

Improving Germination of Winter Wheat

Scientists at the USDA recently determined soil water status can have a significant impact on the germination success of winter wheat (Wuest & Lutcher 2013).

Although it has long been known that soil moisture content can have a significant impact on seed germination, scientists at USDA have emphasised it is actually soil water potential which is the most important parameter for successful seed germination.

The results are particularly important for wheat growers in semi-arid or rain-fed agri-systems where there is little control over soil moisture availability. The scientists found that rapid germination occurred (3 to 4 days) when soil water potential was greater than -1.1MPa (-1100kPa or 11 Bar). In contrast, soils drier than -1.6MPa experienced poor germination following 25 days.

The scientists found that these water potential values were the same across three soil types, however the water content values varied significantly. [As discussed previously](#), water potential, of the soil and the plant, is a much more meaningful value than water content as water potential is a precise measurement of the energy state of the soil or plant. Soil water content, on the other hand, is a factor of many variables particularly the bulk density and relative fraction of sand, silt and clay (i.e. soil texture).

As part of their experiment, the scientists used Decagon Device's WP4C Dewpoint Potentiometer instrument to determine soil water potential. The WP4C can accurately measure soil water potential, within 5 to 10 minutes, in the range from -0.1MPa to -300MPa (-100kPa to $-300,000\text{kPa}$ or 1 Bar to 3000 Bar).



WP4C Dewpoint Potentiometer accurately measures soil water potential in the laboratory.

Reference

Wuest, S.B., Lutcher, L.K. 2013. Soil Water Potential Requirement for Germination of Winter Wheat. Soil Science Society of America Journal 77: 279-283. doi:10.2136/sssaj2012.0110

<https://www.soils.org/publications/sssaj/articles/77/1/279>

