SEEDING RATE AND SEED SIZE CONSIDERATIONS FOR DRYLAND WHEAT PRODUCTION IN THE PACIFIC NORTHWEST

Clark Neely and Brandon Gerrish
Washington State University, Department of Crop and Soil Sciences, Pullman, WA.

BACKGROUND

Spring wheat (Triticum aestivum L.) acres in the inland Pacific Northwest are second only to winter wheat acres under dryland production systems and used mainly as a management tool to help control herbicide resistance in grassy weeds. Often times, soil conditions are less than ideal at planting with soils being too wet, too dry or too cold. Larger seed size has been credited with providing germinating seedlings with more energy reserves and more vigorous early season growth, which may help seedlings overcome adverse growing conditions at planting (Ambika et al., 2014). However, limited data is available in the inland Pacific Northwest on the impacts seed size has on spring wheat growth and production. Similarly, limited information is published to support current dryland spring wheat seeding rates in the inland Pacific Northwest.

Seed size treatments were embedded within the 2023 WSU Extension spring wheat variety trials at all locations and assessed for early season growth and harvest measurements. A separate seeding rate study was conducted to evaluate impact of seeding rate on spring wheat performance. This information will inform producers of ideal seeding rates for dryland spring wheat production and whether seed size impacts performance.

OBJECTIVES

• Determine whether seed size impacts early season growth and grain yield of spring wheat.
• Identify the ideal seeding rate for spring wheat under different precipitation zones to maximize yield potential.

RESEARCH HYPOTHESIS

The hypotheses for these studies are that ideal seeding rates for maximizing spring wheat grain yield will vary based on yield potential and that larger seed size will improve early season establishment and growth.

EXPERIMENTAL SITE AND DESIGN

• Seed size treatments were included at 16 soft white spring wheat variety trials (three replications) located around Eastern Washington (Fig 1).
• Seed sizes using soft white spring wheat variety ‘Ryan’ were (Fig 2):
  - Small = 35.640 seed kg⁻¹ Medium = 28.930 seed kg⁻¹ Large = 20.680 seed kg⁻¹
• Seeding rate trials conducted at Farmington, Horse Heaven, Reardan, and St. John with four replications.
• Seeding rate treatments were 538k, 1.1 ml, 1.6 ml, 2.2 ml, 2.7 ml, 3.2 ml, and 3.8 ml seed ha⁻¹.
• Used hard red spring wheat variety ‘Hale’ and soft white spring wheat variety ‘Ryan’

DATA MEASUREMENTS AND ANALYSIS

• Early season plant vigor measurements assessed
  - Stand counts taken from one linear meter section of middle two rows of each 1.5 x 5 m plot.
  - Canopy cover estimated from images with Canopeo software (Patrnignani and Ochsen, 2015) (Fig 3)
• Plots harvested with a Zern small plot combine
• All treatments/trials analyzed as an RCBD
• Statistical analysis conducted using SAS 9.4 (SAS Institute, 2013)
• PROC GLIMMIX used for ANOVA
• LSMEANS statement with PDIF option used for mean separation
  - Seed size and seeding rate assigned as fixed effects for each respective trial along with Location and corresponding interactions.
  - Best fit trend lines for seeding rates done with Microsoft Excel

RESULTS (CONTINUED)

Table 2: Table of significance for measurements of seed size treatments across multiple environments in Eastern Washington

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• Seeding rate significantly impacted most measured traits (Table 2)
• Grain yield had a quadratic relationship with seeding rate across all sites and varieties, but peaked at different rates (Fig 6 and 7)
• Canopy cover increased linearly with seeding rate (Fig 8)

CONCLUSIONS

• This research confirmed that larger seed size had an overall positive impact on season vigor and grain yield
• Growers should seek out larger seed for planting when possible
• Optimal seeding rates for maximizing spring wheat grain yield increased with increasing yield potential
• Higher seeding rates provided greater canopy cover and could be used by growers to help compete with problematic weeds

REFERENCES


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