

THE COST OF IRREGULAR SEED PIECE SPACING
AND REDUCED STANDS

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Over the past several years Robert Thornton has been experimenting with % stand and the effect of doubles on yield. This winter we attempted to estimate the effect of these factors on returns.

REDUCED STAND

Although there were 35 replications over two years the data were insufficient to sort out the statistical relationships. The raw data suggest that reduced stands do reduce returns, but there just isn't enough information to really measure the effect.

This is an increasingly common problem in that the questions being asked are becoming more sophisticated and the size of experiments suitable for research in the past is inadequate for today's questions. Yet the potential losses warrant the research expenditures to really answer the questions.

Percent stand is a good example. If the industry is averaging 25 tons per acre and 80% stand, the loss to the industry (compared to 100% stand) if average returns are \$65 per tons could be as much as \$22,500,000 per year. That assumes no compensatory effect by the plants. If half of the loss in stand is offset by greater production per plant, there is still a potential loss of \$16,250,000 per year.

In today's environment experiments cost about \$1000 per application. The cost of 200 replications is about \$200,000, but the return on that investment could be quite high.

IRREGULAR SPACING

The other work dealt with the effect of doubles on returns. Three years of work have been done on this question. However, only two were used in this analysis as the first year plots were planted much later and had a significantly shorter growing season which severely affected the results for that year.

Table 1 shows the spacings used to estimate the effects of doubles. Two ounce seed pieces were planted at the different spacings with doubles at 9, 18, and 27 inches. Triples were planted at 27 inches also.

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The values were calculated using the information in Table 2. Base price was set at \$60 per ton of useables. Two incentive clauses were used in the evaluation - size and specific gravity. During 1989, two payment schemes were used for each of these clauses and each has been considered here.

Table 3 lists the traditional size incentive. It has a base of 45% and pays \$0.50 per percentage point above or below the base. Maximum potential incentive is \$12.50 and the maximum possible penalty is \$7.50.

The new size incentive does not have a deduction as such. Table 4 shows this incentive. The payment pattern starts at \$1.00 per ton at 29% 10 oz. and larger. The incentive level increases up to \$8.00 at 40%, remains constant at \$8.00 up to 49% when the incentive payment begins to decline. The payment level declines until, at 56%, there is no longer a premium for 10 oz. and larger potatoes.

Tables 5 and 6 show the payment schedules for specific gravity used here. Table 4 is a commonly used schedule. The schedule ranges from \$-4.50 at 1.0700 to 1.0709 specific gravity to \$6.30 per ton at 1.093 specific gravity. The new schedule ranges from no incentive for specific gravities below 1.0760 to \$12.75 for gravities at 1.089 and above.

The data were evaluated with three incentive clause combinations. The first evaluation is based on the old style size and specific gravity clauses (Tables 3 and 5). The second evaluation is based on the traditional gravity clause and the new size clause (Tables 3 and 6). The third analysis is based on the new gravity and size clauses (Tables 4 and 6).

After the gross returns for each trial was calculated with the contract, the results were adjusted for the cost of seed. Figures 1, 2, and 3 show the effect of doubles on adjusted returns at alternative spacings and cost of seed delivered to the field.

The pattern of the curves in the figures suggest that the effect of doubles, as has been measured, is heavily influenced by seed cost. Although not shown here, if seed costs are ignored it was not possible to statistically measure the relationship between doubles and returns. As the cost of seed increased the statistical relationship increased in strength.

Figures 1 and 3 show that, at close spacings, the potential effect of doubles is approximately the same. However, the effect of the new clauses (both gravity and size) is to reduce the effect of seed cost more rapidly as spacing increases. (Note, in Figure 1 how the effect of doubles at 18" is still negative for \$9 seed cost. In Figure 3 the same effect is positive at 18 inches). The new size clause combined with the traditional gravity clause has a bigger negative effect on returns at closer spacings and the negative effect is worse in the range of common spacings than either of the other two analyses.

Table 8 shows the impact on returns of 100% doubles at 9" spacing. These results suggest that doubles have a negative effect on returns greater than the cost of the seed. The reduction in returns is greater than the cost of the extra seed. For example, at \$9 per cwt the seed cost per ac. is \$231. With the traditional incentives, the loss is \$87 greater than the cost of the additional seed planted (all the doubles).

Table 9 shows the effect of each 1% doubles. At \$12/cwt the loss in adjusted revenue per ac. (adjusted for seed cost) is \$5 and \$4 for the traditional and new clauses, respectively. If there were 10% doubles, with the traditional clauses, the loss per ac. would be \$50. With the new clauses, 10% doubles would cause a \$40 loss per ac.

It is likely that these results are understated. Earlier research on spacing indicates a significant relationship between spacing and total yields, and tuber size. There was insufficient information in the data used here to identify the full effects.

