ROW PLANTING For *ALFALFA SEED PRODUCTION*

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Planting of alfalfa in rows for seed production is now a common practice in southern Idaho. Row spacings vary among growers but are generally the same as for other row crops in the farm enterprise.

Considerable research has been done in past years on alfalfa seed culture in Idaho and neighboring states. However, optimum spacings of rows and plants within rows have not been adequately determined. Past research was conducted under considerably different conditions than those now found in southern Idaho. Probably the primary difference is the almost total dependence today of Idaho growers on wild pollinators — the leafcutter bee and alkali bee — for pollination of their seed crop.

To clarify the effects of cultural practices on alfalfa seed production in southern Idaho, studies were initiated in 1965 at the Parma and Twin Falls Branch Experiment Stations. Primary objectives were to determine optimum plant and row spacings for seed yield and to study the effects of plant density on other seed characteristics. Alfalfa was planted at various row spacings and compared. Additional comparisons were made after the first seed year by removing every other or every third row from the stand. Vernal was the variety chosen for these studies because of its relatively poor seed yield and because of its widespread use.

Similar management practices were used at both locations. Lygus and other harmful insects were controlled by recommended spray programs. Weeds were controlled by spray and cultivation; hand weeding was used only where other practices failed. Irrigation practices varied somewhat between years and locations. However, every effort was made to provide enough water to keep plants growing without excessive vegetative production. Leafcutter bees in excess of recommended numbers were provided as the main pollinators. These were supplemented by native populations of wild bees and honey bees at both locations. Early seed set was found most years and was attributed to honey bees since it occurred prior to emergence of the wild bees.

Early spring growth at both locations was delayed by cultivation prior to May 10. At Parma, one half of each plot was clipped May 20 to determine the effect of further delay on seed yield. The study at Parma was abandoned after the 1967 harvest because of extreme soil variability in the test area.

In the Parma study, seed yields increased as row spacings increased to 36 inches, then decreased as spacings widened (Table 1). These yields trends also occurred in both clipping treatments although the delayed growth produced lower seed yields.

TABLE 1. Pounds of seed per acre harvested from the alfalfa row spacing study at Parma in 1966 and 1967.

Row Spacing (inches)	1966 Clipped	1966 Not Clipped	1966 Ave.	1967 Clipped	1967 Not Clipped	1967 Ave.	2 Year Ave.
12"	314	760	537 b*	755	860	808	673 c
24"	526	968	747 a	810	842	826	787 b
36"	637	965	801 a	905	983	944	873 a
48"				885	946	916	
54"				836	968	902	
72"				599	906	753	
Ave.	492	898	695	813	916	865	777
C.V.%			17.8			14.5	9.5
L.S.D.(.05)			147			NS **	70

*Values followed by different letters are significant at the 5% level.
**Significant at the 10% level of probability.

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The results from the Twin Falls study were somewhat different (Table 2). The four year average seed yields from rows spaced from 7 to 36 inches apart were not significantly different, although yields peaked at the 22-inch spacing nearly every year. Spacing of rows further than 36 inches resulted in significantly lower seed yields primarily because of sharp decreases in yields at wider spacings in 1969.

TABLE 2. Pounds of seed per acre harvested from the alfalfa row spacing study at Twin Falls from 1966 to 1969.

Row Spacing (inches)	SEED YIELDS 1966	1967	1968	1969	3 year Average	4 year Average
7	528	840	895	1019 ab*	918 ab	820
15	563	890	825	1132 a	949 ab	853
22	628	955	1060	1057 ab	1024 a	925
30	582	893	947	954 b	931 ab	851
33		898	924	979 ab	934 ab	819
36	586	842	825	1024 ab	897 ab	
45		840	842	786 b	785 c	
54		825	773	602 c	733 c	
60		856	840	491 c	729 c	
72		781	753	591 c	708 c	
Ave.	578	863	874	868	868	855
C.V.%	29.9	14.8	20.1	16.1	11.4	11.8
L.S.D.(.05)	NS**	NS	NS	162	114	NS

*Values followed by different letters are significant at the 5% level.
**NS — Yield differences not significant.

