

EFFECT OF SEEDING DATE ON 3 MALTING BARLEY VARIETIES

In North Central North Dakota

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Growers of malting barley and the malting industry are concerned about the high protein and low per cent of plump kernels in barley. This interest has prompted considerable research concerning these problems. Experiments in North Dakota have indicated a number of contributing factors. One is the effect of delayed seeding. In this project, started in 1963, the variables of variety and seeding date were studied.

Zubriski (4) found that delayed seeding resulted in a decrease in yield, test weight, and per cent of plump kernels. It also resulted in an increase in barley protein. Seeding delayed beyond a certain time also resulted in decreased yields in research conducted by Peterson and Foster (2). They said early seeding of barley helps it escape the hazards of foliar diseases and high temperatures during the kernel development period.

Research in Iowa (1) (3) with oats also indicated delayed seeding lowers yields. Wiggans (3) reported that a delay of 3 to 4 days at seeding time resulted in a one-day delay at maturity. Frey (1) tested three varieties of oats at various seeding dates. He found that varieties reacted differently to delayed seeding. The higher yield of Andrew oats was attributed to the development of more seeds per head than on the other varieties. In the same test the relative 100 kernel weight was similar for all varieties for the late seeding.

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PROCEDURE

Uniform lots of Larker, Traill and Dickson malting barley seed were selected for testing in each year from 1964 through 1967. Only Larker and Traill were tested in 1963. Rod row plots, with 12 inches between rows, were planted by hand at the rate of 1¼ bushels of seed per acre. The seed was treated with a mercuric fungicide before planting. Each year three plantings were made at two-week intervals, starting with the first seeding around May 8. The plots were kept weed-free by hand weeding. The experiment was set up as a split block design and each treatment was repeated 4 times. Complete field notes were kept

Table 1. Effect of seeding date on the growth of malting barley in North Central North Dakota. (1965-1967 average).

Seeding Date	Days from planting to		Days from emergence to		Plant ht. Ins.
	Heading	Ripe	Heading	Ripe	
May 8 (7-9)	62b ¹	87 ^b	50 ^b	75 ^b	32 ^b
May 22 (20-24)	55 ^{ab}	79 ^a	46 ^{ab}	70 ^a	31 ^b
June 6 (3-10)	52 ^a	76 ^a	46 ^a	70 ^a	26 ^a

¹Averages within each column do not differ significantly at the 0.5 level if they are followed by the same letter.

Table 2. Leaf disease readings of three malting barley varieties in North Central North Dakota. (1965-1967 average).

Variety	Leaf diseases on 1-10 scale		
	Septoria	net & spot blotch	total infection
Dickson	2.7 ^{a1}	1.7 ^a	4.4 ^a
Larker	4.2 ^b	2.3 ^b	6.5 ^b
Traill	4.0 ^b	2.1 ^b	6.1 ^b

¹Averages within each column do not differ significantly at the 0.5 level if they are followed by the same letter.

Table 3. Test weight of seed produced from three malting barley varieties grown in North Central North Dakota. (1965-1967 average).

	Test weight in lbs./bushel			Effect of variety
	May 8	May 22	June 6	
Dickson	47.2 ^{a1}	45.2 ^a	43.8 ^a	45.4 ^a
Larker	47.9 ^a	45.5 ^a	45.6 ^b	46.3 ^b
Traill	47.3 ^a	45.3 ^a	44.1 ^a	45.5 ^a
Effect of seeding date	47.5 ^b	45.3 ^{ab}	44.5 ^a	

¹Average values within seeding date and effect of variety columns, and effect of seeding date lines being compared do not differ significantly at the .05 level if they are followed by the same letter.

and after harvest additional data were collected on yield, test weight, protein¹ and kernel size distribution. Data from 1965 through 1967 were statistically analyzed to determine significance. The data from 1963 and 1964 were not complete and therefore not analyzed with the other three years.

Results and Discussion

One of the more important factors affecting

¹The per cent protein in the grain was determined by the Soils Department, North Dakota State University.

the length of growing season in this test was the time required for the barley to emerge after planting. The May 8 seeding took an average of 12.5 days to emerge, whereas the May 22 only required 9.2 and the June 6 seeding 6.5 days. All varieties emerged at the same time at each seeding date.

