

CONFIDENTIAL\*

4.9. EFFECT OF ROTATIONAL CULTIVATIONS  
ON WEED BEET, 1981

NAS 203 ML  
1st year

SUMMARY

In a long term cultivation experiment comparing ploughing, tine cultivation and direct drilling, large numbers of weed beet seed were sown immediately after a sugar beet crop was harvested in 1980. Emergence of weed beet is being studied in a three year rotation of sugar beet, winter wheat, winter wheat.

In the first winter wheat crop in 1981, no weed beet emerged after conventional ploughing. Relatively large numbers emerged after direct drilling (a total of 115/m<sup>2</sup>) with emergence after tine cultivation being intermediate. However there were only a small proportion of the seed sown (2.30% and 0.62% after direct drilling and tine cultivation respectively).

OBJECT

Ploughing, tine cultivation or direct drilling were compared on main plots for two cereal crops whilst ploughing, tine cultivation or strip tillage for sugar beet were compared on sub plots within each main plot in a long term cultivation experiment (NAS 203 ML) started in 1975. The object of the new subsidiary investigation started in 1981 is to study the emergence of weed beet in a three year rotation of sugar beet, winter wheat, winter wheat when large numbers of weed beet seed were scattered immediately after a sugar beet crop was harvested in 1980. Different sequences of cultivation systems for the cereals and beet may hasten or reduce the rate of weed beet decline between beet crops and increase or impede weed beet emergence in the beet crops. It is hoped that the information obtained will make it possible to prescribe cultivation sequences aimed at rapidly reducing weed beet populations (a) straight after weed beet seed has been shed in a beet crop and (b) where the seed has previously been dispersed throughout the ploughed layer.

\*NOT FOR PUBLICATION WITHOUT THE DIRECTOR'S CONSENT. This report deals primarily with only one year's work so any conclusions given are only provisional.

TREATMENTS

Existing cultivations trial

1. Main plot for cereals in 1975, 1976, 1978, 1979 and 1981
  - a) Traditional - conventional plough
  - b) Minimal - tine cultivation
  - c) Direct drill
  
2. Sub plots for sugar beet in 1977 and 1980
  - a) Traditional - conventional plough
  - b) Minimal - tine cultivation
  - c) Strip tillage

Mini plots of weed beet seed were sown immediately after the 1980 sugar beet crop was harvested. With three replicates of the cultivation treatments in sugar beet, 27 of these mini plots were sown.

METHOD

Mini plots of weed beet seed (4 m<sup>2</sup>) were sown on sub plots immediately before ploughing the appropriate main plots on 31 October 1980, before tine cultivation on 1 November and before a shallow pass with a dutch harrow and direct drilling with Bounty winter wheat using a Carrier drill on 3 November. In each of the 27 sub plots, approximately 5000 viable weed beet seed/m<sup>2</sup> were sown.

All husbandry details are as described in NAS 203 ML 81.

To allow for dispersal of some seed from the edges of each mini plot during subsequent cultivations, the numbers of weed beet in a 1 m<sup>2</sup> quadrat at the centre of each of the 4m<sup>2</sup> plots were counted on 3 April 1981, 11 May and 1 September. Emerged weed beet were sprayed with herbicide after each count.

RESULTS

Weed beet populations - plants/m<sup>2</sup>  
(% of seeds sown)

Method of cultivation for 1981 crop	Weed beet (plants/m <sup>2</sup> )			Total
	3 April	11 May	1 September	
Traditional	0.0	0.0	0.0	0.0
Minimal	21.4(0.43)	5.4(0.11)	4.0(0.08)	30.8(0.62)
Direct drill	42.1(0.84)	56.1(1.12)	16.9(0.34)	115.1(2.30)
SE	±4.81(0.096)	±1.80(0.036)	±0.92(0.018)	

At each of the three counts, no weed beet had emerged after conventional ploughing. On 3 April, an average of 21.4 weed beet/m<sup>2</sup> were found after tine cultivation, with 42.1/m<sup>2</sup> after direct drilling, whilst on 11 May 5.4 and 56.1/m<sup>2</sup> were present after tine cultivation and direct drilling respectively. Weed beet were counted again after harvest and on 1 September, an average of 4.0 plants/m<sup>2</sup> being found after tine cultivation and 16.9/m<sup>2</sup> after direct drilling. Total numbers of weed beet emerged up to this time were 0, 30.8 and 115.1/m<sup>2</sup> after conventional ploughing, tine cultivation and direct drilling respectively.

Conventional ploughing had effectively buried the weed beet seed with none emerging in this first winter wheat crop. In contrast, a relatively large number of weed beet emerged after direct drilling, with tine cultivation being intermediate, but these were only a small proportion of the seed sown.

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