Washington agencies will have a definite effect upon the industry. A close awareness of their views is essential for successful industry operation.

I want to make five recommendations which I believe must be put in effect and effectively carried out before the industry can get into a healthy position. Most certainly, it would take one to two years to arrive at such a situation, but without a cooperative program no improvement can be anticipated for even a longer period. These recommendations are:

1. A reasonable expansion of our publicity and information program to inform the public of the facts pertaining to pesticide hazards to minimize legislative proposals and, where such legislation is necessary and in the public interest, to maintain it on a practical basis.

2. A modest expansion of our information program for the purpose of assembling data on the economic importance to the grower of pesticides. This should be by crops and growing areas, and to expand present markets and promote new uses, such as protection of stored grain, grassland programs, forest pests, herbicides, etc.

3. A program for the improvement of the quality of our materials and the possible establishment of standards (not standardization), with particular reference to physical characteristics, analytical methods, maintenance of quality in storage, etc.

4. The development of a cooperative promotional program in the world markets to publicize American pesticides, with approved standards and provisions for an industry seal of approval. This must be done to meet similar certification by some of the foreign countries.

5. A study of the economic factors pertaining to the industry, which would include, time of purchase, warehouse and storage customs, credits, etc. Finally, and perhaps the most important of all, the association needs the guidance and help of those in top management who determine company policies.

Fertilizer Industry's Educational Program Explained

IN VIEW OF THE CLOSE PARALLEL between farm income and fertilizer sales, the clouds that appeared on the agricultural horizon a year and a half ago told us we were heading into critical times and that we had better devote our best efforts to doing something about it. This would be true in any time of farm trouble, but the impending supply situa-

Table I. Results of Trials on Crosby, Light Colored Silt Loam on a Corn, Soybean, Wheat, Hay^a Rotation

	Average Crop Yields		
	Corn '43-48	Soybeans '42-48	Wheat '43-47
(1) No fertilizer	47.0 bu.	21.0 bu.	11.7 bu.
(2) 200 pounds of 0-12-12 on corn 400 pounds of 0-12-12 on wheat	70.6	20.7	20.1
(3) Double amount of 0-12-12 on corn and wheat as (2), plus 96 pounds N on corn, 30 on wheat	90.9	23.3	28.5

^a Fertilization increased hay yields about a half ton per acre with very little difference for various treatments.

Table II. The Financial Returns^a from Fertilizer Application in the Complete Rotation

Fertilizer Cost	Total Production & Harvesting Cost	Yield in Dollars	Net Profit	Profit as % of Profit on Check	Return per \$ Spent on Fertilizer
0	\$123.18	\$191.22	\$ 68.04
\$12.90	136.08	269.04	132.96	195%	\$5.12
45.30	168.48	339.71	171.23	251%	3.28

^a Figures from Indiana Agricultural Experiment Station. The costs and yields are from four acres, one each in corn, soybeans, wheat, and hay.

tion intensified the problem. The fertilizer industry was and is in the midst of the greatest expansion program in its history. Some \$600 million in new capital is being invested to expand the output of plant nutrients by 70 to 80% between 1950 and 1955.

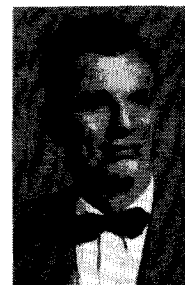
In formulating a program to meet this situation we kept in mind three facts: if farmers used the amounts and kinds of fertilizers recommended by experiment stations, even the expanded production capacity would be insufficient to meet needs; financial rewards for the individual farmer are so great that no farmer who understands them will fail to use enough fertilizer if he is able to make the purchase; and there are thousands and thousands of citizens interested in promoting fertilizers as a part of a sound farming program, with whom we should work.

What we set out to do was to interpret scientific data into dollars-and-cents business terms. We wanted to help show the farmer what proper fertilizer use would mean in terms of net profit per acre and cost of production per ton, per bale, per pound, or per bushel; to show what fertilizers could mean to the farmer in a declining farm market.

An example of the type of information we are collecting and disseminating is in Table I, which shows fertilizer use on a long time rotation experiment conducted by Purdue University. It is not very impressive—looks as though a great deal of fertilizer was used to produce the increase. But when these same data are presented in dollars-and-cents terms, which was done by George Enfield of Purdue, the results are impressive (Table II). Profits go up to 251% of those on the unfertilized field. What is

W. R. Allstetter

Vice President
National Fertilizer
Association
Washington, D. C.



more important, if agricultural prices fell to 60% of their present level, these fields on which fertilizer was used would show a net profit, while those without fertilizer would show a net loss.

We have tried to emphasize that fertilizer alone won't bring the high yields that cut unit costs and raise profits—good seed, weed control, insect control, and other good farming practices are also necessary.

How has this information been disseminated? First through the colleges, county agents, and vocational agricultural teachers. The agricultural press has always liked authoritative dollars-and-cents stories, and our information, as well as similar information from other sources, has been featured by them.

Through the *National Fertilizer Review*, we have plugged this idea to some 40,000 agricultural leaders. Special publications have been distributed to banks, agricultural workers, fertilizer salesmen, and others. Our story has been presented at most of the annual state fertilizer conferences. A film, "Cash In On Corn," has spread the doctrine with over 200 copies in circulation. Fertilizer companies have incorporated our materials into their own sales programs.