Table 1

PLANTING PATTERN

	ACTUAL SPACING Inches	AVERAGE SPACING Inches
	4.5	4.5
	9.0	9.0
Doubles at	9.0	4.5
	18.0	18.0
Doubles at	18.0	9.0
	27.0	27.0
Doubles at	27.0	13.5
Triples at	27.0	9.0

Table 2

89 FIELD TRIAL CONTRACT

			\$/TON	TOTAL \$
<u>Base</u>	Base Price		60.00	1692.00
	Processing Culls (2.0%) (Max 15.0%)		15.00	9.00
	Culls (4.0%)		0.00	0.00
	Fumigation Premium		0.00	0.00
<u>Contract</u>	Out of Field		0.00	0.00
<u>Incentives</u>	Specific Gravity	1.0820	2.10	59.22
	Size	47.0%	1.00	28.20
<u>Yield</u>	Useable%	94.00%	Useables	\$ 63.10/Ton
	Field Run Tons	30.00	Field Run	\$ 59.61/Ton
	lbs. Delivered	60000.00	Total Value	\$1788.42

Table 3

TRADITIONAL SIZE INCENTIVE

70%	12.50
69%	12.00
68%	11.50
67%	11.00
66%	10.50
65%	10.00
64%	9.50
63%	9.00
62%	8.50
61%	8.00
60%	7.50
59%	7.00
58%	6.50
57%	6.00
56%	5.50
55%	5.00
54%	4.50
53%	4.00
52%	3.50
51%	3.00
50%	2.50
49%	2.00
48%	1.50
47%	1.00
46%	0.50
45%	0.00
44%	-0.50
43%	-1.00
42%	-1.50
41%	-2.00
40%	-2.50
39%	-3.00
38%	-3.50
37%	-4.00
36%	-4.50
35%	-5.00
34%	-5.50
33%	-6.00
32%	-6.50
31%	-7.00
30%	-7.50

Table 4

NEW SIZE INCENTIVE

70%	0.00
69%	0.00
68%	0.00
67%	0.00
66%	0.00
65%	0.00
64%	0.00
63%	0.00
62%	0.00
61%	0.00
60%	0.00
59%	0.00
58%	0.00
57%	0.00
56%	0.00
55%	1.00
54%	2.00
53%	3.00
52%	4.00
51%	5.00
50%	6.00
49%	7.00
48%	8.00
47%	8.00
46%	8.00
45%	8.00
44%	8.00
43%	8.00
42%	8.00
41%	8.00
40%	8.00
39%	7.50
38%	7.00
37%	6.50
36%	6.00
35%	5.50
34%	4.50
33%	3.50
32%	3.00
31%	2.50
30%	2.00
29%	1.00
28%	0.00

Table 5.

TRADITIONAL SPECIFIC GRAVITY PAYMENT SCHEDULE

1.0930 and up	6.30
1.0920 - 1.0929	6.30
1.0910 - 1.0919	6.30
1.0900 - 1.0909	6.30
1.0890 - 1.0899	6.30
1.0880 - 1.0889	5.70
1.0870 - 1.0879	5.10
1.0860 - 1.0869	4.50
1.0850 - 1.0859	3.90
1.0840 - 1.0849	3.30
1.0830 - 1.0839	2.70
1.0820 - 1.0829	2.10
1.0810 - 1.0819	1.50
1.0800 - 1.0809	0.90
1.0790 - 1.0799	0.30
1.0780 - 1.0789	0.00
1.0770 - 1.0779	-0.30
1.0760 - 1.0769	-0.90
1.0750 - 1.0759	-1.50
1.0740 - 1.0749	-2.10
1.0730 - 1.0739	-2.70
1.0720 - 1.0729	-3.30
1.0710 - 1.0719	-3.90
1.0700 - 1.0709	-4.50
1.0690 - 1.0699	0.00
1.0680 - 1.0689	0.00
1.0670 - 1.0679	0.00
1.0660 - 1.0669	0.00

Table 6

NEW SPECIFIC GRAVITY PAYMENT SCHEDULE

1.0930 and up	12.75
1.0920 - 1.0929	12.75
1.0910 - 1.0919	12.75
1.0900 - 1.0909	12.75
1.0890 - 1.0899	12.75
1.0880 - 1.0889	12.50
1.0870 - 1.0879	12.25
1.0860 - 1.0869	12.00
1.0850 - 1.0859	11.75
1.0840 - 1.0849	11.50
1.0830 - 1.0839	11.00
1.0820 - 1.0829	10.00
1.0810 - 1.0819	9.00
1.0800 - 1.0809	8.00
1.0790 - 1.0799	7.00
1.0780 - 1.0789	6.00
1.0770 - 1.0779	4.00
1.0760 - 1.0769	2.00
1.0750 - 1.0759	0.00
1.0740 - 1.0749	0.00
1.0730 - 1.0739	0.00
1.0720 - 1.0729	0.00
1.0710 - 1.0719	0.00
1.0700 - 1.0709	0.00
1.0690 - 1.0699	0.00
1.0680 - 1.0689	0.00
1.0670 - 1.0679	0.00
1.0660 - 1.0669	0.00

Table 7

CONTRACT SPECIFICATIONS

1. Traditional size and gravity clauses.
2. Traditional gravity and new size clauses.
3. New gravity and new size clauses.

