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DIGGING INTO RESEARCH

Seedbed utilization and fungicide timing impacted malt barley production

CATEGORY **disease** | *December 15, 2021*

Fungicide applications at flag leaf emergence and heading growth stages reduced net-blotch severity and increased malt barley grain yield and kernel quality, but early fungicide applications at the 2- to 3-leaf stage generally had a limited impact. Placement of seed with 11 inch shovel openers with a 9 inch row spacing reduced net blotch severity compared to low disturbance narrow band systems, but few seeding systems utilize this configuration today.

At the time of the research in 1999 and 2000, limited information was available regarding the impact of seed placement and row spacing, and their interaction with fungicides, on leaf diseases and agronomic performance of barley. While over 20 years old, these results still provide valuable agronomic information on fungicide control of leaf diseases.

A direct-seeding field experiment was conducted at three locations at Lacombe and Beaverlodge, Alberta, and Melfort, Saskatchewan. The objectives were to determine the influence of seedbed utilization on foliar disease development and the yield and quality of a disease-susceptible malting barley cultivar; and the impact of seedbed utilization on the efficacy of fungicide application at different rates and timings.

The seed-placement methods included distinct rows at 9 inches (23-cm) or 12 inches (30-cm) spacing, using a 0.75 inch (2 cm) wide knife opener, and a third treatment which spread seed using 11 inch (28-cm) sweep openers with 9 inch (23-cm) row spacings.

The six fungicide treatments included an untreated control, full-rate fungicide applications of Tilt (propiconazole, 125 g of a.i./ha) at the 2- to 3-leaf growth stage (GS 12–13), the flag-leaf stage (GS 37–39), or the heading stage (GS 58), and two half-rate applications (propiconazole, 62.5 g a.i./ha) at the 2- to 3-leaf plus flag-leaf stage or the flag-leaf plus heading stage.

Two-row Harrington malting barley was seeded at a rate of 30 seeds/ft^2 (300 seeds/m^2) in early to late May depending on the location and year. Other agronomic inputs were managed with typical fertility and weed control applications.

Net blotch severity higher with narrow row bands

Severity of net blotch [*Pyrenophora teres*] was higher for the 9- and 12-inch distinct row spacings compared with the spread-band placement using sweeps. It was expected that the wide, 12-inch distinct-row seed spacing would have facilitated air movement within the plant canopy, potentially leading to a greater loss of moisture and less conducive conditions for disease development compared with the other placements. On the other hand, the researchers thought that the uniform plant stand with the spread pattern may have reduced both wind speed in the crop canopy promoting longer periods of high relative humidity and leaf wetness, leading to an increase in disease severity.

Overall, the spread band with 11 inch shovel openers on 9-inch row spacing had the lowest net-blotch severity, and higher yields compared with both narrow row placements. Kernel weight, plumpness, and test weight also tended to be highest with the spread band for most site–years where net-blotch development occurred. Lower disease levels may have contributed to a longer period and greater extent of grain filling, contributing to the higher yield, kernel weight, plumpness, and test weight observed for the spread band compared with both narrow row placements.

In general, the distinct inter-row spaces with the 9 and 12 inch narrow openers may not have affected the canopy microenvironment sufficiently to impact disease development. However, the distinct inter-row spaces may have facilitated spore dispersal from crop residues to plants as well as upwards from lower infected leaves.

Target the flag leaf with fungicides

Reductions in net-blotch severity were most consistently observed for those treatments that included a fungicide application at the flag-leaf and/or heading stage. The dual half rate treatment at GS 12–13 and again at the flag-leaf stage did not provide any additional benefit in terms of leaf disease control, especially compared with a single full rate application at the flag leaf stage. Grain yield, kernel weight, plumpness, and test weight tended to be highest for those treatments that included a single or dual fungicide application between the flag-leaf and heading stages over most site–years. These treatments would have permitted a longer period of grain filling, leading to higher grain yield, kernel weight, plumpness, and test weight because of enhanced protection of the upper leaves from net-blotch infection. This is consistent with current recommendations.

Results from the experiment suggest that spread-band seed placement could be considered as a part of an integrated pest management strategy leading to reduced net-blotch severity and improved crop productivity for disease- susceptible malting barley cultivars, but when the risk of net-blotch development is high, susceptible malting barley cultivars will benefit from foliar fungicide application under all seed-placement systems. However, the yield benefit of spread-band seed placement may not be achieved when weed control is inadequate given that the associated increase in soil disturbance may activate the weed seed bank.

Further, since the research was conducted, most seeding systems have moved to a low disturbance, narrow band seeding system to reduce equipment capital costs, and operating expenses. As a result, today, the main conclusion from this research is that fungicide application for leaf disease control in barley should be conducted at the flag leaf and/or heading stages for optimum yield and quality. In addition, increasing row spacing and having wider distinct inter-row spaces may not contribute to lower leaf disease risk.

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