THISTLE - EXPERIMENTAL WORK IN CHEMICAL CONTROL

By: A. A. Duncan.
Wanganui.

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There have now been a large number of experiments carried out on the chemical control of most varieties of thistle over a wide range of conditions. Some treatments have given excellent results while others have not been so satisfactory. Rather than giving a detailed description of individual trials, this paper is chiefly concerned with giving the successful results and recommendations emanating from the trial work.

CALIFORNIAN THISTLE (*Cirsium arvense*):

Californian has proved the most difficult of the thistle family to eradicate. There have been fifty trials carried out in pasture and in crops where the thistle is a nuisance.

(a) In Pasture.

The most effective results were obtained on growth from seedlings, when one treatment is enough for a complete kill. Most plants, however, arise from the underground root system. Best results were obtained by initially treating these plants at the flowering stage. Established patches in old pastures need repeat applications for control; the first treatment to be made at the flowering stage and the regrowths treated in the following autumn. A third spot treatment will probably be necessary in the following spring.

Results, when the initial treatment on old well established patches was given well before the flowering stage, were not so successful, the great majority of plants making regrowth in the same season. The treatment of regrowth after mowing also was not as effective as treatment in the flowering stage.

In new pastures where previous cultivation has broken up the thistle roots into small pieces, control has been obtained with one application of hormone.

The ethyl ester was the most effective on seedling thistles and regrowths from roots cut up in cultivation.

The most effective preparations on old well established patches are the sodium salts of M.C.P. and 2,4-D in the spray form at the rate of up to 2 lbs. acid-equivalent per acre, the amount depending on the nature of the growth and the thickness of the infestation.

The dusts also proved effective, but generally speaking had to be applied at double the rates of acid-equivalent per acre to equal the performance of the sprays.

(b) In Crops.

1. Cereals.

Californian thistle is not a serious problem in cereal crops because the cereals offer enough tolerance to hormones to enable the thistle to be eradicated or at least knocked back hard enough to prevent it being a nuisance at harvesting.

The most suitable time for spraying is when the crop is 6 - 8 ins. high or after the 6-leaf stage and before shooting commences. At this stage a spring-sown crop has a tolerance of up to 2 lb. acid-equivalent per acre, provided that the sodium salts are used and not the oil-based ester. In one spring-sown trial 1 lb. per acre of the sodium salt of M.C.P. considerably reduced and stunted Californian thistle. Autumn-sown cereals will stand any form of 2,4-D.

2. Peas.

Californian thistle was checked sufficiently by Denoc and D.N.B.P. compounds to allow the pea crop to succeed in a trial where the thistle was

treated at a very young stage. The thistle did not recover until the peas were well on in the flowering stage. Mature thistles when treated with Denoc usually recovered fairly quickly. In one trial with Partridge peas, the amine of 2,4-D and the sodium salt of M.C.P. at rates of 0.25 and 0.375 lb. acid-equivalent checked the thistle, but gave no control, while 0.5 lb. M.C.P. gave control. In the same trial 0.75 lb. of the amine of 2,4-D gave control of the thistle but it severely checked the pea growth. However, the peas eventually recovered and yielded almost as well as the other plots.

VARIEGATED THISTLE (*Silybum marianum*):

Sodium chlorate and atlacide were compared with hormone weed-killers, but proved less suitable, because in addition to killing the thistle they killed the surrounding grass and clover. This left more bare ground for re-infestation by the thistle.

Hormone dust treatments gave variable results, and from these results the necessity of getting a good even distribution was demonstrated.

On dry windy days it was difficult to get a good distribution, owing to material becoming air-borne. Also the material tended to become dislodged and did not adhere closely to the perfectly dry leaves. The dust treatments were however, very effective under the right conditions, namely relatively calm days and when the surface of the leaf was moist after dew or rain. With a moist surface the dust adhered much better. A further factor is that there has to be some moisture before the dust is absorbed into the plants.

Generally speaking dusts up to $2\frac{1}{2}$ lb. acid-equivalent per acre gave good kills when applied under reasonably satisfactory conditions.

With sprays, good results were obtained with applications of up to 1 lb. acid-equivalent per acre, seedling thistles and those in the rosette stage being controlled with $\frac{1}{2}$ lb. acid-equivalent. Good kills were obtained up to the time of formation of the flower head, but increased amounts of hormone were required for control. There is no point in treating annual weeds after flower-head formation. Equally good kills were obtained in spring and autumn for thistles at the same stage of growth. Satisfactory results were obtained from all types of hormones used, the ethyl ester being the most effective.

SCOTCH THISTLE (*Cirsium lanceolatum*):

Scotch thistle is susceptible to hormone weedkillers. It is best treated in the seedling stage, but is quite susceptible up to flower-head formation. It can be treated in either spring or autumn, the most effective formulations being the salts of M.C.P. and the salts and amines of 2,4-D. Seedlings are killed with $\frac{3}{4}$ lb. acid-equivalent per acre but older plants require $1\frac{1}{2}$ lb.

Scotch thistle is mainly a problem on flat or rolling country where it can be treated with mechanical equipment. Sprays are used extensively and also concentrated dusts.

The concentrated dusts are very effective providing they are properly mixed with the spreader and evenly distributed. Lime has proved a better mixing medium than superphosphate, chiefly because it is more finely ground and gives a better distribution. The mixture can be applied through the topdresser in either spring or autumn and by its use liming and weed-killing are combined in one operation.

OTHER THISTLES:

The control of Saffron thistle (*Carthamus lanatus*), Cotton thistle (*Onopordon acanthium*), Winged thistle (*Carduus tenuiflorus*) and Nodding thistle (*Carduus nutans*) is similar to that of Scotch thistle.

CRITICISM OF HORMONES FOR THE CONTROL OF THISTLES IN PASTURES:

It is relatively easy to kill thistles, but the problem then arises

of what is going to take the place of the deceased thistle - more thistles or pasture? In one experiment in the Waikato, Winged thistle has been treated in both spring and autumn for five years and is still just as thick as when the experiment was first started. This illustrates the importance of getting a cover on the thistle patches and this is fairly difficult to achieve in a short space of time. It is wise, however, to persist with oversowing, more particularly in the autumn months. Another important factor is to spell the paddock from continuous grazing by sheep.

In the Wanganui district, variegated thistle seed is all through the hill country and will germinate if the grass cover is destroyed, for example by a gorse or manuka burn. It is wise to remember that this thistle only flourishes on the more fertile hill country, either in naturally fertile hollows or basins, or on ridges where sheep manure has raised the general fertility.

Some farmers are tempted to get busy and start treating the thistle all over the burn. This is largely a waste of time and energy as it will not be long before the thistle will disappear from the general hill face and confine itself to the places where we are so used to seeing it.

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