LOW VOLUME CHEMICAL WEED CONTROL IN PEAS

By - G.H. Blair.

We carried out 35 trials in pea crops on 7 different properties between Spotswood and South Springston.

I think at this stage it would be well to relate the circumstances that led to the laying down of these trials. After a meeting of a group of farmers and a merchant in Christchurch, all interested in pea growing, where the potentialities of low volume chemical weed control in peas was discussed, it was agreed that too little experience was available, to justify the risk of a farmer spraying a whole paddock. It was further agreed that the fastest satisfactory method of getting information was to make trials ourselves.

The soils encountered were heavy silt loam, peat, medium loam, and heavy loam, typical soils where one would expect garden peas to be grown. Unfortunately weeds also do well on these types of soil if extensive cropping is carried out. These trials were laid down principally as observational and comparative trials. In one trial area where we were using 5 different compounds, namely 2 Dinitro Ortho Cresols + Sulphate of Ammonia, 2 Dinitro Butyl Phenols and 1 MCPA Hormone, we were particularly fortunate in receiving the co-operation of the Dept. of Agriculture and the Dept. of Scientific and Industrial Research. Between them they harvested and tabulated the yields of these trials.

We commenced the trials using a low volume hormone spraying outfit. The only material available in which we had any confidence was Dinitro Ortho Cresol + Sulphate of Ammonia as an activator. While this material had been used with some success when used in 60 to 100 gals. of water per acre, we felt that it was not acceptable because of the bulk of water and the time involved, besides which considerable damage resulted in hauling this bulk of water and the necessary equipment over the peas. Right from the start we were of the opinion, that within the limits, pressure or atomisation could replace water as a means of even distribution and penetration of any hairy protection, on to the leaf surface.

The first trial was laid down on the 3rd November at Spotswood, in a 6 acre paddock of Massey Peas. The soil was heavy silt loam. and when we started it was a fine hot day. The peas, except for a small area near some pine trees, were in an advanced stage of growth, that is 6" to 9" high. There was a very heavy infestation of fathen up to 3" high, and Nightshade up to 2" high. We divided the paddock into four equal parts, No.1 we sprayed at the rate of 1 US gall. of Sinox + 1lb of Sulphate of Ammonia in 19 gals. of water per acre @ 50 lbs p.s.i. pressure, No.2 at 1 US gall. of Sinox + 1lb Sulphate of Ammonia in 14 gals. of water per acre @ 50lbs p.s.i. pressure, No.3 at 1 US gal. of Sinox + 1lb of Sulphate of Ammonia in 11 gals. of water per acre @ 50 lbs. p.s.i. pressure, No.4 we left as a control area. The only factor we altered was the amount of water per acre. While we were spraying No. 3 the sky became overcast and as we finished heavy rain set in, which lasted for about $\frac{1}{4}$ of an hour.

The materials were mixed prior to putting them in the tank. Although curdling took place, to the extent that the mixture could not be poured through a benzine funnel and filter but had to be poured straight into the tank, no blocking of nozzles occurred with the 19 gals. of water mixture. 2 blocked nozzles occurred with the 14 gals. of water and 3 with the 11 gals of water. Four of these blockages occurred after the machine had been stopped for refilling the tank. It would seem from this, that 50lbs p.s.i. pressure was sufficient to blow the strainers in the nozzles clean in the 19 gals. of water mixture, but it was not sufficient to do the same in 14 and 11 gal. mixtures.

As we were going out of the paddock it was noticed that in No. 1 Plot, which had been sprayed about 4 hours earlier, the weeds were showing definite signs of dying.

At an inspection of this area 16 days later I made the following observations:-

WEEDS: Fathen and nightshade No. 1 plot (19 g. water) 100% kill, No. 2 (14 gl. water) approx. 90% kill, No. 3 (11 gl. water) approx. 70% kill, No. 4 (Control) weeds have every indication of choking out the peas.

