WEED CONTROL IN CHOUMOELLIER AND SWEDES WITH DICAMBA

R. L. TAYLOR

Farm Chemicals Company, Mapua, Nelson

Summary

Choumoellier and thousand-headed kale have shown consistently good tolerance but swedes variable tolerance to the diethanolamine salt of dicamba sprayed post emergence at about 2 oz a.i./acre. Control of redroot (*Amaranthus hybridus*) and thistles was good, of fathen (*Chenopodium album*) and willow weed (*Polygonum persicaria*) fair to good. Choumoellier and kale yielded better after spraying in all 10 trials, swedes in 17 to 20 trials.

INTRODUCTION

BEFORE this investigation began, it was known that swedes did not have tolerance to dicamba as good as choumoellier (marrow stem kale). It has been necessary to do many trials to find out in what circumstances the spraying of swedes with dicamba can be justified. In addition to the 25 trials described (Table 1), a larger number of observational trials were done which showed the crops weighed were a fair sample of those which have been treated.

Observational trials are useful provided they are closely compared with trials where weights are taken. Without this comparison, observations are misleading because swedes in untreated areas look bigger than they are because of their tall leaves and look also more numerous because gaps between them are filled in with weeds.

Soft turnips are more sensitive to dicamba than swedes and should not be sprayed with dicamba unless growing with a larger amount of choumoellier.

RESULTS AND DISCUSSION

Crop weights, taken in early winter, are given in Table 2. Substantial increases in yield have been obtained in many trials. It is clear that even a moderate number of weeds can seriously depress brassica crops. The removal of these weeds by dicamba would lead to yield increases provided the crop was not excessively affected and had enough vigour to take advantage of removal of the weeds.

Choumoellier sprayed with dicamba has yielded significantly better in all trials, even where the weeds were never numerous and had been further reduced by scuffling. This confirms the satisfactory tolerance of choumoellier to dicamba.

Rather than using 4 oz of dicamba (all rates in a.i./acre) at the 6- to 8-true-leaf stage of the choumoellier, it is usually better to use only 2 oz at the 4- to 6-true-leaf stage when weeds are small and much easier to kill. Fathen (*Chenopodium album*) should be sprayed when about 6 in. tall and Californian thistle (*Cirsium arvense*) when about 12 in. It may be supposed that vigorous choumoellier crops are not affected by

TABLE 1: TRIALS IN WHICH CROP WAS WEIGHED

Details of abbreviations

Sen.: Sensation variety of swedes Cal. thistle: Californian thistle
 Cal.: Calder variety of swedes d: flat drilled
 Sup.: Superlative variety of swedes r: ridged
 T.H.: Thousand headed kale s: scuffled, *i.e.*, cultivated between the rows

<i>Trial and Location</i>	<i>Crop</i>	<i>Main Weeds</i>	<i>Rate (oz/acre)</i>
1966			
1. Waimea Plain, Nelson	Sen. swedes	d redroot, fathen	2
2. Waimea Plain, Nelson	Sen. swedes	d redroot	2
1967			
3. Waimea Plain, Nelson	Sen. swedes	d redroot, stagger weed	2
4. Waimea Plain, Nelson	Sen. swedes	d redroot, fathen	2
5. Waimea Plain, Nelson	Sen. swedes	d redroot	2
6. Mosgiel	Doon swedes	d wireweed	2, 4
7. Mosgiel	Sen. + Cal. swedes	r Cal. thistle	2½
8. Gore	Doon swedes	rs fathen, Cal. thistle	2
9. Wyndham	Wilhemsberger swedes	r fathen	2
10. Invercargill	Doon swedes	r fathen	2½
11. Five Rivers	Cal. swedes	rs fathen, Cal. thistle	2
12. Garston	Cal. swedes	rs fathen	1½
13. Gore	Chou. + turnips	rs fathen, Cal. thistle	2
14. Gore	Chou. + turnips	r Cal. thistle	2½
15. Edendale	Chou. + turnips	rs fathen	2
16. Mosgiel	Chou + swedes + turnips	rs Cal. thistle	2
17. Moa Flat	T.H. kale + swedes	r fathen, Cal. thistle	2
1968			
18. Winchester	Cal. swedes	d fathen, nodding thistle	2
19. Inchclutha	Sup. swedes	rs willow weed	2
20. Middlemarch	Sen. swedes	rs fathen	2
21. Winchester	Chou.	d fathen	2
22. Waikouaiti	Chou.	r fathen, Cal. thistle	2
23. Middlemarch	Chou. + Cal. + Sen. swedes	rs fathen	2
24. Outram	Chou. + Cal. swedes	d fathen, willow weed	2
25. Inchclutha	Chou. + Sup. swedes	rs fathen	2

weeds. This view is not supported in these trials, in which Nos. 22 and 25 showed very vigorous growth from the beginning.

Swedes, on the other hand, usually suffer some visible check from dicamba which is occasionally severe. Whether this will lead to a depression of crop yield appears to depend on several factors:

- (1) The direct effect on the swedes.
- (2) The ability of the swedes to recover and to grow into the space vacated by the weeds.
- (3) The density and vigour of the weeds.
- (4) How well all important weeds are controlled.

