Semi-arid Dryland Wheat Yield and Yield Stability Change with Crop Rotation

Decisions to intensify dryland cropping systems in the semi-arid Central Great Plains are influenced by farmers’ perceptions regarding the effects of reducing fallow frequency on the base crop for the region, winter wheat.

In an article recently published in *Agronomy Journal*, researchers from northeast Colorado report how crop rotation influences winter wheat (W) yields and yield stability for eight dryland rotations employing fallow (F), corn (C), pea (P), and proso millet (M) phases.

The researchers reported that 24-year average wheat yields in continuously cropped systems were 45% lower than wheat yields following a 12- to 14-month fallow period. They also found that wheat yield stability was greater for W-F systems and a W-M-F rotation than for continuously cropped systems and the W-C-F and W-C-M-F rotations. The probability of producing a wheat yield less than 1,500 kg ha⁻¹ was extremely low (about 4%) when wheat followed a no-till fallow period while the probability ranged from 36 to 58% for wheat following pea or millet.

For farmers considering a change to a more intensive cropping system than the traditional W-F system, a good choice would be W-M-F as that rotation minimizes any detrimental impact on wheat yield while maintaining yield stability.


Response of Sunflower to Nitrogen and Phosphorus in North Dakota

While sunflower is native to North America, it is a relatively new commercial crop in the Northern Great Plains. Crop yields have increased in the past three decades with the introduction of new varieties, but the recommendations for nitrogen and phosphorus have not been updated.

In an article recently published in *Agronomy Journal*, researchers report on a multi-year study, totaling 23 experiments within farmer fields in North Dakota to determine the response of sunflower to supplemental nitrogen and phosphorus.

The team found that sunflower yield was related to the sum of soil residual nitrate in this northern U.S. environment plus supplemental N. The response functions were different based on state region, tillage system, and whether the sunflower was an oilseed or confection cultivar. As available nitrogen increased, oil concentration in oilseed cultivars decreased, and wind-induced lodging increased in both oilseed and confection cultivars. Updated nitrogen recommendations will include an economic analysis that considers oil reduction and risk of lodging with nitrogen fertilization, as well as the probability of seed yield increase.

Sunflower was not responsive to supplemental phosphate despite most sites testing low in soil phosphate. A small yield increase due to phosphorus fertilization was recorded at only one site. New fertility recommendations will not include phosphorus fertilization as a required practice.