AVAIL® Treated Phosphorus Rate Effects as a function of Erosion Severity on Dryland Winter Wheat in a Calcareous Soil

Ryan C. Hodges, Dr. Grant Cardon, Dr. Earl Creech, and Dr. Paul Gross
Dept. of Plants, Soils, and Climate, Utah State University, Logan, UT

Background
- Dryland winter wheat growers in the area face the challenge of meeting crop needs with adequate phosphorus before it is fixed via adsorption or precipitation.
- AVAIL®: A polymer purported to increase P availability. Shown to increase yield when applied with ½ recommended rate of P fertilizer (1).
- Two Experiments: Broadcast Exp. 2017 (WE_17) and Banded Exp. 2018 (WE_18)
- Godfrey Farm, Clarkston, UT:

Objective
- To find what effects AVAIL® has with MAP when applied as a mid-season broadcast fertilizer, or incorporated with the seed at planting, on dryland winter wheat in a calcareous soil over four levels of erosional severity.

Materials and Methods
- Soil: Silt Loam and Silty Clay Loam. Precip= 21 in., MAT= 47 °F (Utah Climate Center). CaCO3: 0-13% to 1 ft. Location: Godfrey Farm, Clarkston, UT.
- Seed used for WE_17: Lucin Clearfield, WE_18: Magic Clearfield. Seed for both experiments were planted perpendicular to slope to mitigate erosion.
- Fertilizer: granular Monoammonium Phosphate (MAP): 11-52-0
- Full Rate: 60 lbs P2O5/acre, Half Rate: 30 lbs P2O5/acre
- AVAIL®: additive sprayed onto granular MAP via cement mixer.

Broadcast Experiment (WE_17) Results
- No significance between treatments within any slope segment.

Discussion
- Spring broadcast applied fertilizer may have some effect on yield, but the lack of significance between the four fertilizer treatments means a grower can save roughly $18.85/acre by applying 30 lbs/acre of MAP without AVAIL® as a spring broadcast than the recommended rate of MAP with AVAIL® for dryland small grain.
- If grower experienced similar yield results to this experiment, they could supplement 30 lbs/acre of MAP with AVAIL® for comparable or best yields and still save $16.38/acre.
- Having CaCO3 and Organic Matter ranges for each level of erosional severity may give us a correlation of their impact on yield. If they do have statistical effect on yield, we can make improved fertilizer recommendations to growers based on more than just plant needs.

Going Forward:
- Determine CaCO3 and OM content for correlation with yield.
- Harvest, sample, and analyze plant and soil material from our Banded Experiment this summer.

Conclusions
- Soil P (P = 0.0344) and Erosion (P<0.0001) have statistically significant effects on yield.
- There is no significance between treatments within erosional severity segments on yield OR protein content.
- ½ rate with AVAIL® had higher yields than ½ rate without AVAIL® across all segments. This trend does not hold for the full rate treatments.
- While ½ rate of MAP with AVAIL® had comparable or better yield and profit results with the full rate of MAP without AVAIL® and was not economically advantageous only in the slightly eroded slope segment.

Resources

Acknowledgements
- I would like to thank Dr. Grant Cardon, Dr. David Hole and staff, and Bailey Shaffer for their continued support with this ongoing study.