WEED CONTROL RESEARCH IN COLORADO POTATOES—
A REVIEW

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ABSTRACT

Studies have been conducted for three years to determine the herbicides best adapted for the control of annual broadleaf and grass weeds in Colorado potato fields. The most effective registered herbicides are EPTC, EPTC + trifluralin, and metobromuron. Promising herbicides that are not registered are alachlor and 4-amino-6-t-butyl-3-(methylthio)-1H-triazin-5-(4H)-one (BAY-94337).

These experiments show the efficacy of several herbicides. The data indicate little need for the presently accepted pattern of extensive postplanting cultivation when weeds are chemically controlled.

Several authors (1, 4, 7, 12, 13) have stated that cultivation of potatoes is primarily for weed control, and other benefits are determined by specific soil conditions. Potatoes are very sensitive to weed competition (4, 5, 12, 13). The row widths commonly employed allow foliage to provide an effective weed control canopy only during the latter part of the season. Weed competition studies in many crops have shown that the most critical period of weed-crop competition is at emergence and during the early stages of growth. Cultivation and hilling of potatoes is necessary to create and maintain irrigation furrows, provide higher temperatures for tubers, and prevent greening; however, this mechanical operation does have several documented disadvantages. Post planting cultivation can lead to loss of moisture at critical times (4, 12); mechanical damage of shoot, root, or tuber (11); increased soil compaction and clod formation (1, 2, 6, 9); increased frost susceptibility (5, 12); harvest problems (10, 12); and an increased incidence and spread of disease.

In spite of the data which support the advantages of using herbicides in potato production, little has been done to recognize and develop their potential uses in Colorado. This has been due, in part, to the lack of efficacy data. These experiments were designed to correct this deficiency by evaluating several herbicides for weed control efficacy and crop phytotoxicity. We also hoped to determine if extensive postplanting cultivation is necessary for weed control.

MATERIALS AND METHODS

We have conducted a total of six replicated research experiments; one in 1968, two in 1969, and three in 1970. Experiments were conducted...
in Northern Colorado in 1968, 1969, and 1970 and in the San Luis Valley of Colorado in 1969 and 1970. The Northern Colorado experiments were conducted on a clay loam in 1969 and a silt loam in all 3 years. The San Luis Valley trials were on a silty clay loam (61% sand). All of the soils had less than one percent organic matter. All herbicides were applied with a bicycle type plot sprayer in approximately 20 gallons of water per acre (187 l/ha) at 50 psi (3.51 kg/cm²). Each experiment consisted of four randomized replications with plots 4 rows by 40 feet (15.2m). The varieties Russett Burbank, Norgold, and Oromonte were used. Experiments were conducted under furrow and sprinkler irrigation.

RESULTS AND DISCUSSION

Over the course of 3 years, several herbicides have consistently proven to be unsuitable for Colorado conditions independent of location. For the reason indicated these herbicides have been placed in one of three groups: Group 1. lack of adequate weed control, Group 2. excessive phytotoxicity of potatoes, Group 3. no significant improvement over available treatments.

Group 1: a) 3-(2-methylphenoxy pyridazine (NIA-20439) at 2 and 4 lb/A.4
   b) 6'-tert-butyl-2-chloro-N-(methoxymethyl)-O-acetotoluidide (CP-44939) at 2 and 4 lb/A.
   c) DCPA at 9 lb/A has often given very acceptable weed control but generally does not compare favorably with other herbicides. It must be incorporated lightly. DCPA has been more effective under sprinkler irrigation.

Group 2: a) 2-(4-chloro-6-ethylamion-s-triazin-2-ylamino)-2-methyl-propionitrile (SD-15418) at 2 and 4 lb/A.
   b) 3,4-dichloro-2,5-difluro-4-hydroxypyridine (Haloxydine). Severe injury to potatoes occurred with pre-emergence treatments, especially on light sandy soils but it was not as severe postemergence at 0.5 and 2 lb/A.

Group 3. a) Chloramben.
   b) 2-(3,4-dichlorophenyl)-4-methyl-1,2,4-oxadiazolidine-3,5-dione (VCS-438) has given excellent control of Amaranthus retroflexus L. (redroot pigweed), Chenopodium album L. (common lambsquarters), and Kochia scoparia L. Schrad. (kochia). It has been ineffective on annual grasses particularly Echinochloa crus-galli (L.) Beauv. (barnyardgrass). VSC-438 also caused foliar injury and occasionally depressed yields 2 to 3 lb/A.
   c) 2-tertiobutyl-4-(2,4-dichloro-5-isopropoxyphenyl)-5-oxo-1,3,4-oxadiazoline (RP-17623). Injury was observed in one year but annual broadleaf weeds have always been controlled in the range of 1 to 3 lb/A.

4lb/A x 1.12 = kg/ha. All rates refer to active ingredient/A.