Seeding date also had a significant effect on days from planting to head or ripe. This difference between seeding dates can be attributed largely

Table 4. The effect of seeding date on the yield of three malting barley varieties grown in North Central North Dakota. (1963-1967).

Seeding Date	Variety	Yield in bushels per acre					4-yr.* Ave.	3-yr. Ave. 1965-67
		Year						
		1963	1964	1965	1966	1967		
Early May (7-9)	Dickson	1	38.5 ^b	62.4 ^c	62.5 ^a	34.9 ^a		53.3 ^b
	Larker	59.2 ^b	34.0 ^b	38.4 ^a	61.5 ^a	35.0 ^a	48.5 ^a	45.0 ^a
	Traill	45.2 ^a	27.2 ^a	44.2 ^b	59.8 ^a	34.2 ^a	45.9 ^a	46.0 ^a
Late May (20-24)	Dickson		40.1 ^b	57.6 ^b	57.7 ^a	45.2 ^b		53.5 ^b
	Larker	38.9 ^b	38.0 ^b	41.7 ^a	53.5 ^a	34.7 ^a	42.2 ^a	43.3 ^a
	Traill	31.4 ^a	32.7 ^a	41.8 ^a	51.0 ^a	42.1 ^{ab}	41.6 ^a	45.0 ^a
Early June (3-10)	Dickson			43.9 ^b	67.3 ^a	29.5 ^a		46.9 ^a
	Larker	40.3 ^b		35.6 ^a	68.3 ^a	27.5 ^a	42.9 ^a	43.8 ^a
	Traill	31.1 ^a		41.2 ^b	60.4 ^a	28.4 ^a	40.3 ^a	43.3 ^a
Variety average over all seeding dates								
	Dickson		39.3 ^b	54.6 ^b	62.5 ^b	36.5 ^a		51.2 ^b
	Larker	46.1 ^b	36.0 ^b	38.6 ^a	61.1 ^{ab}	32.4 ^a	44.6 ^b	44.0 ^a
	Traill	35.9 ^a	30.0 ^a	42.4 ^a	57.1 ^a	34.9 ^a	42.6 ^a	44.8 ^a
Seeding dates average over all varieties								
Early May		52.2 ^b	33.2 ^a	48.3 ^b	61.3 ^b	34.7 ^{ab}	49.1 ^b	48.1 ^b
Late May		35.2 ^a	36.9 ^a	47.0 ^b	54.0 ^a	40.6 ^b	44.2 ^a	47.2 ^b
Early June		35.7 ^a		40.2 ^a	65.4 ^b	38.5 ^a	42.5 ^a	44.7 ^a

*Average values within each three division column do not differ significantly at the 0.5 level if they are followed by the same letter.
*1964 date not included.

Table 5. Effect of seeding date on the protein content in three malting barley varieties grown in North Central North Dakota. (1965-1967).

Seeding Date	Variety	Per cent protein in barley 1965-1967			
		Year			
		1965	1966	1967	1965-67 ave.
Early May (7-10)	Dickson	14.5 ^{b1}	12.1 ^a	12.8 ^a	13.1 ^a
	Larker	15.0 ^c	12.9 ^b	13.0 ^a	13.6 ^a
	Traill	13.8 ^a	12.0 ^a	13.0 ^a	12.9 ^a
Late May (20-24)	Dickson	13.2 ^b	12.0 ^a	13.6 ^a	12.9 ^a
	Larker	13.6 ^b	12.7 ^b	14.0 ^a	13.4 ^a
	Traill	12.6 ^c	12.1 ^{ab}	13.2 ^b	12.6 ^a
Early June (3-10)	Dickson	15.6 ^a	12.9 ^a	14.2 ^a	14.2 ^a
	Larker	16.2 ^b	13.9 ^b	14.3 ^a	14.8 ^a
	Traill	15.3 ^a	12.6 ^a	14.1 ^a	14.0 ^a
Variety average over all seeding dates					
	Dickson	14.4 ^b	12.4 ^a	13.5 ^a	13.4 ^{ab}
	Larker	14.9 ^c	13.2 ^b	13.7 ^a	13.9 ^b
	Traill	13.9 ^a	12.2 ^a	13.4 ^a	13.2 ^a
Seeding dates average over all varieties					
Early May		14.4 ^b	12.4 ^a	12.9 ^a	13.2 ^a
Late May		13.1 ^a	12.3 ^a	13.6 ^b	13.0 ^a
Early June		15.7 ^c	13.1 ^b	14.2 ^b	14.3 ^b

*Average values within each three division column do not differ significantly at the 0.5 level if they are followed by the same letter.

to the time required for the crop to emerge. If the days are measured from emergence to head or ripe, the differences between seeding dates are not as large. The range between seeding dates in days from planting to head were 52 to 62 days, or a 10 day difference. From emergence to head, the range is 45.5 to 49.5 days, or a 4.0 day difference. The trend was the same when considering days to ripe. There was no significant difference between varieties regardless of the seeding date (Table 1).

