

Growing Sugar Beets Following Alfalfa In Montana¹

H. E. MORRIS and M. M. AFANASIEV²

In rotations in which sugar beets are grown as the principal cash crop, alfalfa has an important place. However, many failures of sugar beets have been recorded when alfalfa was the preceding crop. Koot rots of sugar beet seedlings have been prevalent in Montana for many years, and this condition usually seems to be more severe when sugar beets immediately follow alfalfa.

The usual procedure in handling alfalfa in the rotation is as follows. The land is shallow plowed (crowned) after the third crop has been removed. From 3 to 4 weeks later, or as soon as the severed roots have dried, the land is plowed to a depth of 8 inches and left rough over winter. In the spring a satisfactory seedbed is prepared by disking, harrowing, and leveling.

Very little if any decomposition of the residual alfalfa material takes place until warm weather occurs, which usually coincides with the germination and early growth of the young beets. Therefore, competition for available nutrients, especially nitrogen, occurs between

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²Montana Agricultural Experiment Station, Bozeman, Mont.

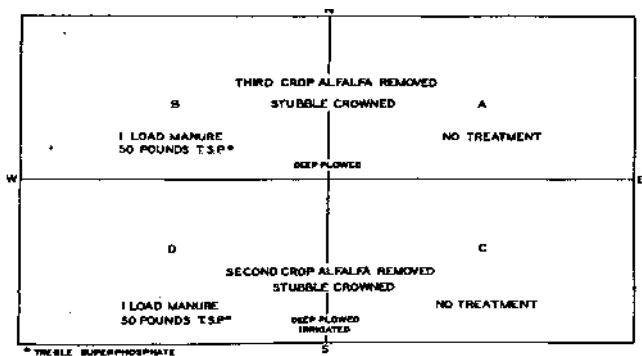


Figure 1.—Different treatments of a 2-year-old alfalfa plot: (Rotation 46), Huntley (Mont.) Field Station, 1942-1945.

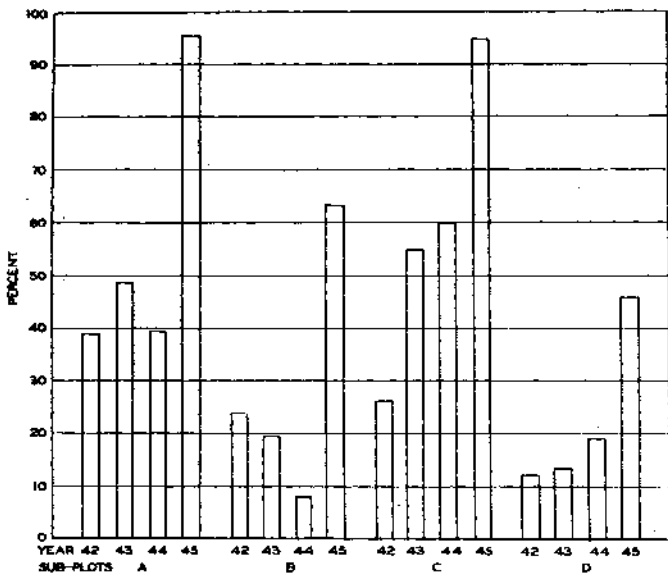


Figure 2.—Seedling diseases of sugar beets on sub-plots A. B. C. D, Rotation 46, Huntley (Mont.) Field Station, 1942-1945.

the young beets and the organisms concerned with decomposition of the organic matter plowed under in the fall.

It is a well-known fact that alfalfa is a heavy feeder on the available phosphorus supply in the soil. It is an equally well-known fact that sugar beets require considerable amounts of available plant food, especially nitrogen and phosphorus, in order to produce strong, vigorous plants resistant to the attack of soil organisms which often cause seedling diseases. Following alfalfa, sugar beets often suffer from a lack of nitrogen in their early stages of growth, and beets grown in unfertilized soil immediately following alfalfa frequently show the characteristic symptoms of phosphate deficiency in mid-season or later.

The importance of handling alfalfa land preceding sugar beets in order to secure good stands and yields of beets was well demon-

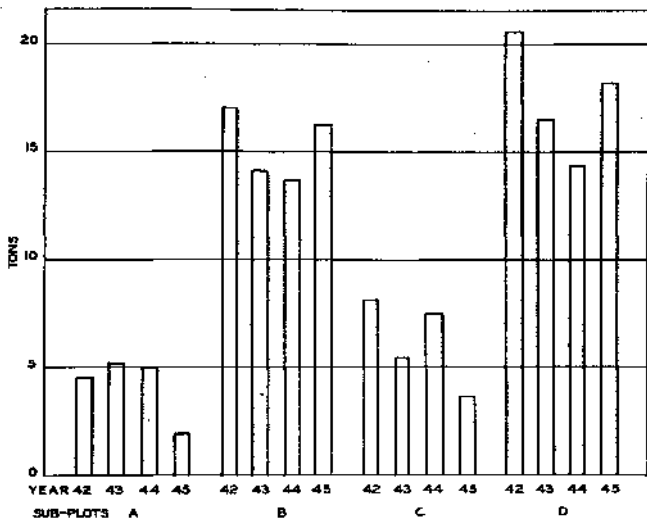


Figure 3.—Yield (tons) of sugar beets on sub-plots A, B, C, D, Rotation 46, Huntley (Mont.) Field Station, 1942-1945.

