Better Crops with PLANT FOOD

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Science Has Produced . . .

Formula Farming

Jeff McDermid

IT'S a consolation to me that some others know more about chemistry than the rest of us, and that they applied their cabalistic formulas finally to the problems and pests of agriculture. Otherwise, we would still be slapping beetles off potato vines with a lath, collecting houseflies on sticky paper, and painting the crevices of a bed with kerosene. And were it not for the Bunsen burner boys with the dichlorophenoxyacetic vocabulary, the No. 1 man in the whole picture —the farmer—would have some things far more dismal to fret over than floods, drought, sheep-killing dogs, and the parity level.

Agriculture is outdoing the mystery that enthralled the readers of the Arabian Nights. Once they believed in the art of the alchemist and talked of "phlogiston" in connection with scientific crop production and soil management. But today it's nothing less than the same old genii in the form of genius, rubbing up some complex compounds to give all farmers the potent powers of Aladdin with his wand-waving "presto changeo" and "abracadabra."

Few but the highly trained college farmers begin to pretend they understand it. The erudite editors of farm publications are themselves in general but poorly prepared to call forth these chemical wonder-workers and explain their action. Every spring they draft experts in entomology, plant pathology, chemistry, and agronomy to recommend what farmers should use out of the ever-growing lists of laboratory concoctions.

This spring is no exception. Here a Midwest extension bug fighter has his say-so in a recent farm journal. He began with a brief review of what the experts call "chlorinated hydrocarbons"

that contain both old and new insecticides.

Beginning with the old favorite, first of the modern insect destroyers—DDT, he lists chlordane, BHC and lindane, toxaphene, methoxychlor. These are the steady performers, the compounds that seem to have established their places. Along with these, he names others that are somewhat newer, such as aldrin, endrin, dieldrin, and heptachlor.

New uses for many of these chemicals are recounted also, such as for seed treatment against maggots and other boring insects, and for widespread control of numerous soil-borne bugs. In another fascinating group the writer gives farmers the low-down on some of the most powerful and toxic organic phosphates. Sometimes they are absorbed by plants and taken into the tissues and carried there in enough strength to kill sucking insects which nibble and gnaw on the growing vegetation.

SUCH organics are known, he says as systemic poisons. Mostly their use is on cotton and ornamentals. At least two of them, he advises, are used on vegetables to control aphids and mites—Schradan and Systox. Malathion with low poisonous effect on man and animals is a bitter foe of flies, scale, and caterpillars. Diazinon, he says, is more poisonous to man but great guns to stop flies and it lasts several times longer than others in its class. He reviews field tests with two other such compounds newly introduced, but not yet offered to farmers in any amount. These are chlorthion and pyrazion. Quite a difference, is it not, from our old-time main reliance upon paris green, which we slopped on with an old rusty watering pot or a stiff brush and a 10-quart bucket?

Then we page Mr. Fungicide Foiler, who tells how bordeaux mixture and lime-sulfur are back numbers now since 1941 when the original antibiotic, penicillin, was isolated from a certain fungus. Antibiotics, too, seem to act as a systemic disease fighter inside of the plant to which they are fed. The best progress made recently in checking plant diseases with these drugs is the discovery that a few microorganisms produce antibiotics that can kill or limit the action of fungous diseases. All of the main ones longest used act as bacteria barriers instead of being valuable against fungi. Some of the most promising of these battlers that seem to lick fungi and viruses are known as "helixin," "toximycin," "antimycin," and "thiolution."

To make these tough babies even worse enemies of the plant disease family, they add certain plant growth regulators such as 'indoleacetic acid." Then we often hear seasonal discussions in the field of cotton defoliation as an aid to the maturity and harvesting ease of the crop in the South. These include such technical names as "calcium cyanamide" and "amino triazol." Besides, the whole field of weed eradication has been invaded by chemical control methods with a language all its own—making the old-time terms almost as archaic as the hoe.

ALL this means far greater security against the old foes and pests we could never quite conquer or subdue. It also means a heap of queer and dizzy scientific words that only the expert and the manufacturers are able to roll off their tongues and keep them separate and well behaved. Your county agents will back me up when I say that chemicals for crop protection and livestock sanitation, and for home and stable application, are now just as important to farming as the plow, the combine, and the electric power line.

The general public doesn't realize the great role that the chemist and his technology play in getting better quality into farm products and to some extent saving labor and time. You see the combine and the power plows and all the other mechanical accoutrements with which the farmer multiplies his

individual efforts. But the decisive action of detergents, adhesives, weed killers, plant hormones, trace elements, and antibiotics are very little in evidence by comparison to the bulky and noisy machines so indispensable to agriculture today.

Few know that the discovery and application of chemical methods and substances in all the specialized fields of farming and stock raising have actually spread much faster than the introduction and adoption of improved machinery. We have had mechanical marvels and gadgets to speed the plow and lift the burden from routine farming for over half a century. But the

actual chemical era in agriculture has dawned and risen to its present unique place within the span of 20 years or less. Figures have been cited by authorities to convince us that this is true.

Taking the 1935-36 period as 100, the situation in 1950 indicated that while all manufactured products stood at 210, and general chemical products at 265, the position of chemicals made for industry and agriculture zoomed up to 455. By this time no doubt the upward stretch has sent these applied chemicals for farm and factory beyond the 500 index.

The oldest of human arts and professions is going through a revolutionary change by reason of the new chemistry it is fast absorbing into its everyday life. The times ahead are ripe with promise of food and fiber in plentiful supply, but it may carry with it some grave problems of a social and economic kind for which we must be well prepared.

About the time that our farm friends in the East decided that eternally pushing their way westward to fresh lands was at an end, it became clear that new frontiers in skill and improved methods was destined to replace the wanderlust and speculation of the prairie schooner days. So presently we saw the establishment of our system of agricultural trial and error centered in the experiment stations.

THIS soon led to the birth of agricultural chemistry. Looking back, we recall that the first achievements credited to agricultural chemistry related to plants, soils, and artificial fertilizers. We all remember how few of our neighbors were originally willing to lay aside the manure fork to invest in plant foods coming to them in bags. But some of them used commercial mineral plant foods even at the turn of the century, possibly, if the records are straight, about fifty million dollars' worth of it. By 1950, farmers were investing as much as 900 million dollars a year for chemical menus for hungry plants on unbalanced soils.

Every year the fear that we will run short of fertilizer is quickly dispelled by authorities who hasten to reassure anxious farmers about new production units and more potent formulas. Telling a farmer these days that he ought to use fertilizer chemicals is like advising a baker he ought to use flour.

So up until about 15 years ago, agricultural research was centered mostly on aiding the physiological processes in plants and animals in the ordinary, routine ways with fertilizers for soils and better feeds for livestock. In doing this, use was made of materials already at hand. New synthetic combinations were unknown. That is to say, the scientists of the recent past went a good step further. They used some imagination, after bumping headlong into some results in the laboratory and the test plots that did not square up with ordinary chemical experiences.

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