Title Grain harvesting strategies to minimize grain quality losses due to Fusarium head blight in wheat

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Abstract

Fusarium head blight (FHB) reduces wheat grain yield and quality, leading to price discounts due to *Fusarium*-damaged kernels (FDK), deoxynivalenol (DON) contamination of grain, and reduced test weight (weight per unit volume of grain). Experiments were conducted to determine whether changing combine harvester configurations to differentially remove diseased kernels affected the yield and quality of grain harvested from plots with different mean levels of FHB index (IND, mean proportion of diseased spikelets per spike), achieved with inoculations at different spore densities. Plots were harvested using four combine configurations, with C1 being the standard, set at a fan speed of 1,375 rpm and a shutter opening of 70 mm, and C2, C3, and C4 regulated to fan speeds and shutter openings of 1,475 rpm and 70 mm, 1,475 rpm and 90 mm, and 1,375 rpm and 90 mm, respectively. C3 and C4 consistently had significantly lower mean arcsine-transformed FDK and log-transformed DON and higher mean test weight than did C1. However, C3 and C4 also resulted in significantly lower mean amounts of harvested grain than did C1. The estimated mean responses to combine configuration were consistent across a range of mean IND levels (5 to 35%). Using a common price discount schedule based on the incidence of FDK, DON, and test weight, and the mean values found in the current investigation for these grain-quality variables, configurations C2, C3, and C4 resulted in between $10 and 40/t lower estimated grain price discounts than C1, with the lowest discounts corresponding to C3 and C4. Using the discount values, a range of grain prices, and the mean yield values from this investigation, estimated gross cash income (GCI; mean estimated yield × grain price adjusted for discounts due to inferior quality) was generally higher for grain harvested with C2 and C4 than with C1 or C3, with C4 being the most consistent across a range of IND levels (5 to 35%) and grain prices ($118 to 276/t). For all modified configurations, the greatest increases in GCI over C1 were observed at the lowest tested grain price, and the improvement of GCI over C1 increased with increasing IND up to the highest disease level tested. Thus, these results showed that, when harvesting grain from FHB-affected fields, the improvement in grain

quality and reduction in price discounts with a combine adjustment could be great enough to counteract the reduction in harvested grain that results from the adjustment.