

NO.24 SELECTIVE CHEMICAL WEED CONTROL IN ONIONS -
VICTORIAN TRIALS.

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1. INTRODUCTION.

In Southern Victoria onion crops are grown on volcanic ash, peat and red loam soils. Seed is drilled in the cold wet weather of the early winter months when germination of onion seed and seedling growth are very slow. Winter growing weeds have always presented a problem to onion growers who have developed efficient cultivating implements but have been compelled to remove the weeds in the rows by hand, an operation requiring much labour. Trials by the Victorian Department of Agriculture to study selective chemical weed control in onion crops were commenced in 1950.

Early trials demonstrated that sulphuric acid, potassium cyanate and sodium pentachlorophenate gave fair control of weeds without a marked decrease in onion yields and a few growers used these materials on a commercial scale. Sulphuric acid gave poor control of grasses but was rejected by growers chiefly because it was unpleasant to use and corroded the spray machinery. Potassium cyanate was ineffective on weeds during cold weather, but gave good weed control with little damage to the onions when applied in the spring. It is still used extensively late in the season against summer weeds. Sodium pentachlorophenate controlled a wide range of weeds but damaged onion leaves and caused distortion of bulbs when used as a post-emergence spray. DNOC was ineffective against weeds at strengths which did not damage the onions.

Detailed studies made on the growth of onion crops indicated that the young onion seedlings were very sensitive to damage for eight to ten weeks after emergence. Growers harrowed the field until emergence of seedlings and then commenced inter-row cultivation after the onions had developed two to three leaves. During this period weeds in the rows had grown too large to be smothered by the soil hilled over the rows during inter-row cultivation. Cross-harrowing removed some of these weeds but hand weeding was always necessary. To control weeds during this period many chemicals were tested as a pre-emergence application of which Chloro IPC-isopropyl N-(3 chlorophenyl) carbamate, and monuron-N-(4-chlorophenyl) N, N-dimethylurea were the most successful,

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with "Randox" and "Vege-dex" somewhat less effective in the control of weeds. Chloro IPC was selected for recommendation to growers, rather than monuron, because it gave better weed control with less damage to onions over a wide range of conditions. (Kefford and Wright, 1958).

2. CHLORO IPC.

Chloro IPC is now being used by onion growers in most districts both as a pre-emergence and a post-emergence spray. There have been teething troubles and some serious crop losses all of which were caused by excessive rates of application for the particular soil type. However as growers have gained experience in the use of Chloro IPC there are many crops in which hand weeding has been eliminated, with if anything an increase in crop yield. The grower practice which has developed is to sow the seed at least, but no more than 1 inch in depth. Deeper sowing caused damage to onion seedlings possibly because they were approaching the sensitive "flag" stage when they broke through the surface soil and came in contact with the film of Chloro IPC. The field is harrowed until the first onion seedlings emerge and then the Chloro IPC application is made to the weed-free soil. On the heavy black volcanic soils at Glenormiston where the Departmental trials are conducted Chloro IPC at 6 lbs. per acre is the best treatment, while the 4 lbs. rate is as effective in initial weed control but has a shorter residual effect. The recommendation to growers on this soil type is Chloro IPC at 4 lbs. per acre, on lighter volcanic soils and peaty soils 3 lbs. per acre and on sandy loam soils 2 lbs. per acre. At these rates seed of the major winter weeds:

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| Winter grass | <u>Poa annua</u> |
| Chickweed | <u>Stellaria media</u> |
| Mouse-eared chickweed | <u>Cerastium glomeratum</u> |
| Wireweed | <u>Polygonum aviculare</u> |
| Capeweed | <u>Cryptostemma</u> <u>calendulaceum</u> |

will not germinate and seedlings of the Poa annua and chickweed are killed. The residual effect lasts for eight to ten weeks. Control of clover is less effective, while Henbit deadnettle (Lamium amplexicaule) and thistles are resistant.

Growers have been encouraged to contact Departmental officers for personal advice on calibration of spray machines to ensure that correct rates of application are made. Some growers use strip spraying but often the width

of the strip being sprayed is overestimated, e.g. adjusting the application rate for a 5 inch strip when in fact only 3 inches is being sprayed. The common practice is to spray the whole area. Another tendency is for growers who have achieved success one year to increase the rate the following year usually with resultant crop damage.