CHEMICAL DAMAGE: While confined to the lower leaves showed in all plots from fairly severe in No. 1 to slight in No. 3. In No. 3 some peas only showed burnt spots on some leaves. While the rain immediately after spraying may have contributed to this, the same results were observed in a later trial done on a hot, fine day. This led me to believe that it was a result of poorer distribution, which theory would also account for the lower weed kill.

WHEEL + CHEMICAL DAMAGE: In Nos. 1 and 2, I assessed this at 70% death rate of peas in the wheel tracks, in No. 3 at 20%. A point noted here was that near some pine trees, where the peas were only at the 6-leaf stage when sprayed, very little damage was done in the wheel tracks.

YIELDS: No. 1 (19 gl. p.a.) 20 sacks, No. 2 (14 gl. p.a.) 18 sacks, No. 3 (11 gl. p.a.) 16 sacks, No. 4 (Control) Nil.

These yields were supplied by the farmer who said, that although there were a few peas in the control area it was impossible to harvest them on account of the weeds, particularly the nightshade.

The second area was laid down at Ladbroke on Mr. Duncan's property, in a paddock of Onward peas, which were in an advanced stage of growth, being 6" to 9" in height. All were agreed that the crop was too far advanced for spraying, but it was decided to carry on. The main weed was fathen 2" to 4" high, except for an area of about $\frac{1}{2}$ acre, where an old pig yard had been. Here the fathen was a dense mat and up to 6" high. The day was fine and hot and we sprayed five plots in order to observe what effect a reduction in the Sulphate of Ammonia had, and what effect a reduction in Sulphate of Ammonia and water had, compared with the 1 U.S. gl. of Sinox + 1 lb. Sulphate of Ammonia in 19 gals. of water mixture. The plots were all sprayed at 50 lbs. p.s.i. pressure. Here again the Peas received a check and there was some burning of the lower leaves. As the Sulphate of Ammonia or the water, or both, were reduced so was the check and burn on the peas, and the weed kill was proportionately less. The wheel + chemical damage in the wheel tracks was fairly severe. The 6" high fathen, which came in the 19 gals. of water + 1 U.S. gl. of Sinox, + 1 lb. of Sulphate of Ammonia per acre plot, had suffered a 100% kill. Odd docks, Californian thistle, hogweed, nettle and geranium seemed to be resistant. Six hours after spraying the fathen showed severe distortion, and the peas were also affected.

We then laid down seven trial plots in Marshland, Belfast and Ladbroke to observe the effect on specific weeds.

		Gl. Water.	Sinox.	Sul. Amm'ia.
Redshank	- killed up to 2 leaf stage, with	19 + 1 U.S. Gl.		+ 1 lb.
Cornbind	- " " " 2 " " "	19 + 1 " " "		+ 1 "
Sorrel	- " " " 2 " " "	19 + 1.2/3 "		+ 1.2/3 lb.

All were sprayed at 50 lbs. per square inch pressure.

While this last mixture was fairly severe on the peas, this trial was one in which it was known, that unless the weeds were controlled, no peas would be harvested. As it was, quite a payable crop was harvested.

One trial area at Ladbroke on heavy peat land was sown in William Massey peas, which were about 3" high at the time of spraying. This was only 20 days after sowing, and the peas had grown very rapidly. On inspection 19 days later it was very difficult to distinguish the wheel marks at all, but the peas had suffered a fairly severe check. Two factors here seemed to be significant, first that by spraying early, wheel + chemical damage could be practically eliminated, but at the same time check to the peas was increased; second that height of growth was not a positive method of determining the optimum time to spray. We decided that in future, we would be guided by the number of nodes on the pea plant's stem, namely three.