Figure 1 illustrates how yields at Twin Falls decreased as spacing increased beyond 22 inches with moderate spacing being superior to hay stands. In contrast, Parma results showed a yield response as spacings increased to 36 inches. Further increases in row width produced a gradual yield reduction.

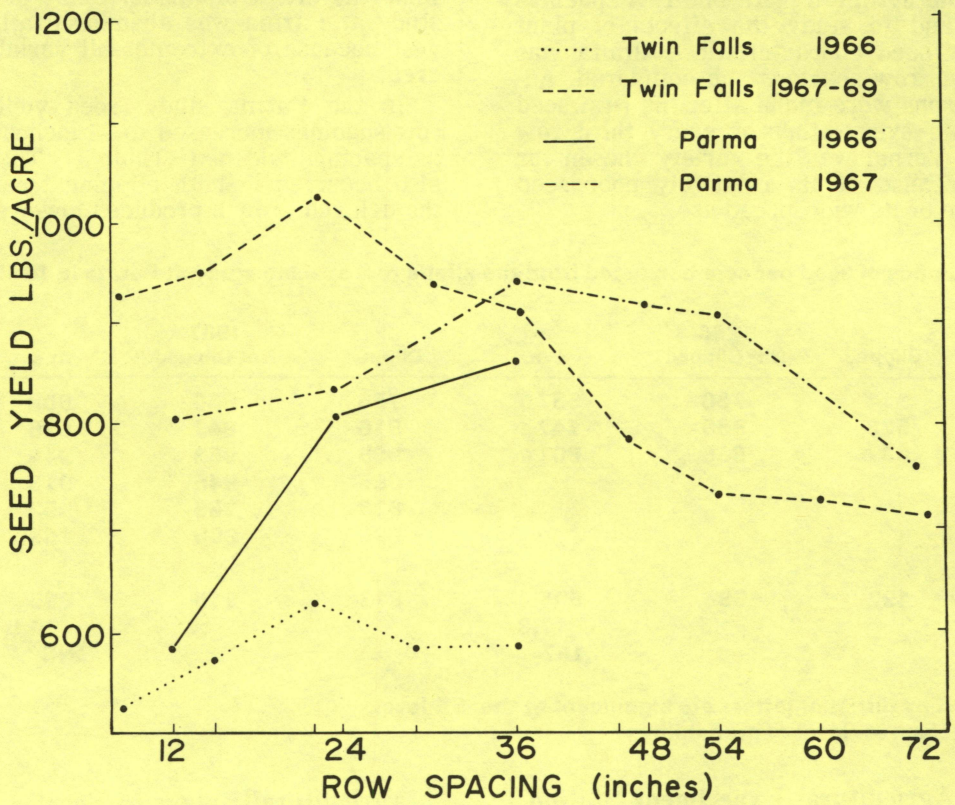

Figure 1. Average seed yields harvested from alfalfa row spacing studies at Parma and Twin Falls, 1966-69.

In a related study at Twin Falls, alfalfa plants spaced 24, 36, 48, and 60 inches apart were compared to plants in 4-and 8-inch rows. As shown in Table 3, plants spaced 24 inches apart yielded more seed than wider spacings or hay stands. Weight of seed per plant increased as space per plant increased, but yields per acre were lower because the yield increase was not sufficient to compensate for the smaller number of plants. Spaced plants were more robust, shorter, and bloomed earlier than those in the closely spaced rows.

TABLE 3. Seed yields in grams per plant and in pounds per acre harvested from the plant population study at Twin Falls from 1967 to 1969.

