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Land Drainage: A Key to Increased Productivity

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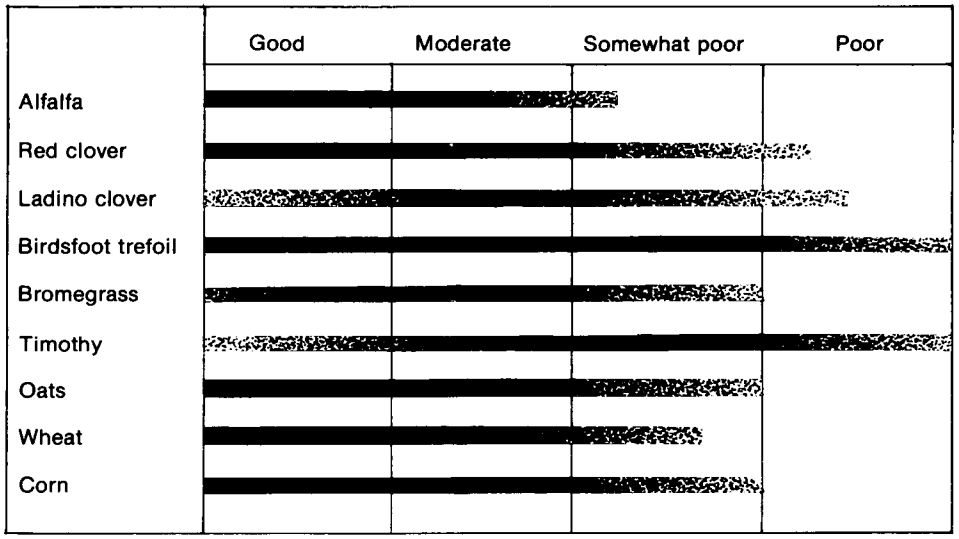

Chart 1. Crop adaptation to soil drainage

Land drainage—the removal of excess water from the soil—increases the productivity of farmland. Most soils with drainage problems are "late" soils—they do not become dry enough to work until late in the planting season. It has been shown that late planting, especially for corn, reduces the yields about 1 bushel per day. A 2-week delay would reduce the yield of a potential 100-bushel-per-acre crop by about 14 percent. And the cost of seed, fertilizer, plowing, fitting, and pesticides is just as high as for a 100-bushel crop of corn.

Crop Adaptation to Soil Drainage

Most crops grow best in well- or moderately well-drained soils. The chart indicates that some crops tolerate wetness better than others. Timothy and birdsfoot trefoil, for example, tolerate somewhat poorly drained soils better than does alfalfa.

But this does not mean that those crops that tolerate wetter conditions produce as well in wet soils as they would if the same soils were drained. Birdsfoot trefoil, for example, tolerates somewhat poorly and poorly drained soils; but yield data from Ithaca show that birdsfoot trefoil produces better yields on better drained soils. The average yields of birdsfoot trefoil, over a 3-year period, were 3.4 tons per acre in moderately well-drained soils and only 3.0 tons per acre on somewhat poorly drained soils. If the experiment had been continued longer, there would probably have been differences in how long the trefoil persisted under the different drainage conditions.

Drainage Improvement Increases Crop Yields

A comparison of crop yields before and after drainage in Jefferson County yielded the data shown in table 1. Table 2 gives comparisons of corn silage yields on drained and nondrained parts of a field in Clinton County. Drained and nondrained sections of the field were treated in the same way. The same corn variety was planted on the same date, and the same rates of fertilizer were used. The differences in yield are due solely to differences in soil drainage. The yield

Table 1: Effects of drainage on crop yields in Jefferson County

Crop	*Before drainage*	*After drainage*
Corn silage	11 tons/acre	16 tons/acre
Oats	52 bushels/acre	65 bushels/acre
Hay	2.4 tons/acre	3.5 tons/acre

Table 2: Effects of drainage on corn yields in Clinton County

Year	*Drained*	*Nondrained*
	tons/acre	*tons/acre*
1975	18	13
1976	23	8
1977	21	19
3-year average	20	13

differences might have been larger if the drained area had been planted as early as the soils would have allowed. Some yield reduction was incurred by waiting until the nondrained soil was ready to work.

Drainage Improves Crop Quality

The longevity of legumes is generally reduced in the wetter soils. This effect is not always reflected in the crop yields because the legume is often replaced by grasses. Total yield may not decrease dramatically, but crop quality may decline. For example, the composition of hay harvested in 3 successive years from a seeding of Empire birdsfoot trefoil-timothy on moderately well-drained and somewhat poorly drained soils showed the results given in table 3.

One might argue that grass, properly harvested, makes high-quality hay. However, it makes expensive hay if you plant birdsfoot trefoil and harvest mostly *grass* hay. If you combine these data with the yield figures, it becomes clear that even a "tolerant" crop like birdsfoot trefoil-timothy produces better yields, as well as better quality, on better drained soils (see table 4).

Table 5 shows that alfalfa is not well adapted to soils that have poor drainage, and experimental data confirm this conclusion.

These data confirm farmer experiences: improved soil drainage can produce better yields of better quality crops. Obviously, the economics of such better crops are tied to the overall program of business management and the costs of drainage improvement. These aspects of farm management are discussed elsewhere in this series.

Table 3: Effects of drainage on hay composition

		First harvest			*Second harvest*		
Year	*Drainage*	*Trefoil*	*Grass*	*Weeds*	*Trefoil*	*Grass*	*Weeds*
		%	%	%	%	%	%
1	Good	66	24	10	74	19	7
	Poor	37	45	18	63	17	20
2	Good	32	63	5	81	14	5
	Poor	40	55	5	76	17	7
3	Good	26	63	11	63	21	16
	Poor	28	61	11	56	15	29

Table 4: Effect of drainage on yields of trefoil-timothy mixture (at 15% moisture)

Year	*Drainage*	*1st cut*	*2nd cut*	*Total*
		tons/acre	*tons/acre*	*tons/acre*
1	Good	3.2	0.8	4.0
	Poor	2.1	0.6	2.7
2	Good	2.5	0.4	2.9
	Poor	2.0	0.3	2.3
3	Good	2.4	0.5	2.9
	Poor	2.1	0.8	2.9

Table 5. Effect of drainage on alfalfa yields (at 15% moisture)

Year	*Drainage*	*1st cut*	*2nd cut*	*Total*
		tons/acre	*tons/acre*	*tons/acre*
1	Good	2.9	1.4	4.3
	Poor	1.4	0.5	1.9
2	Good	3.2	1.4	4.6
	Poor	1.0	0.7	1.7
3	Good	2.1	0.9	3.0
	Poor	1.8	0.6	2.4

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