Excessive damage from which the swedes could not recover occurred in Trial 6, and in two observational trials. Recovery of swedes is generally quicker in crops which are growing well when sprayed. Crops

TABLE 2: ESTIMATED (GREEN WT.) IN TONS (2,240 lb)
PER ACRE

Trial No.	Swedes		Kale		Turnips	
	Sprayed	Untreated	Sprayed	Untreated	Sprayed	Untreated
1	9.4**	5.8				
2	26**	19				
3	6.1	4.9				
4	11	11				
5	21*	15				
6	12 (2 oz)	15				
	7 (4 oz)					
7	9**	4				
8	36**	26				
9	13	13				
10	35*	31				
11	14	10				
12	19*	13				
13			11**	9	1.0	1.0
14			15**	10		
15			20*	15		
16	7.3**	4.7	7.8	4.7	6.0	7.9
17	18*	14	20**	14		
18	17*	9				
19	19	20				
20	9**	5				
21			22*	19		
22			35*	21		
23	7.6**	5.1	2.7**	1.0		
24	11	8	2.0	1.6		
25	26*	19	31*	25		

*Figure differs significantly from untreated ($P < 0.05$)

**Figure differs significantly from untreated ($P < 0.01$)

retarded by drought, poor soil, inadequate manure, waterlogging, aphid attack or other causes do not recover from dicamba quickly enough to benefit fully from weed control. If the weeds are dense enough, they may well do swedes more harm than dicamba, even when it causes severe damage. In Trials 7, 10 and 18 there was appreciable crop damage, but the swedes recovered sufficiently to grow better as a result of weed control.

There are many weeds which are poorly controlled by dicamba. If one of these is numerous in a swede crop, but is being smothered by a more vigorous weed which is sensitive to dicamba, removal of the latter may allow the resistant weed to become a serious crop competitor. This is especially important if the swedes are slow to recover from spraying. In some trials, stagger weed (*Stachys arvensis*) or fumitory (*Fumaria muralis*) had taken over where redroot (*Amaranthus hybridus*) was killed; in others storksbill (*Erodium* spp.) and couch grass (*Agropyron repens*) became dominant when fathen was controlled; and in wet ground floating sweet grass (*Glyceria fluitans*) and kneed foxtail (*Alopecurus geniculatus*) thrived where willow weed (*Polygonum* sp.) was removed.

An increase in yield may still be obtained in spite of a resistant weed rising to dominance after elimination of susceptible competitors as shown in Trial 1, but under these conditions this increase is likely to be disappointing.

Damage to swedes from dicamba increases greatly when the rate is raised above 2 oz, and this rate must never be exceeded in swedes. Control of tall fathen, on the other hand, is improved only a little by higher rates. Much better control of fathen is obtained with even 1½ oz of dicamba applied when the fathen is 6 to 12 in. tall. Swedes appear to gain very little in tolerance between the 5- and 8-true-leaf stage. A rate of 1½ oz at the 5- to 6-leaf stage is probably safer to the crop than 2 oz at the 6- to 8-leaf stage, and is likely to give better control of fathen.

In many of the 1967 trials, spraying was delayed by wind; the fathen was over 2 ft tall when sprayed and was checked in growth rather than killed. It was obviously rendered less able to compete against the crop in this condition because yield increases were still obtained. In Trial 8, for instance, a yield increase of 10 tons per acre was obtained, not more than 3 of which could be ascribed to experimental error. Fathen checked but not killed by dicamba produces less seed, and the seed formed is of reduced viability.

Control of Californian thistle has been better than fathen and very good when done at the recommended stage. Control was poorer where stalks over 2 ft tall were sprayed, especially in the dry inland areas. Some regrowth occurred several months later in open but not in dense crops. Less Californian thistle has come up the following year after spraying dense choumoellier crops. Docks (*Rumex* spp.) and nodding thistle (*Carduus nutans*) emerging from roots have been checked for several months.

Seedlings of Scotch thistle (*Cirsium vulgare*) occur in small numbers in most crops and are useful indicators of areas which have received dicamba even at light rates. If seedling Scotch thistles survive, one can be sure that they were not sprayed with dicamba. Control of other seedling weeds has been listed below.

CONTROL OF WEEDS FROM DICAMBA AT 2 OZ A.I./ACRE

Sensitive: Control usually good to excellent. Scotch and nodding thistle; cornbind (*Polygonum convolvulus*); seedling sorrel and docks; red-root; black nightshade (*Solanum nigrum*).

Moderately Sensitive: Control fair to very good depending on size of weed, conditions of growth and density of crop. Fathen; willow weed.

Moderately Resistant: Checked but recover, and may increase in open crops. Chickweed (*Stellaria media*); spurrey (*Spergula arvensis*); wireweed (*Polygonum aviculare*); shepherd's purse (*Capsella bursa-pastoris*); fumitory (*Fumaria* spp.).

Very Resistant: Always increase in treated crops. All grasses; annual nettle (*Urtica urens*); stagger weed; speedwell (*Veronica persica*); storksbill; twin cress (*Coronopus didymus*); wild turnip (*Brassica campestris*).

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