Lodging was not a serious problem during the time this experiment was conducted. It was, however, more common for the earlier seedings. The late seeded barley was six inches shorter, thus less likely to lodge (Table 1). All varieties reacted the same concerning lodging.

Leaf diseases were serious in 1965 as indicated by the large yield differences between Dickson and the other varieties (Tables 2-4). Dickson showed the most resistance to septoria, net blotch and spot blotch and yielded more when these diseases were serious. In 1966 and 1967, the infection was light and the yield differences between the varieties were much less. Because of low humidity in 1966 and 1967, diseases were light and there was no significant difference in disease infections between seeding dates.

Test weight decreased with each delay in seeding. Larker produced a significantly heavier average test weight than Dickson or Traill. The largest test weight difference occurred in the June seeding (Table 3).

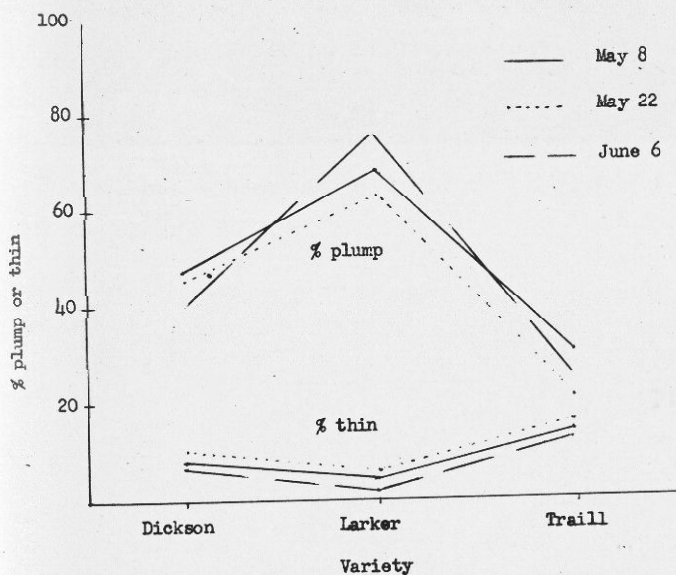


Figure 1. The per cent plump and thin kernels in three malting barley varieties grown in North Central North Dakota. (1965-1967).

In the years when plant disease seriously affected yield, the yield for Dickson was substantially greater than for the other varieties (Table 4). The lower yield for the last seeding date in 1965 and especially in 1967 is considered due more to drouth and high temperatures during the filling stage of development than plant disease infections. This is indicated by the smaller yield differences between varieties. Larker yielded significantly more than Traill in the 4 year average. The 3 year average yield of the first two seeding dates were significantly more than for the June seeding date.

In other crop measurements, the variety Larker had significantly more plump kernels than Dickson and it in turn was significantly more plump than Traill. The reverse trend was true for per cent thin. There was no significant difference between seeding dates (Figure 1).

The 3 year average per cent protein for the June seeding was significantly higher than for the two earlier seeding dates (Table 5). The protein of the barley produced from the May 22 seeding was lower than expected. This was a result of the low protein per cent recorded for that seeding date in 1965. In 1966 it was about equal to the May 8 seeding and significantly higher in 1967. Only in 1966 was the protein level for all seeding dates and varieties below the 13.5 per cent maximum set by the malting trade.

SUMMARY

Delayed seeding resulted in increased protein; decreased yield, test weight, and plant height and a decrease in the number of days from seeding to heading and to ripe. Earlier seedings required more days to emerge than late seedings.

Dickson yielded significantly more and was more resistant to leaf diseases than Larker or Traill. It produced more plump kernels than Traill and contained less protein than Larker.

Larker had a higher per cent plump, higher per cent protein, and a heavier test weight than Dickson or Traill.

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