Table 8

LOSS IF 100% DOUBLES *

	SEED COST		
	\$9	\$12	\$15
Traditional	318.0875	487.9140	657.7404
New Clauses	258.7831	428.6095	595.7403

* Based on 9" spacing.

Table 9

**EFFECT OF 1% CHANGE
IN DOUBLES ***

	SEED COST		
	\$9	\$12	\$15
Traditional	3	5	7
New Clauses	3	4	6

* Based on 9" spacing.

Figure 1

**EFFECT OF DOUBLES ON RETURNS
TRADITIONAL CLAUSES**

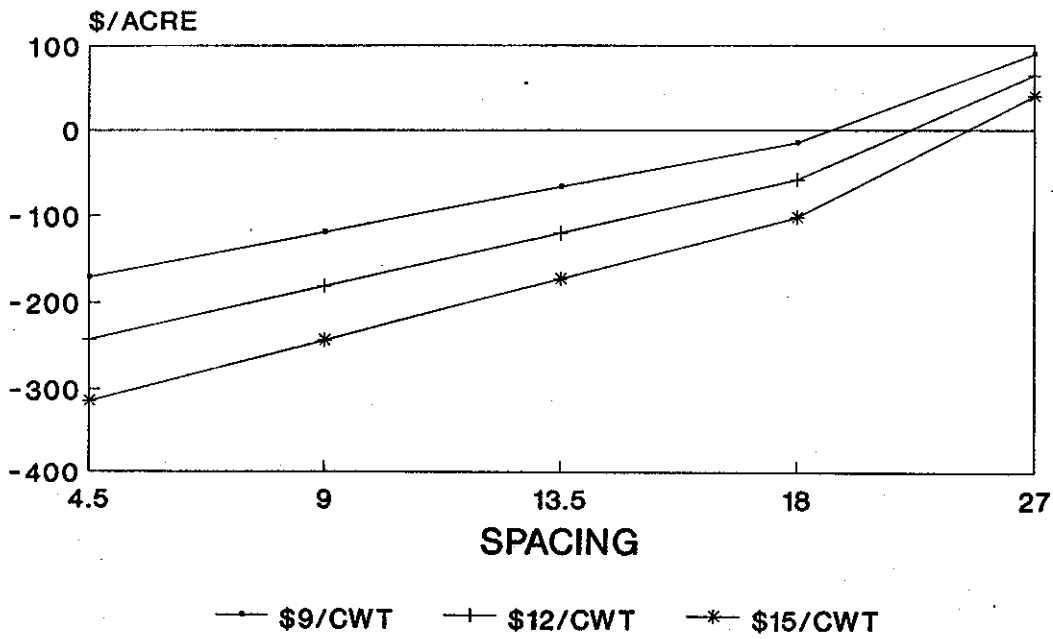


Figure 2

EFFECT OF DOUBLES ON RETURNS
NEW SIZE AND OLD GRAVITY

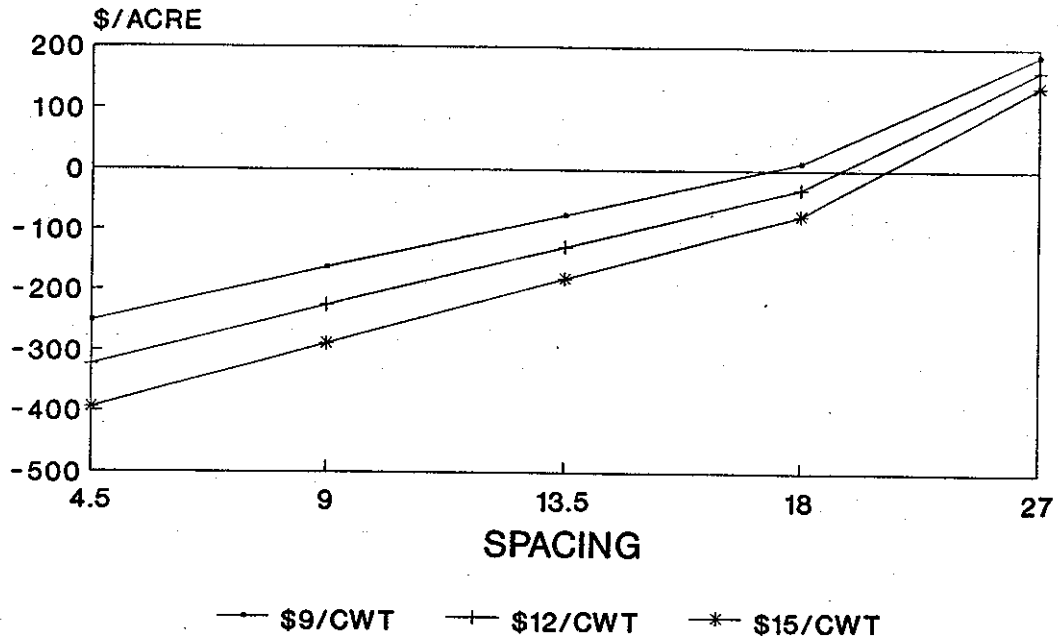


Figure 3

EFFECT OF DOUBLES ON RETURNS
NEW SIZE AND NEW GRAVITY

