Family and SELECTIVITY in HERBICIDES

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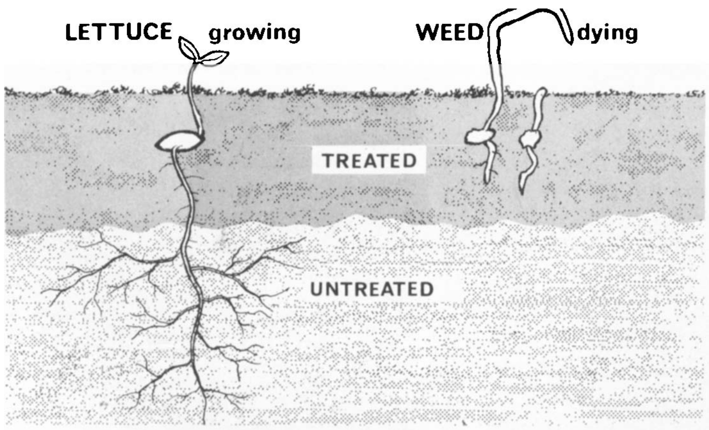
SUMMARY OF WEED SPECIES RESPONSES TO 32 HERBICIDES

HERBICIDES (Common Name)	AMARANTHACEAE	CHENOPODIACEAE	COMPOSITAE	CRUCIFERAE	GRAMINEAE	LABIATAE	LEGUMINOSAE	MALVACEAE	SOLANACEAE	EUPHORBIACEAE	HORDEUM VULGARE	POLYGONUM AVICULARE	PORTULACA OLERACEA	STELLARIA MEDIA	TRIBULUS TERRESTRIS	URTICA URENS	CONVOLVULUS ARVENSIS	CYNODON DACTYLON	CYPERUS SP.	SORGHUM HALEPENSE
ALACHLOR	●	○	○	○	●		○	○	●	◓	◓	○	●			●	○	○	◓	○
ATRAZINE	●	●	●	●	○		●	◓	●	◓	●	●	●	●	◓	●	○	○	○	○
BENEFIN	●	●	○	○	●		○	○	○	○	○	●	●	●	○	○	○	○	○	○
BENSULIDE	●	●	○	○	●		○	○	○	○	○		●	●	○	○	○	○	○	○
PHENMEDIPHAM	○	●	●	●	○				●	○	○	◓	●	◓	◓	●	○	○	○	○
BROMOXYNIL	○	●	●	●	○			◓	●	●	○	●	○	●		◓	○	○	○	○
CDEC	●	●		○	○	●		○	○		◓	○	●	●		◓	○	○	○	○
CHLOROPROPHAM	●	●	◓	●	●		●	◓	●	○	●	●	●	●	○	●	○	○	○	○
CHLOROXURON	●	◓	●	●	○			◓	◓		●	○	◓	●	○	●	○	○	○	○
CYCLOATE	●	◓	◓	○	●		○	○	○	◓	◓	●	●	●	○	○	○	○	◓	○
2,4-D	●	●	●	●	○	●	●	◓	●	●	○	◓	◓	○	●	●	●	○	◓	○
DCPA	◓	●	○	○	●		○	○	◓	●	◓	◓	●	◓	◓	○	○	○	○	○
DICAMBA	●	●	●	◓	○		●	●	●	●	○	●	●	●	●	●	●	○	◓	○
DICHLOBENIL	●	●	●	◓	◓		◓		●	◓	●	●	●	●	○	●	●	◓	●	◓
DIPHENAMID	●	◓	◓	○	●			◓	○	○	●	◓	◓	●	○	●	○	○	○	○
DIURON	●	●	◓	●	●	○	●	◓	●	○	◓	●	●	●	○	●	○	○	○	○
EPTC	●	◓	◓	○	●		○	○	●	●	●	●	●	◓	○	◓	○	○	●	○
LINURON	●	●	◓	●	●	○	◓	◓	●		○	◓	●	●	○	●	○	○	○	○
NITRALIN	●	●	○	○	●		○	○	○	◓	○	●	●	●	●	○	◓	◓	○	◓
NITROFEN	●	●	○	○	◓	●		●	●		○	●	●	○		●	○	○	○	○
NPA	●	●		●	○		○	●	●	○	○	◓	○	●	○	●	○	○	○	○
MSMA	◓	◓	○	◓	◓		○	○	◓	◓	○	○	◓	◓	◓	◓	◓	○	●	●
PEBULATE	●	◓	◓	○	●		○	○	○		◓	●	●	●		○	○	○	◓	○
C 6989	●	●	●	○	●						○			○			○	○	○	○
PROMETRYNE	●	●	◓	●	◓			◓	●	◓	●	◓	●	●	○	●	○	○	○	○
PROPHAM	○	◓	○	◓	●			○	◓	○	●	◓	◓	●	○	●	○	○	○	○
PYRAZON	○	○	●	●	○	●	●	●	●		○	●	◓	●	●	●	○	○	○	○
R 7465	●	●	●	○	●		●	○	○		●	●		●	◓				●	
RH 315	◓	◓	○	●	●	●	○	○	●		●	●	●	●		●			○	
SIMAZINE	◓	●	●	●	○			◓	●	○	●	●	●	●	○	●	○	○	○	○
TERBACIL	●	●	●	●	◓	○		●	●	●	●	●	●	●	●	◓	◓	◓	●	○
TRIFLURALIN	●	●	○	○	●		○	○	○	◓	○	●	◓	●	●	○	◓	◓	○	◓