The final area we laid down on 1/12/49 was at Springston and involved 21 plots. A number of these were with Sinox or D.N.O.C. + Sulphate of Ammonia, and were for the purpose of checking our previous conclusions, so I will not refer to them. One question which had caused us a great deal of concern to date was how to control Californian thistle in peas, and, as D.N.O.C. + Sulphate of Ammonia proved useless for this purpose, we decided to try a hormone. For this trial we chose a new MCPA type hormone, which had just become available called PHENOXYLENE. Two other new materials we used were of the new Dinitro Butyl Phenol, called "Sinox W" and "Sevtox". An immediate advantage of these Dinitro Butyl Phenols was that they did not need Sulphate of Ammonia to activate them, so we did not have the problem of curdling and blocked nozzles.

No. 1 Plot:

$\frac{3}{8}$ lb. Acid MCPA Hormone in 21 gls. water per ac. @ 50 lbs. p.s.i. pressure.

No. 2 Plot:

$\frac{3}{4}$ Imperial Gl. Dinitro Butyl Phenol in 21 gls. water per acre @ 50 lbs. p.s.i. pressure.

No. 3 Plot:

$\frac{3}{4}$ Imperial gl. D.N.O.C. + 1 lb. Sulphate of Ammonia in 21 gls. water per acre @ 50 lbs. p.s.i. pressure.

No. 4 CONTROL.

The hormone gave a satisfactory control of the Californian thistle considering the light application, but did not completely kill the fathen. As the peas did not show any adverse effects, it would appear that a stronger application would be possible, enabling the fathen to be killed. Of the Dinitro Butyl Phenols, both showed they could kill weeds comparable with D.N.O.C. + Sulphate of Ammonia, using comparative low volume technique. "Sinox W", while being markedly superior to the D.N.O.C. + Sulphate of Ammonia in regard to burn and check of the peas, did show some damage and distortion. "Sevtox" showed no damage to the peas, and only very slight check to the growth compared with the control. A higher selectivity was apparent, which would indicate that heavier applications could be used without risk to the peas.

Yields of the comparative trial were:-

Control	12.3 bus. per acro.
D.N.O.C. + Sulphate of Ammonia ..	15.3 " " "
MCPA Hormone	18.3 " " "
Dinitro Butyl Phenol	19.0 " " "

Here the Butyl Phenols did not justify their extra cost, 32/- per acre, as against the 7/- or 8/- per acre for the Hormone. Further, when it is appreciated that the Hormone trial was put down in an area heavily infested with Californian thistle, I think it fair to say that this material compares very favourably with any other.

GENERAL CONCLUSIONS:

- That comparatively low volume spraying of peas is practicable.
- That D.N.O.C. + Sulphate of Ammonia is a material which has been superseded.
- That pressure, in a greater or lower degree, can replace water as a spreader.
- That weight of the equipment is the determining factor in wheel damage.
- That wheel + chemical damage increases with the age of the plants.
- That Dinitro Butyl Phenols do not create as many difficulties as D.N.O.C. + Sulphate of Ammonia for low volume spraying.
- That the use of MCPA Hormone is practicable as a means of Californian thistle control in peas.
- That the effectiveness of D.N.O.C. or D.N.B.P. on susceptible weeds does not vary much according to the soil, but the recovery of the crop plant may. Subsequent weather has a marked effect on the recovery of pea plants.

That one of the factors contributing to the irregularity in result of low volume spraying has been the failure of the finer spray to penetrate the hairy protection on foliage, and that within limits, increased pressure is the balancing factor between high and low volume spraying in so far as it not only means better distribution but better penetration as well.

That to determine whether to spray or not, it is necessary to decide whether the check to the peas is offset by the benefit they derive, due to reduced weed competition. Only further trial work can answer this.

QUESTIONS AND DISCUSSION

MR. GORDON (Wellington): We know that in England MCPA is being used and that $\frac{1}{4}$ gallon per acre is effective, but here we are rather scared of it. I think you might kill the peas with it.

MR. BLAIR: The results we got from that trial plot showed that it did not affect the peas in any marked way at all, but it did kill the fathen. In all trials I have seen MCPA did not affect the foliage of the crop as much as 2,4-D did. I have had that substantiated in cereals and potatoes.

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