

SUGAR BEET

THE EFFECT OF DOUBLES IN A CROP DRILLED TO A STAND

NAS 505 ML 72 (Bayle)

SUMMARY: The presence of 8% and 16% doubles in a crop drilled to a stand using a polyploid variety caused a yield loss of 0.8 and 0.9 ton per acre when harvested by hand and 0.9 and 1.2 ton per acre when harvested by machine. The presence of doubles caused little reduction in the efficiency of machine 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 20 in. x 127 ft
Harvest area 1 row x 20 in. x 120 ft.

SOIL TYPE: Ashley series (sandy loam)

PREVIOUS CROPPING:- 1971 Winter Barley
1970 Spring Barley
1969 Sugar Beet

MANURING: 6 cwt per acre Kainit in autumn
22 March 6 cwt per acre of a 22.11.11 compound fertiliser

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

DRILLED: 29 March

HARVESTED: 1 December

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METHOD: The experiment was drilled with Sharpe's Klein Polybeet pelleted seed on 5 April at 7 in. spacing followed by pyrazone overall sprayed at 2.2 lb a.i. per acre. Emergence counts of plant stations and doubles were made on the 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 number of doubles were determined on 18 July. The experiment was harvested on 1 Dec. by hand and machine under rather wet conditions.

RESULTS:

FINAL PLANT POPULATION (Plant stations '000 per acre) 18 July

Level of doubles	Method of harvesting		Mean
	Hand	Machine	
	(± 1.1V) (±0.9 HI)		(± 0.8)
Nil	27 (00)	30 (0.0)	29 (0.0)
50% removed	28 (8.2)	29 (7.9)	28 (8.1)
All doubles removed	29 (16.5)	26 (15.4)	27 (16.0)
Mean	28 (8.2) (±0.3)	28 (7.8)	

SE per main plot (3 df) = ± 0.6 or 2.0% GM

SE per sub plot (12 df) = ± 2.2 or 7.7% GM

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

1. The average population obtained from 7 in. spacing was 28,000 plant stations per acre. All treatments had 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 numbers of doubles obtained expressed as a percentage of plant stations are also given in the table. Using a polyphoid variety drilled to a stand with no doubles removed the maximum proportion of doubles was only 16% (identical to 1971 result)

TOTAL ROOT YIELD (ton per acre)

Level of doubles	Method of harvesting		Mean
	Hand	Machine	
	(± 0.632) (± 0.726)		(± 0.447)
Nil	21.67	20.08	20.87
50% removed	20.85	19.15	20.00
All doubles left	20.73	18.92	19.83
Mean	21.09	19.38	

SE per plot (3 df) = ± 1.019 or 5.0% GM

SE per sub plot (12 df) = ± 1.265 or 6.3% GM

1. Total yield of roots whether harvested by hand or machine showed a decline in yield as the proportion of doubles increased. The yield loss of 0.8 ton per acre due to 8% of doubles was very similar to the 1971 experiment. There was little further yield loss as the proportion of doubles increased to 16%.
2. When harvested by hand there was a small increase of 0.50 ton per acre in the incidence of small size roots as the proportion of doubles increased. The mechanical harvester only recovered 0.20 ton per acre of this increased amount of small roots.
3. Top tare was greater from machine harvesting but there was no indication that the proportion of doubles had any effect on topping efficiency.

SUGAR YIELD (cwt per acre)

Level of doubles	Method of harvesting		Mean
	Hand	Machine	
	(± 2.35 V) (± 2.60 HI)		(± 1.66)
Nil	78.9	72.5	75.7
50% removed	76.1	69.0	72.6
All doubles left	75.4	68.9	72.1
Mean	76.8	70.1	

SE per plot (3 df) = ± 3.49 or 4.8%

SE per plot (12 df) = ± 4.70 or 6.4%

1. Sugar content was not influenced by the proportion of doubles in the stand but was higher from hand lifted beet.
2. Sugar yield showed the same trends as root yield. As the proportion of doubles in the stand increased sugar yield tended to decrease. There was no interaction between the proportion of doubles and method of harvesting. The level of doubles obtained from a polyploid variety 'drilled to a stand' was 16% and at this level the efficiency of mechanical harvesting was little affected.

R.W.C.
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APPENDIX I

NAS 505 ML 72

SUGAR CONTENT (%)

Level of doubles	Method of harvesting		Mean
	Hand	Machine	
	(± 0.088) (± 0.076 HI)		(± 0.062)
Nil	18.21	18.06	18.13
50% removed	18.25	18.02	18.13
All doubles left	18.18	18.20	18.19
Mean	(± 0.023) 18.21 18.09		

SE per plot (3df) = ± 0.046 or 0.3% GMSE per sub plot (12 df) = ± 0.177 or 1.0% GM

- Sugar content was lower following machine harvesting but was not affected by the proportion of doubles in the stand.

APPENDIX II

YIELD OF SMALL SIZE ROOTS (ton per acre)

Level of doubles	Method of harvesting		Mean
	Hand	Machine	
	(± 0.116) (± 0.127 HI)		(± 0.082)
Nil	0.70	0.75	0.72
50% removed	0.95	0.88	0.91
All doubles left	1.20	0.90	1.05
Mean	(± 0.085) 0.95 0.84		

SE per plot (3 df) = ± 0.169 or 18.9% GMSE per sub plot (12 df) = ± 0.232 or 26.0% GM

- The mechanical harvester lost more small roots as the proportion of doubles in the stand increased.

TOP TARE (%)

Level of doubles	Method of harvesting		Mean
	Hand	Machine	
	(± 0.47)	(± 1.27 HI)	(± 0.33)
Nil	5.0	10.3	7.7
50% removed	5.0	10.8	7.9
All doubles left	5.0	10.8	7.9
Mean	5.0	(± 1.21) 10.6	

SE per plot (3df) = ± 2.42 or 31.0% GM

SE per sub plot (12 df) = ± 0.94 or 12.0% GM

1. Top tare was higher from machine harvesting but was not affected by increasing proportion of doubles in the stand.