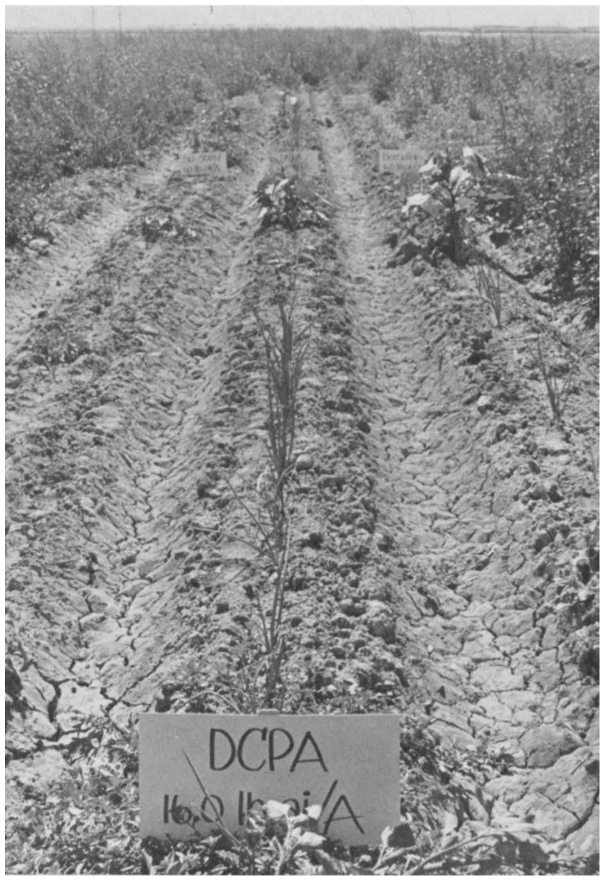
○ Usually not controlled ◓ Partial or erratic control ● Usually controlled

Amaranthaceae = Pigweed family
Chenopodiaceae = Lambsquarter family
Compositae = Sunflower family
Cruciferae = Mustard family
Labiatae = Mint family
Leguminosae = Cheeseweed family
Solanaceae = Nightshade family
Euphorbiaceae = Spurge family
Hordeum vulgare = barley
Polygonum aviculare = knotweed
Portulaca oleraceae = purslane
Stellaria media = chickweed
Tribulus terrestris = puncture vine
Urtica urens = stringing nettle
Convolvulus arvensis = bindweed
Cynodon dactylon = bermuda grass
Cyperus sp. = nutsedges
Sorghum halepense = johnson grass



Physiologically resistant lettuce seedling (left) germinating in treated soil and growing down into untreated soil. A susceptible weed (right) being killed as it germinates in treated soil.

Annual weeds controlled by DCPA (Dacthal) a pre-emergence herbicide, without injury to onion plants even at excessive rates of application.



Species

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Photo comparison of an untreated weedy carrot plot (left) with a carrot plot that had been treated with linuron (Lorox) a pre-emergence herbicide most effectively used post-emergence.

WEED COMPETITION and the variable response of weeds and crops to modern selective herbicides are basic to row-crop agriculture. The total number of weeds known to taxonomists is so great that it would be impossible for agriculturists to identify all of them, let alone know their responses to the more than 150 herbicides now available.

Within a plant family (an aggregation of similar plants) response is often fairly consistent to a given herbicide. The number of plant families important to agriculture is sufficiently small to offer some hope that their reaction to herbicides can be learned, even if it can not be fully understood. It is for this reason, that the data from weed species responses to herbicides have been summarized here (see list). This summary of data and observations has been double checked with work from other areas of the country with generally good agreement.

