Optimizing Fertilizer Application in Winter Wheat through Sap Testing

Ryan Boylan
RyanB@PalouseCD.org

Taking a look at a trial field

In 2024, Palouse CD (PCD) entered the second year of a project looking at sap testing as a diagnostic tool for winter wheat nutrient application. Through partnerships with three growers in Whitman County, PCD staff have spent the last couple of years setting up trials and collecting data for this project, which is funded by USDA's Western Sustainable Agriculture Research and Education (WSARE).

Plant sap analysis measures the difference in nutrient concentrations between old and new leaves in a growing plant. By making this comparison, we can determine which minerals and nutrients the plant needs when the test is taken to guide and fine-tune spring fertilizer applications during the growing season. Sap analysis has proven successful at increasing overall plant health in high-value crops such as vegetables and tree fruit. In winter wheat, it has the potential to reduce the overapplication of fertilizer, with positive outcomes for increased yields and decreased input costs. However, while sap testing has recently been adopted by many wheat growers in our region, little work has been done to examine its effects in relation to crop yields, labor, and inputs.

In the 2023 and 2024 growing seasons, PCD conducted on-farm trials using a paired plot design. For these trials, a one-acre treatment plot was managed for nutrients based on recommendations from soil and sap analysis and then compared against a one-acre control plot, which was fertilized based on traditional soil and plant tissue tests. After harvest, we assessed grain quality and nutrient density for each plot to determine the accuracy of sap analysis in diagnosing crop nutrient needs and its utility in increasing the quality and nutrient density of wheat crops. The overall goal of this project is to determine whether plant sap analysis provides economic and soil health benefits in our area to understand its potential for adoption in the Inland Pacific Northwest. Preliminary data from the 2024 crop year showed a thirty-two percent average increase in crop yield in the sap testing plots on two farms, while the third farm's yield decreased by ten percent. There is still more work to be done and we plan to have comprehensive results available at the end of 2025.

Collecting leaves for analysis

Shipping samples to the lab