In all this we have departed somewhat from what some consider to be the conventional advertising technique. We have avoided exaggeration. We have tried to limit our claims not only to what can be scientifically demonstrated, but further, to what we think will be acceptable to the thinking agricultural leaders of the area in which we are working.

Has this sold more fertilizers? We think so—a lot more. We think it has sold fertilizers on the soundest possible basis—through benefiting our customers. It is the settled policy of NFA that this program will be continued and intensified.

Fertilizer-Insecticide Mixtures Reduce Application Costs

M. D. Farrar

Dean of Agriculture
Clemson Agricultural
College
Clemson, S. C.



IT IS PHYSIOLOGICALLY necessary for the plant to develop an extensive feeding area for its roots in order to find food and water for the above-ground parts. Insects can destroy the roots of plants either mechanically or by using the roots as food. In either case the damage that they cause will limit the plant development. Insects that have adopted certain crops as their preferred host may so seriously injure the plants as to make the growth of the crop unprofitable.

Use of fertilizers has become a standard practice in most farm operations. Machines are available to apply fertilizer in almost every desirable manner. It is then almost a logical assumption that if something is to be applied to the soil, why not follow the procedures used for fertilizers. The bulk of fertilizers applied per acre is rather large. Relatively simple fertilizer machines are in common use. The amount of pesticide required per acre is relatively small, and essentially no satisfactory machines are available for distributing pesticides. Where insecticides and fertilizers can be applied together, a single operation may do the job. Where fertilizer-pesticide mixtures are broadcast and worked into the soil by machines, they are extremely satisfactory.

Already vast areas of farmlands have been rid of certain pests by the treatment of their soils with pesticides. In some states the bulk of materials has been applied as fertilizer-pesticide mixtures.

Granular insecticides now available provide a medium of purchase whereby a

farmer can buy a pesticide under a label. Purchasing the pesticide in this manner assures a full value, as compared to an item of uncertainty where the pesticide is mixed with the fertilizers. The problem of labeling and testing fertilizer-pesticide mixtures is confusing. There are many ways of handling the problem. None is completely satisfactory.

The procedure for uniformly mixing a small volume of pesticide with a large volume of fertilizer has not been satisfactorily established. Routine sampling of mixtures would indicate that formulators will have to improve their processes for mixing. Data to date has shown a very variable analysis which would indicate a poor mixture of the fertilizer and the insecticide. Since the amount of insecticide is so small, a premix of the insecticide will probably be necessary in order to develop a uniform product.

The present methods appear to be satisfactory when based on results on the farm. Most producers have been well satisfied with results obtained following the use of fertilizer-pesticide mixtures. "Control wise," however, much work needs to be done in order to ensure a uniform product that will be satisfactory to both the manufacturer and the producer.

Technical Problems Can Be Worked Out

E. P. Ordas

Head, Product
Development Division
Velsicol Corp.
Chicago, Ill.



THE INVESTIGATION OF CROP RESIDUES and the persistence of the pesticide in the soil are chemical and biological problems requiring the development of analytical techniques of extreme sensitivity and accuracy. Even with one given insecticide, the development of an analytical procedure for soil residues requires almost as many different procedures as there are soil types. Similarly, different analytical techniques must be developed for the analysis of pesticide residues in different crops.

Residues in the soil have been of considerable concern from two particular points of view: The question of whether repeated applications will result in a gradual build-up to harmful levels and the economic question of how long the pesticide will persist in the soil to give control before retreatment is necessary. Controlled experiments show that insecticides applied for soil infestations gradually but definitely decrease in content

in the soil even though insect control is still obtained. The inference from these experiments is that once infestation is under control, there is less probability of reinfestation.

In almost all cases, pesticides are used at a low concentration when combined with fertilizer. A typical formulation which is to contain 0.5% pesticide is preferably prepared by blending in a premix 10% pesticide concentrate amounting to 5% of the total. In this case, sufficient time must be allowed for practical and uniform distribution of all ingredients. Depending upon efficiency of the equipment and assuming a ribbon-type of blender is used the blending cycle has been stated to require from 10 to 20 minutes. Because of the possibility of small particles of dry powder segregating themselves from the bulk of the fertilizer during storage, care must be exercised in the choice of form of insecticides to be used. Rigid control of the mixing and blending operation must be maintained and it is desirable that each lot be chemically analyzed to assure uniform distribution.

Since most of the insecticides used with fertilizers for the control of soil insects are of the chlorinated hydrocarbon types, it must not be assumed that merel analyzing for organically bound chlorine is adequate. Because of the rather high percentage of inorganic chlorides in fertilizer, it is advisable to extract the insecticide from the mixture with techniques suitable to the insecticide in question.

Fertilizer-pesticide mixtures have been demonstrated to be entirely practical and economical. Yet, there still is reluctance on the part of some authorities to recognize or sanction their use. This is certainly understandable since there are specific questions which do arise. We should, however, recognize the advantages and consider possible disadvantages, if any, with regard to their order of significance so that a most effective yet economical product can be made available to the grower.

Mixtures Effective And Economical

C. C. Compton

Julius Hyman & Co.
Division
Shell Chemical Corp.
Denver, Colo.



FERTILIZERS have been applied to soils for many years. We know that many insects exert their destructive action at the roots of plants. Then it seems