METER
ENVIRONMENT

DOES EARLY PLANTING INCREASE RISK TO WINTER CANOLA?

Many dryland winter canola growers assume that if they plant earlier, they will establish a stronger plant, but Washington State University researcher Megan Reese recently found that this was not the case. She and her team discovered that planting earlier increases risk to the plant, as more water is used, and the reduced amount of water then left after the winter season limits spring regrowth. Megan's findings could be valuable as water is the most yield-limiting factor in eastern Washington state's wheat-dominated dryland systems, where winter canola has newly emerged as a rotational crop.

EARLY PLANTING

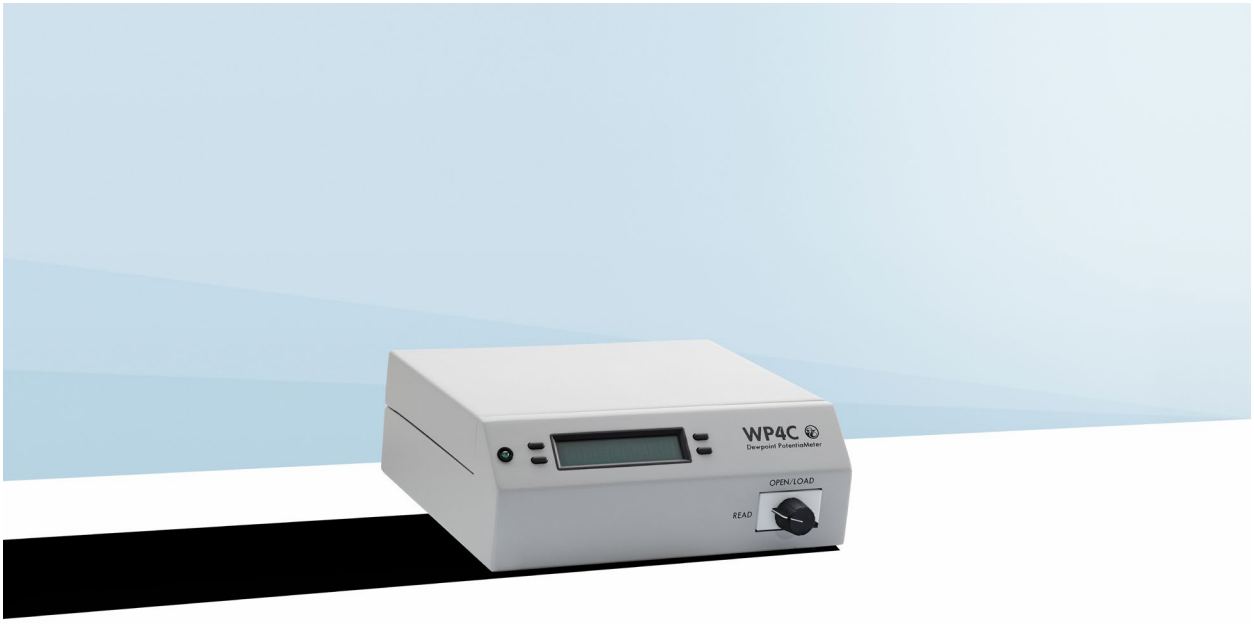
Winter canola is cold hardy, but it's not as resilient as wheat. It's planted in August, much earlier than winter wheat, which is planted in the late fall. In order to survive, winter canola has to establish a hardy taproot system so that plants have reserves to survive the winter. Megan says, "Opinions vary, but anecdotally, a dinner plate sized plant can survive winter fairly well, so that's why winter canola is planted in August. However, because establishment and germination can be an issue, we decided to try planting in June at Ritzville, Washington, thinking the soil would be more moist and have a cooler seedbed. However, the early planting date had a negative effect on winter survival. Not one of the early plants survived. We found the plants that started earlier used a lot more water, and consequently, the winter rains weren't enough to refill the soil profile. Excessive growth and bolting also contributed to low survivorship."

METHODS AND MOISTURE RELEASE CURVES

Megan monitored soil water in the profile several different ways. At one location she used a neutron probe and hand-sampled gravimetric soil moisture in the top 30 cm of the profile, and in other locations, she was limited to hand samples. Then she combined those measurements with local weather stations to provide the crop water balance for the canola. Using these data, she was able to determine soil water use as indicated by the water content change through the growing season and

calculate the depletion of soil water.

Megan also took soil samples into the lab from each depth increment at every site and used a METER WP4C hygrometer to construct a moisture release curve. This helped her to define the apparent permanent wilting point at -1.5 MPa. She says, “I was able to then see how efficient canola was at extracting available water, and I could look at available water instead of total water contents, which was more useful in terms of plant accessible moisture in the soil profile. It allowed me a consistent platform to compare actual water amounts across sites with differing soil types. At one site, 12.5% of the water was unavailable, but in the sandier soils at another site, it was 4%. So there were significant differences in permanent wilting point.”



WP4C hygrometer

WATER AND PHYSIOLOGICAL CHALLENGES AFFECT WINTER SURVIVAL

Megan found that the June planted canola used every milliliter of available water in the soil profile by late October/early November, but August-planted canola still had some water above wilting left in the profile over the winter, which helped the plants in the spring. She says, “It was a milder winter, so we didn’t get the usual amount of snow and rain, which probably played a role, but we did not see the profile refilled in the June-planted canola. In addition, those June plants were purple and wilted by November, so water stress could have hurt the plants in terms of its defenses. However, I think a larger issue was that they grew so large (the crowns actually

elongated and bolted so they weren't close to the soil) they were more susceptible to the harsh temperatures, whereas the August planted canola were much smaller and their crowns stayed right on the soil surface." These findings are based on only one year of data, and Megan notes that early plantings have worked well in the milder climate of Pendleton, OR.

WHAT DOES IT MEAN FOR FARMERS?

Megan says, "We were able to surprise a lot of farmers by showing that canola roots access water down to 1.5 to 1.7 m in the fall; it was hard to believe that a winter crop would do that. Also, in my second year's data, we followed water use all the way through harvest, so we were able to show how much yield we gained for every millimeter of water used, and farmers liked hearing that number as well. I think it's useful information that incorporates biophysics principles and answers some questions that these new canola producers are interested in. I have three locations this season that we are currently following to give farmers a further idea of what the water use looks like, when canola uses that water, and from where in the soil profile. Hopefully, this research will help them manage their rotations and look at the possibility of adopting canola."

Discover the WP4C hygrometer