Plant Spacing	Grams of seed per plant				Pounds of seed per acre			
	1967	1968	1969	Ave.	1967	1968	1969	Ave.
4 inch rows					876 b*	780 a	635 ab	763 b
8 inch rows					941 b	715 ab	643 ab	766 b
24 inches	53.7	36.3	35.1	41.7	1288 a	871 a	842 a	999 a
36 inches	79.0	69.7	75.9	74.9	843 b	744 ab	793 a	792 b
48 inches	82.2	97.2	70.6	83.3	481 c	583 b	457 bc	507 c
60 inches	89.2	104.2	82.8	92.1	339 c	400 c	336 c	358 d
Ave.	76.0	76.9	66.1	73.0	794	682	618	697
C.V.%					15.6	20.4	11.0	10.2
L.S.D.(.05)					148	167	198	85

*Values followed by different letters are significant at the 5% level.

In 1964, some seed growers and seedsmen noticed that the number of scalded or brown seed might be less in row plantings than in hay stands. Seed was carefully harvested in 1967 so that light brown seed was retained in the threshing process to determine if row spacings affected the amount of brown seed. It was found that the percentage of brown seed did not differ greatly among spacings. However, large differences were found between Twin Falls and Parma (Figure 2). Extreme variation among plots was found at Twin Falls and Parma with some plots having over 30% brown seed.

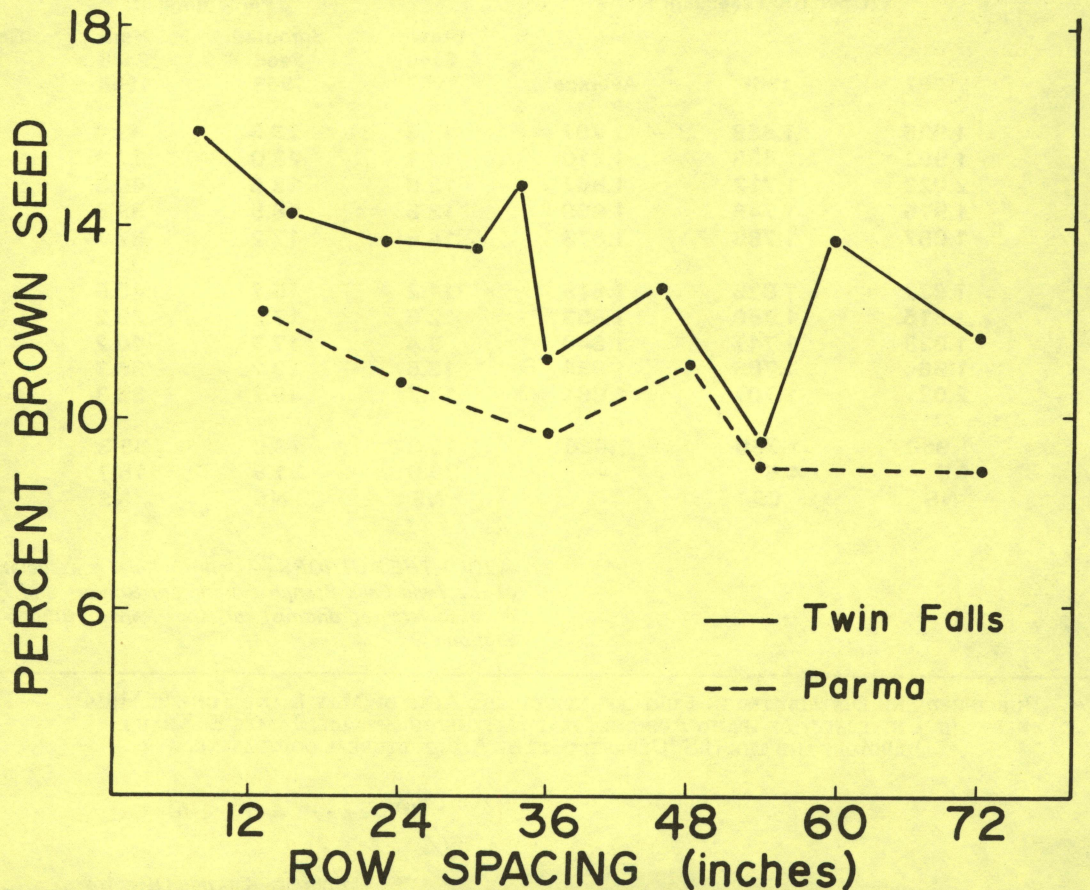

Figure 2. Percentage of brown seed in samples harvested from alfalfa row spacing studies at Parma and Twin Falls in 1967.

