

Selective Weed Killers

synthetic compounds important development in agriculture

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SYNTHETIC SELECTIVE WEED KILLERS chiefly 2,4-D—2,4-dichlorophenoxyacetic acid—are the most important selective herbicides developed in the history of agriculture.

Their discovery stimulated research along fundamental lines and encouraged the belief that synthetic substances may be found which will meet many different specific situations, involving various combinations of crop plants and the unwanted weeds.

Witness the recent development of isopropyl phenyl carbamate, phenyl mercuric acetate, and salts of trichloroacetic acid, which are, however, still in the early experimental stages. Among the selective herbicides are the dinitro compounds, such as sodium dinitro-orthocresylate and the ammonium salt of dinitro-ortho-secondary-butyl-phenol.

The use of oils and their fractions as selective weed killers is a relatively new development.

There are now available, in commercial quantities, selective herbicides for use in the control of weeds in the following crop plants: all small cereals, including rice; in corn, milo, turfs and pasture lands; in peas, flax, onions, garlic; in carrots, celery, and other members of the Umbelliferae; in alfalfa, both seedling and established stands.

Low-Volume Applications

A spectacular development in weed control has been low-volume applications of herbicides. Whereas we usually thought in terms of 100 to 300 gallons of liquid applied to an acre, we now are using successfully volumes as low as three gallons—or even less—per acre.

Low-volume applications have been made possible by improvements in equipment, particularly nozzles, and by taking advantage of the characteristics of 2,4-D and other hormonal herbicides. Low-volume applications are especially valuable in small-grain areas where there is not a ready source of water and hence hauling and refilling add materially to the cost of weed control by herbicide applications.

Preemergence Sprays

Considerable attention and emphasis have been given recently to the control of weeds in row crops by preemergence chemical treatments.

Two methods of attack have been employed:

1. Application of a selective herbicide to the soil at the time of seeding. The chemical in the soil may inhibit the germination of certain weed seedlings, but those of crop plants are uninjured.

2. Application of a general-contact herbicide to a population of weed seedlings prior to the emergence of crop seedlings, or prior to the seeding of the crop. Under certain soil and weather conditions, slowly emerging seedlings, like those of onions, may be preceded by a dense stand of weed seedlings.

Possible Advantage

It may be advantageous and economical to destroy this weed population by using a chemical which is lethal to all types of weeds, including grasses. The crop seedlings emerge and make their early growth free of weed competition. Moreover, the cost of hand weeding may be substantially reduced. Under other conditions it may be desirable to allow a crop of weeds to develop, drill the seed into the young weeds, and then destroy the weed population before crop seedlings emerge.

Preemergence weed control recognizes the fact that, as a rule, only those weed seeds that are within the upper one-fourth to one-half inch of soil germinate; and that if the initial population of weed seedlings is destroyed, without disturbing the soil and thus bringing more weed seeds near the surface, very few weeds will be present to interfere with the early growth of the seedlings of crop plants.

Crop and Weed Competition

Preemergence weed control also recognizes the fact that the early competition of weeds with crop seedlings is a factor of great significance; that the competi-

tion underground is quite likely more severe than that aboveground; and that vigorous, healthy development of crop seedlings is enhanced by the absence of this root competition.

If preemergence chemical weed control is to be of maximum benefit, and economical, application of the materials must be made when the weeds are very small—from one-fourth inch to one inch tall. At these stages the weeds are easily killed, the volume of materials required is low, and competition is eliminated early in the season.

Machinery and Equipment

The development of spray and dusting equipment for the application of herbicides has been spectacular and meteoric. There are marked improvements in pumps, booms, and particularly nozzles, adapted to both ground rigs and airplanes. In all these developments the agricultural engineers have a wide open opportunity and obligation.

Tillage for Weed Control

There seems to be a tendency to over-stress chemical methods of weed control and not give due attention to cultural, cropping, and other nonchemical means, or combinations of the two general methods.

Tillage still is standard and reliable procedure for weed control.

Although special weeding tools have been devised, such as the rotary hoe, the rod weeder, the straight blade, the duck-foot, the "finger" weeder, the spike-tooth harrow, and the loose-chain harrow, agricultural engineers could give more attention to the development of tillage machinery adapted for specific weeds and specific crops.

Concentration Required

Satisfactory progress has been made in the control of any one specific noxious weed or type of infestation only when special and direct attention was given to it—bringing to bear on the problem fundamental biological studies covering every aspect.

Such attention calls for the services of plant physiologists, plant morphologists, chemists, agronomists, and agricultural engineers.

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The Division of Pomology is devoting about 80 acres of experimental orchards to the improvement of almonds, apricots, plums, pears, peaches, nectarines and cherries.