strated in an experiment started in the fall of 1941, using the plots of Rotation 46 at the Huntley Field Station. This rotation, begun in 1916, consisted of 2 years of alfalfa, sugar beets, and oats in one-fourth-acre plots. For 5 years previous to 1941 the yield of sugar beets in this rotation averaged less than 3 tons per acre. It was often necessary to replant the beet plot largely because of loss of seedlings from root rot which resulted in a poor stand.

In 1941 the one-fourth-acre plot (second year alfalfa) in Rotation 46 was equally divided into four small plots. In sub-plots G and D the alfalfa stubble was shallow plowed after the second crop of hay was removed; treble superphosphate (50 pounds) and manure (1 ton) were applied to sub-plot D, and 2 or 3 weeks later these two plots were plowed and irrigated (figure 1).

The third crop of alfalfa was removed from sub-plots A and B, the stubble was shallow plowed, and treble superphosphate (50

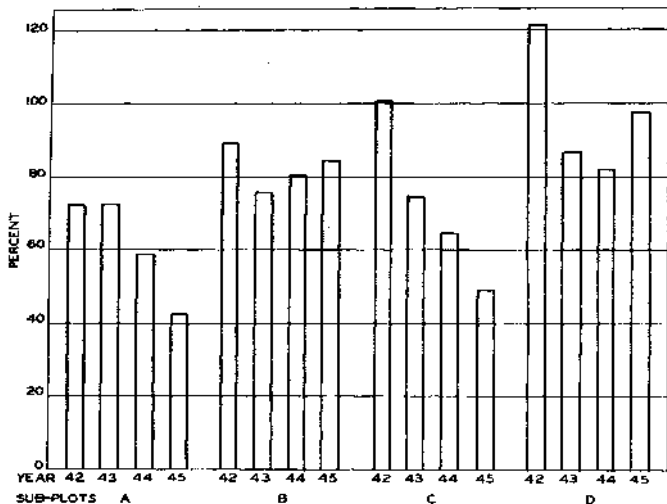


Figure 4.—Stand of sugar beets on sub-plots A, B, C, D, Rotation 46, Huntley (Mont.) Field Station, 1942-1945 (percentage of theoretical stand 26.13%).

pounds) and manure (1 ton) were added to sub-plot B, and 2 or 3 weeks later the two plots were deep plowed (figure 1).

In the spring the same cultural procedures were followed on all four sub-plots, and each was planted to sugar beets. During the 3 following years a different plot of Rotation 46 was treated in a similar way.

The yield of beets in tons, the stand, and the amount of seedling diseases in each of the sub-plots, A, B, C, and D, are shown in figures 2 and 4 and table 1.

The results show that the addition of treble superphosphate and manure to the alfalfa soil before the beets were planted was highly beneficial in producing good stands and yields of beets with less seedling disease in comparison with beets planted in unfertilized alfalfa soil.

Low yields in sub-plots A and C each year are explained by the fact that the beets in their early growth had to compete with the organism causing decomposition of the alfalfa residue for their nitro-

Table 1.—Sugar beet sub-plots of Rotation 46, Huntley (Mont.) Field Station.

Plots	Stand*			
	(percent of theoretical stand 1942)	(percent of theoretical stand 1943)	stand 26,136 1944	1945
A	72.5	727f	5&8	42.2
B	89.4	75.7	80.9	85.2
C	101.5	74.0	G5.3	49.0
D	121.9	86.7	82.6	97.8
	Seedling diseases†			
	(percent)			
A	38.2	47.2	39.3	94.0
B	23.2	19.7	7.5	62.5
C	26.2	54.5	60.0	94.9
D	12.8	13.9	18.6	56.5
	Yield			
	(tons per acre)			
A	4.40	5.30	5.10	1.93
B	36.88	14.22	13.45	16.17
C	8.11	5.38	7.42	3.43
D	20.48	16.37	14.14	17.94

*Stand determined on thinned beets.

†Seedling diseases determined on unthinned beets.

gen supply, and later in the season they suffered from lack of phosphorus as the alfalfa had used a great deal of the available phosphorus.

Summary

1. The results of this test, which extended over 4 years, show that if sugar beets follow alfalfa the soil should be plowed after the second crop of alfalfa, which should preferably be plowed under, and some additional nitrogen (manure) and phosphorus should be added.

2. After the alfalfa is turned under, irrigation should be used to aid decomposition.

3. The planting of sugar beets on late-fall-plowed alfalfa land, unless manure, nitrogen, and phosphorus are added to the soil, is not recommended because the prevalence of root rots makes it difficult to obtain a satisfactory stand and yield.