Effect of spacing on seed size was determined by counting 200 to 400 seeds per sample. Little difference was found among spacings at Twin Falls (Table 4), but the difference between years was very large. Part of the differences could be attributed to the rainy harvest period of 1968 when much of the early seed was lost by sprouting and shatter leaving a higher percentage of late maturing, light seed.

Germination of seed produced in 1968 showed a high content of hard seed but no differences among spacings in total germination of hard seed. Percentage of sprouted seed based on actual number of sprouted seeds per sample also did not show any significant differences among spacings although the percentage of sprouting was highest for the close spacings.

Summary

Our brief studies indicate that production of alfalfa seed from rows is advantageous compared to use of hay stands providing that row width does not become excessive. Considerable latitude exists for growers to determine the spacing best suited to their growing conditions and farm equipment.

Highest yields were obtained from the 22-inch spacing at Twin Falls and the 36-inch spacing at Parma. The higher yield from the wider spacing at Parma probably can be attributed to the longer growing season and warmer temperatures. These conditions produced larger plants that more efficiently could utilize the extra space available. This response to wider spacing was especially noticeable in the alfalfa that was not delayed by clipping.

Seed weight or quality differences among spacings were difficult to ascertain because of extreme variability in the experimental results. Seed from hay stands were generally lower in quality being lighter in weight with highest percentage of brown seed and sprouted seed.

When stands were thinned to individual plants at various spacings highest seed yields were from plants spaced 24 inches apart. Yields decreased as spacing became wider and solid stands yielded less than moderate spacing (24''-36'').

The results of these studies were consistent with those reported by the Utah workers. They found that opening stands by row planting and by thinning stands within rows stimulated seed production. Increased seed production was due largely to making alfalfa plants more attractive to pollinators.

TABLE 4. Weight per 1000 seeds in grams and other data from the alfalfa row spacing study at Twin Falls from 1966 to 1969.

	Wt. per 1000 seeds (gr.)			Percentage of			
Spacing	1967	1968	Average	Brown Seed 1967	Sprouted Seed 1968	Hard Seed 1968	Germinable Seeds 1968
7	1.925	1.668	1.797	15.8	23.3	42.8	82.8
15	1.992	1.628	1.810	14.1	23.0	37.3	82.6
22	2.022	1.712	1.867	13.6	18.5	40.3	84.0
30	1.975	1.746	1.860	13.5	16.9	39.8	82.0
33	1.957	1.788	1.873	14.6	17.2	37.3	85.5
36	1.932	1.825	1.879	11.2	15.7	40.5	86.3
45	1.915	1.750	1.833	12.6	17.2	39.2	84.2
54	1.933	1.747	1.840	9.4	17.3	40.2	84.5
60	1.964	1.708	1.836	13.6	19.2	38.3	81.8
72	2.021	1.707	1.864	11.7	19.7	36.3	84.1
Ave.	1.960	1.730	1.846	13.0	18.5	39.3	83.7
C.V.%	4.9	4.6	-	30.0	31.9	15.7	7.5
L.S.D.(.05)	NS	.094	-	NS	NS	NS	NS

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PUBLISHED AND DISTRIBUTED IN FURTHERANCE OF THE ACTS OF MAY 8 AND JUNE 30, 1914 BY THE UNIVERSITY OF IDAHO AGRICULTURAL EXTENSION SERVICE, JAMES E. KRAUS, DIRECTOR; AND THE U.S. DEPARTMENT OF AGRICULTURE, COOPERATING.

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