The species responses were recorded as follows: If the herbicides consistently controlled weed species commercially (70 to 100 per cent), it was labeled with a black circle. If the herbicide consistently failed to control the weed species, it was designated with a white circle. If continued use of the herbicide resulted in a build-up of the species, it was also indicated with a white circle. If the herbicides controlled the weed sometimes, but failed part of the time, it was ranked intermediate with a black half circle. If the herbicide partially controlled (50 to 70 per cent) the species, it was also ranked intermediate.

Weeds of the same plant family often react similarly to herbicides applied at the same rate per acre; for this reason the list groups species by family. There are exceptions: some species in a family are more susceptible to a particular herbicide than others. However, the plants in a family were usually more alike in their response to herbicides than species from other families.

Some resistant

In some plant families, some species may be resistant and others susceptible to the same herbicides. On the other hand, some groups of families respond similarly. For example, *Solanaceae*, *Cruciferae*, *Compositae*, and *Malvaceae* are resistant to trifluralin, diphenamid, bensulide, and—to some extent—DCPA. These same herbicides are excellent for the control of most annual grasses (Graminae), *Amaranthaceae* and *Chenopodiaceae*.

Varied susceptibility

Variations in the susceptibility of weed species are due in part to physiological differences; but can be attributed to some extent to the shallow soil depths in which most weed species germinate. Many selective herbicides are very insoluble and move very slowly into the first inch of soil where most weed seeds germinate. Row crops are often seeded deeper than the germinating zone of most weed seeds. Furthermore, crop seeds have been selected for their viability (usually, with more than 90 per cent germination); whereas, many weed seeds have a very low germination percentage. Many crops have genetically built-in plant vigor sufficient to outstrip most weeds. Given only a slight physiological resistance to an herbicide, a crop plant can usually find a competitive advantage over the herbicide-injured weed seedling (see diagram).

Some crops and weeds are physiologically quite resistant to specific herbicides. Realizing this, herbicide usage must be carefully planned in crop rotations to avoid the build-up of resistant weed species. This can be accomplished by growing crops with herbicides recommended for the control of resistant weed species.

Annual grasses are easily controlled season-long with trifluralin (Treflan) applied at planting of young dormant grape vines. (Note weedy untreated plot in background).

If nightshade and groundcherry species build up after the extended use of trifluralin or diphenamid for tomatoes, a shift can be made to corn or milo and weeds can be controlled with atrazine; or a shift could be made to carrots and linuron, or the combination of another crop with an herbicide could be used that is effective against weeds in the potato family (*Solanaceae*).

Combinations of herbicides can also be used, however they are rarely ever more than additive. Usually there is a certain "phytotoxicity threshold" of herbicide necessary to obtain commercial weed control of a species or group of species. Cutting back on one herbicide in hopes that a minimum dose of another will make up the deficiency, is usually not adequate to broaden the number of species controlled.

This summary of family and species response is meant to help guide the intelligent choice of herbicides for specific weeds and for the selection of combinations in testing for broader spectrum weed control. This compilation of data and observations is not a recommendation for the use of herbicide combinations, but is rather a guide for pointing the way toward more effective weed control.

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Annual broadleaf weeds being controlled in melons by pre-emergence application of bensulide (Prefar), left, in contrast to untreated plot to right.

Effects and of

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THE PROPER TIME TO PLANT grape cuttings is not well established. Growers generally plant cuttings in March and April. Cuttings are made in the winter and early spring and are stored in the soil or refrigerated until they are planted. The best depth and position in the soil for cuttings in storage have also not yet been determined. It is becoming a common practice to refrigerate graftsticks, rootings and cuttings. The effects of this method of storage on subsequent rooting, and also the effects of the time of planting on rooting, needed researching.

Cuttings made

In January 1966, cuttings were made at the Kearney Horticultural Field Station at Reedley, California. They were stored in refrigeration at 32° to 36° F, and in sand in three positions: right side up, upside down and horizontal; and at 6 inches below the surface of the soil for the first two positions and 12 inches for the latter position. Cuttings were planted on February 15, March 15 and April 14. Rootings were dug January 1967, counted, graded and weighed.

Cuttings stored in sand rooted better than those stored in refrigeration (table 1). Cuttings planted April 14 rooted better than those planted in February and March. Position of storage in sand had no effect on rooting of the cuttings.

Stored upside down

Cuttings stored upside down in sand (table 2) and planted on April 14 gave the heaviest rootings. Cuttings stored in refrigeration gave the poorest rootings. Cuttings stored right side up and horizontal were intermediate in rooting weight.

In 1967, studies were made of the depth of storage of cuttings in sand and refrigeration. The cuttings were stored