

Seeding rate - impact on successful malting barley production

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Introduction

Successful malting barley production depends on a number of sound agronomic management practices. These practices ultimately influence grain quality and the concomitant selection of barley for malting.

Previous research by McKenzie et al, 2005 found that increased seeding rates resulted in slight yield increases as well as slightly lower grain protein and kernel plumpness. Prairie Malt Ltd. and the Canadian Wheat Board conducted a two-year study near Biggar, SK, to better understand the influence of seeding rates on malting barley production.

The objective of the study was to evaluate the impact of seeding rate on grain plumpness, protein and yield. Field studies were also used for grower field tours and for presentations to farmer groups to highlight the impact of agronomic management practices on end-use quality.

Method

The study was conducted near Biggar, SK, in 2005 and 2006. CDC Kendal malting barley was seeded into pea stubble in 2005 and into lentil stubble in 2006. The experimental design was an RCBD with four replications.

In 2005, six seeding rates ranging from 36 to 120 lb/ac were evaluated. In 2006, seeding rates were adjusted slightly to better understand impact of seeding rate within the range of 72 to 96 lb per acre.

Seeding rate treatments for CDC Kendall (lb/ac)

2005	2006
36	48
48	60
60	72
72	84
96	96
120	120

Results

2005

Results from 2005 trial are presented in Table 1. Key observations from 2005 are:

- Yield increased with increasing seeding rate although it was not significantly different above the 60 lb/ac rate.
- In contrast, grain protein decreased with increasing seeding rate, plateauing at the 72 lb/ac rate. This reduction in grain protein may be attributed to yield dilution.
- No differences in grain plumpness were noted with all treatments exceeding 98 per cent on >2.4 assortment.
- In-season rainfall was 2.5x normal precipitation and likely influenced the above-average yield potential and exceptional grain plumpness.

Table 1. 2005 Results of seeding rate effects on yield, grain protein and plumpness of CDC Kendall

Trt No.	Treatment Seeding rate (lbs/ac)	Barley Yield (kg/ha)	Protein (Per cent)	Per cent Plumpness (Assortment >2.4)
1	36	4610	11.7	98.4
2	48	4737	11.3	98.5
3	60	5137	11.4	98.8
4	72	5555	11.0	98.7
5	96	5670	10.9	98.9
6	120	5835	10.9	98.7
LSD (P=.05)		690	0.62	0.44

2006

Results from 2006 trial are presented in Table 2. Key observations from 2006 are:

- Seeding rate was found to have no impact on yield.
- Grain protein was reduced with higher seeding rates although this reduction cannot be attributed to yield dilution.
- Seeding rate had no consistent effect on grain plumpness with all treatments exceeding 92 per cent on >2.4 assortment.
- While early season precipitation was optimal, dry conditions persisted from late June to early August resulting in moisture stress. In early August a hail storm event occurred and resulted in estimated yield loss of 30 to 40 per cent.

Table 2. 2006 Results of seeding rate effects on yield, grain protein and plumpness of CDC Kendall

Trt No.	Treatment Seeding rate (lbs/ac)	Barley Yield (kg/ha)	Protein (Per cent)	Per cent Plumpness (Assortment >2.4)
1	48	1334	9.7	93.9
2	60	1258	9.4	93.4
3	72	1390	9.4	92.0
4	84	1417	9.4	94.4
5	96	1240	9.2	92.9
6	120	1359	9.2	92.2
LSD (P=.05)		168	0.3	1.6



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Summary

Seeding rate appears to have an important influence on malting barley quality. Average results over the two years demonstrate that utilization of seeding rates above 72 lbs/ac can be an effective management strategy to minimize protein levels (see Figure 1). Also noteworthy is the fact that the seeding rates evaluated in this study did not impact grain plumpness.

