**Grain Yield:**

**Year 2 (redone with updated image estimates):**

ANOVA of lmer(log(G)~N\*P\*CROP + (1|Rep) results show MN, NY, WI are significant fixed effects. MN estimate had a lower grain yield -0.8692, NY increased estimate grain yield 0.9294, and WI 0.1425. MN had a significant location : nitrogen rate interaction effect (0.006062). WI had a significant location : crop interaction (-0.8632).

A graph of a ship between grain yield and rate

AI-generated content may be incorrect.Pairwise location comparison of emmeans showed each location as unique. Pairwise nitrogen rate showed each nitrogen rate is unique. Pairwise comparison of location : crop showed KS different between Inter & Mono, otherwise each location is unique and same within location. Pairwise nitrogen rate : location showed MN and KS were similar to each other and WI was the most different location and each nitrogen rate was different (increasing emmean with increase in N).

A graph of a number of grain yield

AI-generated content may be incorrect.

In MN, there was a 0.21% change in grain yield per unit increase in nitrogen. In NY, the increase was 0.10%. In KS, there was a -0.05% change in grain yield per unit increase of nitrogen. In WI, there was a 0.65% increase in grain yield per unit increase nitrogen.

**Grain Partial LER**

A graph showing different colored squares

AI-generated content may be incorrect.**Year 1:** No difference in LER by nitrogen rate, but NY was significantly different (lower PLER, Pr(>|t|)=0.0115) than other locations.

A graph showing different colored squares

AI-generated content may be incorrect.**Year 2**: No difference in LER by nitrogen rate or sites in pairwise comparison. Although ANOVA summary shows that WI location is significantly different (higher LER, Pr(>|t|)=0.0141) and the Nrate MN location interaction was approaching significance (higher LER, Pr(>|t|)=0.0531)

**Year 3**: Need grain dehulled from MN and WI

**Grain Relative Yield**

A graph of different sizes and shapes

AI-generated content may be incorrect.**Year 1**: nitrogen and location were significant fixed effects with NY location significantly different (lower RY, Pr(>|t|)=0.00154).

A graph of different sizes and numbers

AI-generated content may be incorrect.**Year2:** nitrogen and the nitrogen: location interaction were significant fixed effects with N:WI significantly different (lower RY, Pr(>|t|)=0.00132). Pairwise comparison of nitrogen rates showed no differences.

**Year 3**: Need grain dehulled from MN and WI