

SUGAR BEET

THE EFFECT OF DOUBLES IN A CROP DRILLED TO A STAND

NAS 505 ML 73 (Ravens Grove)

SUMMARY: The presence of 7 or 13% doubles in a crop drilled to a stand using a polyploid variety did not reduce the efficiency of mechanical harvesting.

OBJECT: To determine the effect of doubles in a crop drilled to a stand on the yield of sugar beet and the efficiency of machine harvesting.

TREATMENTS: Main:- method of harvesting
1. Hand lifting
2. Machine harvesting

Sub:- percentage doubles removed
1. All doubles reduced to singles
2. 50% of doubles reduced to singles
3. All doubles left untouched

LAYOUT: 4 randomised blocks with split plots.
Treatment area 5 rows x 20in. x 159 ft
Harvest area 1 row x 20in. x 5 ft

SOIL TYPE: Ashley series (sandy loam)

PREVIOUS CROPPING: 1972 Spring wheat
1971 Potatoes
1970 Winter beans

MANURING: 5 cwt per acre Kainit (18% K_2O) in autumn before ploughing.
6 cwt per acre of a 23-10-11 compound fertiliser.

VARIETY: Pelleted 9-12/64th Sharpe's Klein Polybeet

DRILLED: 23 March

HARVESTED: 4 December

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METHOD: The experiment was drilled with Sharp's Klein Polybeet pelleted seed on 23 March at 7 in. spacing followed by pyrazone overall sprayed at 2.2 lb a.i. per acre. Establishment counts of plant stations and doubles were made on 22 May and nil, 50% and 100% of the doubles removed where necessary. All weeds were removed by hand hoeing.

Final plant population and final numbers of doubles were determined on 26 July. The experiment was harvested on 4 December after recent rain which resulted in wet plastic soil conditions.

RESULTS:

FINAL PLANT POPULATION (Plant stations 10^3 per acre) 26 July

Level of doubles	Method of harvesting		Mean
	Hand	Machine	
	($\pm 0.95V$)	($\pm 0.78HI$)	(± 0.67)
Nil	26.8 (0.0)	27.4 (0.0)	27.1 (0.0)
50% removed	28.4 (7.5)	27.7 (7.3)	28.1 (7.4)
All doubles left	28.1 (13.0)	28.7 (13.3)	28.4 (13.1)
	(± 0.03)		
Mean	27.8 (6.9)	27.9 (6.9)	

SE per main plot (3 df) ± 0.06 or 0.2% GM
SE per sub plot (12 df) = ± 1.90 or 6.8% GM

*Figures in brackets represent the actual percentage of plant stations containing two or more plants.

1. All treatments had very similar populations in terms of plant stations and any small variation in population was therefore not likely to affect yield. If expressed as total plants then obviously as the proportion of doubles increased the total plant population also increased.

2. The actual number of doubles obtained expressed as a percentage of plant stations are also given in the table. Using a polyploid variety drilled to a stand with no doubles removed the maximum proportion obtained was only 13% (slightly lower than the 16% obtained in 1971 and 1972).

TOTAL ROOT YIELD (ton per acre)

Level of doubles	Method of harvesting		Mean
	Hand	Machine	
	($\pm 0.522V$)	($\pm 0.595HI$)	(± 0.369)
Nil	20.34	17.46	18.90
50% removed	20.38	16.25	18.31
All doubles left	20.41	16.09	18.25
	(± 0.415)		
Mean	20.38	16.60	

SE per main plot (3 df) = ± 0.831 or 4.5% GM
 SE per sub plot (12 df) = ± 1.043 or 5.6% GM

1. Total yield of roots when hand harvested were not affected by the degree of doubles. When harvested by machine there was a slight tendency for yield to decrease with an increase in the proportion of doubles.
2. As the proportion of doubles increased there was also a slight increase in the incidence of small size roots. These additional small roots were virtually all recovered by the mechanical harvester.
3. The top tare from machine harvesting was not influenced by the proportion of doubles in the plant stand.

SUGAR YIELD (cwt per acre)

Levels of doubles	Method of harvesting		Mean
	Hand	Machine	
Nil	69.9	60.2	65.0
50% removed	70.7	55.2	62.9
All doubles left	69.8	55.2	62.5
Mean	70.1	56.8	

SE per main plot (3 df) = ± 2.35 or 3.7% GM
 SE per sub plot (12 df) = ± 3.70 or 5.8% GM

1. Sugar content was not influenced by the proportion of doubles in the stand nor by the method of harvesting.
2. When machine harvested sugar yield showed the same slight trend as was obtained from root yield. However, the interaction between method of harvesting and the degree of doubles was very small and not of statistical significance. At the level of doubles obtained from a polyploid variety 'drilled to a stand' the efficiency of mechanical harvesting was not affected.
3. Under these wet harvesting conditions machine harvesting gave a large yield loss of 13.3 cwt sugar per acre.

R.W.C.
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APPENDIX I

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SUGAR CONTENT (%)

Level of doubles	Method of harvesting		Mean
	Hand	Machine	
Nil	($\pm 0.179V$) 17.21	($\pm 0.207HI$) 17.23	(± 0.126) 17.22
50% removed	17.35	16.53	17.15
All doubles left	17.12	17.16	17.14
Mean	17.22	(± 0.147) 17.12	

SE per main plot (3df) = ± 0.293 or 1.7% GMSE per sub plot (12 df) = ± 0.357 or 2.1 GM

1. Sugar content was not affected by the level of doubles or by the method of harvesting

APPENDIX II

YIELD OF SMALL SIZE ROOTS (2.25in.) (ton per acre.)

Level of doubles	Method of harvesting		Mean
	Hand	Machine	
Nil	($\pm 0.103V$) 0.60	($\pm 0.106HI$) 0.44	(± 0.073) 0.52
50% removed	0.96	0.54	0.75
All doubles left	0.81	0.79	0.80
Mean	0.79	(± 0.063) 0.59	

SE per main plot (3df) = ± 0.127 or 18.4% GMSE per sub plot (12df) = ± 0.207 or 29.9% GM

1. On average hand harvesting recovered more small roots than machine harvesting. The incidence of small roots increased as the proportion of doubles increased.

APPENDIX III

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TOP TARE (%)

Level of doubles	Method of harvesting		Mean
	Hand	Machine	
Nil	(-0.33V) 5.2	(-1.22HI) 6.0	(-0.24) 5.6
50% removed	4.6	4.9	4.8
All doubles left	4.5	5.9	5.2
Mean	4.8	(-1.19) 5.6	

SE per main plot (3df) = ± 2.38 or 45.8% GM

SE per sub plot (12df) = ± 0.67 or 12.8% GM

1. Top tare was similar from hand or machine harvesting and was not affected by the proportion of doubles in the plant stand.

APPENDIX IV

YIELD OF SMALL ROOTS AS % TOTAL YIELD

Level of doubles	Method of harvesting		Mean
	Hand	Machine	
Nil	(-0.62V) 3.0	(-0.67HI) 2.6	(-0.44) 2.8
50% removed	4.7	3.3	4.0
All doubles left	4.0	5.0	4.5
Mean	3.9	(-0.44) 3.6	

SE per main plot (3df) = ± 0.89 or 23.6% GM

SE per sub plot (12df) = 1.24 or 32.9% GM

1. As the proportion of doubles increased there was also an increase in the proportion of small size roots.