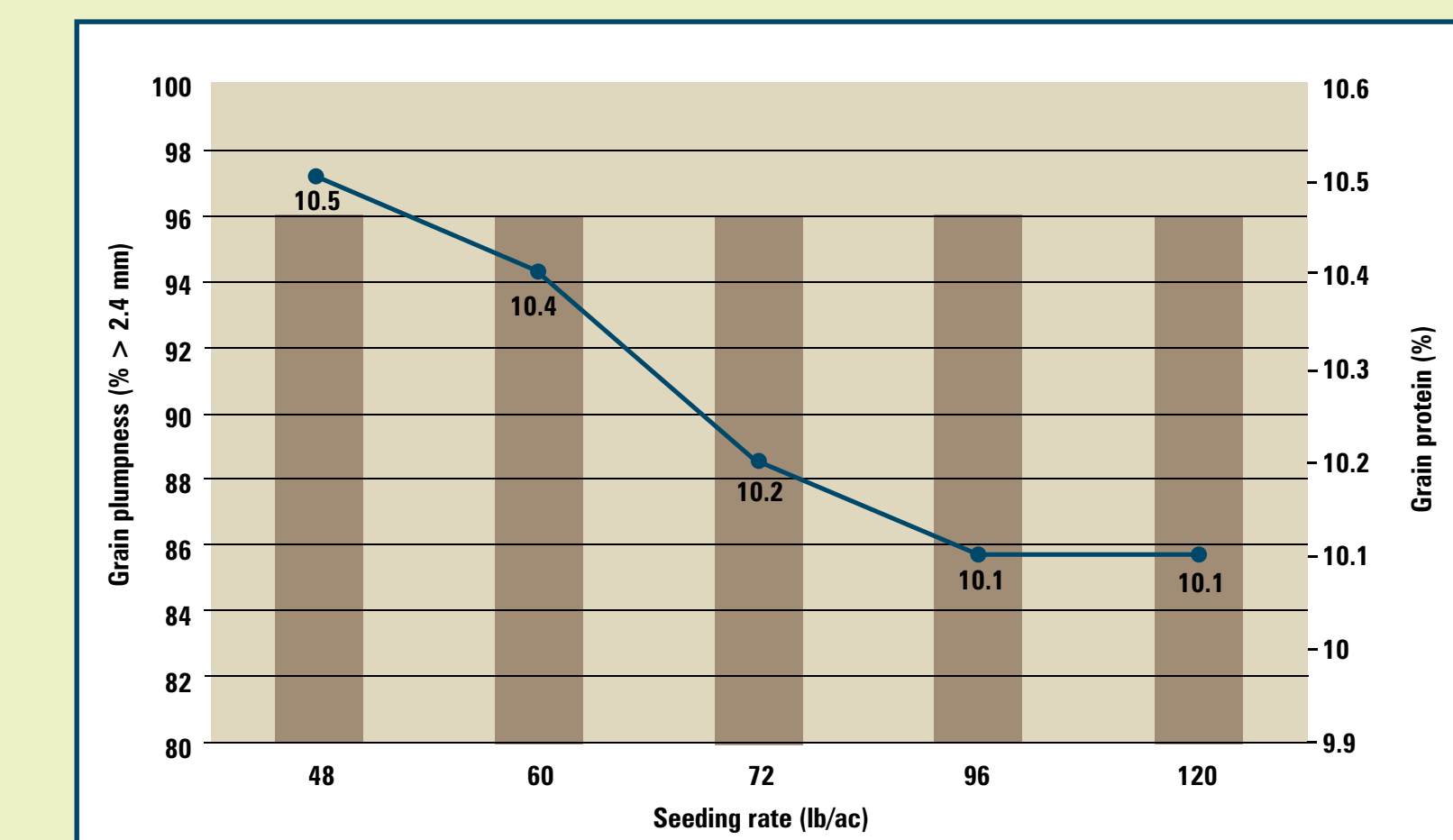


Figure1. Impact of seeding rate on grain protein and plumpness (2005-06)

Seeding rates should be adjusted to target a specific number of emerged plants per area. A very common recommendation is to target 20 emerged barley plants per square foot in the brown and dark brown soil zones. For example, a seeding rate of 92 lb/ac is required to target 20 plants of CDC Kendall barley per square foot assuming a 43 mg seed weight and 90% seed survival. Our results suggest that growers utilizing seeding rates that target 20 live plants per square foot in the brown and dark brown zones are effectively managing grain protein without sacrificing grain plumpness. Growers should account for test weight and kernel plumpness when calibrating their seeding equipment. This is especially important when adopting a new variety that demonstrates higher test weight and kernel plumpness in order to ensure adequate seeding density.

Growers are encouraged to evaluate their seeding rate and consider increasing their rate as a beneficial management practice in order to minimize risk of elevated protein levels for malting barley selection.

References

McKenzie R.H., Middleton A.B., and Bremer E. 2005. Fertilization, seeding date, and seeding rate for malting barley yield and quality in southern Alberta. Can. J. Plant Sci. 85: 603-614