THE HISTORY AND USE OF AGRICULTURAL CHEMICALS

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The first question that would probably be asked is: What are agricultural chemicals? Let me explain:

1. *Insecticides*: The type of agricultural chemical most familiar and probably the most important. It is used, of course, to control injurious insects affecting plants, animals, and man.

2. *Fungicides*: Probably the second most important type of agricultural chemical, though the Plant Pathologists might disagree. It is used to control or prevent diseases that attack plants.

3. *Herbicides*: Used to control noxious and unwanted vegetation.

4. *Rodenticides*: Used to control rodent populations.

5. *Antibiotics*: A rather new development by comparison, used to control plant diseases caused by fungi and bacteria.

6. *Plant regulators*: Used to make plants grow faster or slower according to the desires of man. Accelerates, retards, or otherwise alters the behavior of plants.

7. *Defoliants*: Used to make plants shed their leaves to facilitate maturing and harvesting.

8. *Desiccants*: Chemicals which artificially speed drying of plant tissue to make harvesting easier.

Some of the agricultural chemicals used today have been used by farmers for nearly 100 years. All of them are used to reduce losses caused by pests and to produce insect and worm-free foods for our tables. In recent years some of these chemicals have come into wide use by the public and by health officials. They are used to eradicate or control pests which spread diseases to all species of warm blooded animals, thus saving probably millions of lives and billions of dollars caused by the ravages of these pests.

In these days of plenty, we find it very difficult to remember that our forefathers often suffered famine and death caused by pests. The Bible mentions many injurious pests, from mildew to locusts, and gives dramatic accounts of the wasted fields and lost harvests they caused. The only tools man had at his command then were magic spells, waving fans, and flails wielded by weary slaves. These were little more than feeble human protests against the overwhelming number of these pests.

When the first white men came to North America they found a race of rather primitive men living in reasonable harmony with a relatively stable environment. Under these conditions, this continent supported a population of about one million persons and provided in excess of 2000 acres per capita. Then as now, many species of insects attacked every crop that grew and neither man nor beast escaped their ravages.

In the years that followed, with agriculture on a subsistence basis and a seemingly endless supply of land available, there was plenty for all, and

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1 Presidential address (1962) read at the 46th Annual Meeting of the Florida Entomological Society.
farmers raised only feeble objections to share-cropping with the pests. Later as the urban populations increased, each individual farmer was called upon to meet the food and fiber requirements of an ever-increasing number of individuals. This he had to do on a decreasing number of acres per capita. This trend has continued until today we have only ten acres or less per person, six or seven of these acres are classified as farm land but only about two are devoted to crop production.

For the first two hundred years, although complaining bitterly at times, farmers generally had little choice but to rely upon nature to control their insect enemies. Then as losses mounted and standards of perfection demanded by an increasingly more discriminating consuming public rose, the farmers began to clamor for governmental aid and scientific guidance in the solution of their insect control problems.

As recently as some fifty years ago, one farmer had to produce only enough food and fiber for himself and four others whereas today he has to produce enough for himself and twenty-seven others. The consumers have become even more discriminating today than ever before. The demand that all food products be free from all types of pest damages has placed a heavy responsibility and burden on the present day farmer.

The early state and federal entomologists were essentially naturalists, and they preached the gospel of biological and cultural insect control methods. For years these measures dominated all entomological endeavor because these officials had no other means of control, but when these methods proved inadequate, they turned to chemicals which showed promise. Thus we entered the age of chemical insect control.

The large-scale practical use of insecticides is one of the important technological developments of the 20th century. While it is true numerous materials such as lye, lime, turpentine, soap and fish oil, to name a few, were used as insecticides prior to the year 1800, the really effective use of agricultural insecticides had its origin with the first use of Paris green to control the Colorado potato beetle in 1867. As the uses for Paris green were expanded to include the control of the codling moth, cankerworms, cotton leafworms, and many other leaf-feeding species, insecticide usage increased rapidly.

The success of Paris green naturally led to the testing and study of many related arsenical compounds, some of which possessed characteristics that were highly advantageous for certain specific uses. Lead arsenate was tested quite extensively and intensively in the 1890's but did not come into commercial use until after the turn of the century. Calcium arsenate became popular for control of the Colorado potato beetle in 1912 and for cotton boll weevil control in 1919. Cryolite and related fluorine compounds; pyrethrum, rotenone, nicotine, petroleum oils, tars, cresols, and many lesser products became popular insecticides in the 1920's and '30's.

With the advent of DDT for agricultural use in 1945 and the large array of chlorinated hydrocarbon and organophosphate insecticides that followed in rapid succession, many of the older materials suffered a rapid decline in popularity, and they were almost entirely replaced by the more effective synthetic organic insecticides. As the entomologists and chemists, working hand in hand, produced and placed in the hands of the people who needed to use them, such as farmers, nurserymen, public health officials, conversationists, and home gardeners, new pesticides such as DDT and hun-
dreds of other new chemicals possessing heretofore unknown pesticidal qualities, a number of competent scientists expressed concern because they feared the widespread use of these materials might create a public health problem. Immediately a number of publicity seekers and misguided individuals seized upon the idea that the public was being poisoned, and the whole country was deluged with an amazing flood of scare stories. Then, as the general public began to show some concern, and as charges and counter-charges were hurled back and forth in several places, the scientists settled down to a detailed analysis and factual study of the problem. The public health aspects of the problem were reviewed by several prominent scientific bodies, notably the World Health Organization, the U. S. Public Health Service, and the Food Protection Committee of the National Research Council. The general conclusions drawn in each instance were: (1) the large scale usage of pesticides in the manner recommended by the manufacturer or competent authorities and consistent with the rules and regulations under existing laws could not be inconsistent with sound public health programs and (2) although the careless or unauthorized use of pesticidal chemicals might pose potential hazards requiring further consideration and study, there was no cause for alarm.

I would like to conclude these few remarks by quoting a few excerpts or statements from some prominent scientists and learned societies:

1. “If all the food in the world—including surplus stores were distributed equally and each person received identical quantities, we would all be malnourished. If the entire world were fed on our level (United States), all available food would be only enough to feed less than half the Human Race.” Dr. George Borgstrom, Dept. of Food Science, Michigan State University.

2. “It seems evident that the American people cannot be fed adequately unless crops and livestock are protected from insects and other pests.” Pesticides Subcommittee, National Academy of Sciences.


4. “During years of investigation, it has been impossible to confirm the allegation that insecticides, when properly used, are the cause of any disease, either of man or animals.” Dr. Wayland J. Hayes, Jr., Public Health Service, U. S. Dept. of Health, Education and Welfare.

5. “Too my knowledge not one death (excluding accidental deaths) or serious illness has been caused among the people exposed to the insecticide (DDT) in connection with the control of insects. I estimate that no less than 5 million lives have been saved; no less than 100 million illnesses have been prevented, through the use of DDT for controlling malaria, typhus, dysentery and many other diseases.” E. F. Knipling, A.R.S., U.S.D.A.

6. “Industry, government and non-profit institutions have labored to create these chemical tools, and to research, develop, test, and establish safety standards for them. Nevertheless, like other tools of our civilization, they are susceptible to misuse and abuse which can result in destruction to crops, harm to humans, and pollution of our environment. But instances of such misuse and abuse must not be allowed to obscure the fact that these tools are vital to the health and even the survival of humanity.” Manufacturing Chemists Association, Inc.

In closing I would like to remind everyone that practically all insecticides are poisons and should be treated as such. STOP!! Read the label before using.