Time of application trials have shown that Chloro IPC can be sprayed on onions in the "hook" stage without causing damage to the seedlings, but that the seedlings are sensitive in the "flag" stage. Once the first true leaves have emerged seedlings can again be sprayed without serious damage, but for post-emergence application spraying directed at the base is recommended. However it has not been possible to convince growers of this. They usually apply a post-emergence application directly over the rows when the onions have reached the two leaf stage and there are signs of a fresh germination of weeds. Post-emergence rates of application of Chloro IPC are less critical and are usually 1 lb. per acre above those recommended for pre-emergence. This spray controls the new strike of the winter weeds mentioned previously and also the summer weed, Deadly Nightshade (Atropa belladonna). Fat hen (Chenopodium album) however is resistant to Chloro IPC and is only partially controlled. In the early summer a post-emergence spray of potassium cyanate at 15 to 20 lbs. per acre is applied to control the weeds which have survived the previous treatments. During the periods of warm to hot weather potassium cyanate at these rates will kill quite large weeds without damage to the onions.

Chloro IPC proved unsatisfactory for weed control in onion seed beds on the sandy market garden soils as damage occurred even at the rate of 1 lb. per acre. Shallow sowing of the seed probably increased the susceptibility to damage. However post-emergence sprays applied to transplanted seedlings did not cause damage when Chloro IPC was sprayed at 2 lbs. per acre. Kefford and Stubbs (1959). The major weeds in market gardens are Winter grass and chickweed and one spray usually controls weeds from transplanting until harvest. The fact that Chloro IPC is more effective in cold moist weather and under these conditions has a long residual effect makes it most suited as a selective chemical weed killer in onion crops grown in Southern Victoria. However continued use of Chloro IPC is encouraging the increase of the Chloro IPC-resistant weeds and each year less effective weed control is being obtained. At Glenormiston henbit deadnettle and fat hen are now the dominant weeds on the paddocks used for onion weed control trials. Thistles and clover are also a problem in some areas.

3. CURRENT TRIALS.

Trials conducted at the Glenormiston Agricultural College during the 1959/60 season were designed to test the effectiveness of a number of chemicals in controlling the Chloro IPC-resistant weeds. Trials planned for the 1960/61 season will include the more promising of these chemicals singly and in combination with Chloro IPC and "Randox" both as pre-emergence and post-emergence treatments. It is expected that a combination spray will be necessary to control the full range of weeds in onion crops.

A summary of the performance of the more promising chemicals tested in 1959/60 and which will be further tested in the 1960/61 season is set out hereunder:

(a) Diuron - N-(3, 4 - dichlorophenyl)-N, N-dimethylurea.

Diuron at 1½ and 2 lb. per acre rates was the most effective chemical in controlling henbit deadnettle in both the germinating seed and also the germinated seedling stage. Winter grass, chickweed and wireweed were also effectively controlled. There was some evidence that nightshade was tolerant to Diuron although some nightshade seedlings had germinated when the post-emergence application was made. Diuron was much superior to monuron in controlling weeds in this trial. When Diuron was applied at 2 lbs. per acre post-emergence, following a 2 lbs. per acre pre-emergence application, yellowing of the tips of the onion leaves developed, although the onions later recovered and grew out of this symptom. The possible disadvantages of Diuron are formulation as a wettable powder and long residual effect which may cause damage to the crop following the onion crop.

(b) Neburon. 3-(3, 4 dichlorophenyl) n-butyl-1-methyl urea.

Supplies of Neburon were not obtained in time for a pre-emergence application and when applied at post-emergence it was not as effective as Diuron in controlling henbit deadnettle seedlings. In other respects it was similar to Diuron and because of its reported lower solubility may prove superior to Diuron as a pre-emergence application.

(c) C.D.A.A. 2 chloro N, N-diallylacetamide.

"Randox" (CD AA) was preferred to "Vege-dex" (CD EC) in this trial, because of better performance in previous trials. "Randox" at 6 lbs. per acre did not

control henbit deadnettle. However in view of the promising results being obtained with "Radox" and "Vegedex" in other areas and the fact that the latter is said to control henbit deadnettle both these chemicals will be included in the 1960/61 season trials.

4. REFERENCES.

Kefford, R.O., and Wright, E.W. (1958).- J. Dept. Agric. Vict. 56: 357-368.

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