Climate Impact on Cereal Crop Development and Soil Health Research in Subarctic Region of Alaska

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Abstract
Climate warming in the subarctic region of Alaska provides challenges to current small grain production systems in Alaska and to soil health that supports such a system. Facing these challenges, two fundamental questions are asked 1) can current cultivars still be used in the future warmer climate? 2) What soil health indicators should be aligned to support future agriculture production? For the first question, two modeling approaches (simulation and AI) are used to determine future crop yield when current cultivars are used. Results showed that performance of AI algorithms varied with crop growth stages and locations of the trial, and DSSAT simulation is constrained by locality of additional field physiological measurements. Nevertheless, results from both approaches indicate yield decline as climate warms in the subarctic regions. For the second question, soil health research was conducted by comparison of soil test parameters from a studied soil with a reference soil. The results indicated that the commonly used approach, i.e., comparison of a soil of interest with a reference soil did not work in the subarctic condition. In this presentation, the limitation of current approach of soil health research in the subarctic areas is presented, and alternative approaches are discussed. By addressing the two questions, food for thought is provided for the uniqueness of agriculture production and soil science research in the northern climatic conditions.

Biography
Dr. Zhang obtained his Ph.D. in soil science in 1993 from the University of Alberta. Currently, he works as a tenured track full professor in the Institute of Agriculture, Natural Resources and Extension at the University of Alaska Fairbanks (UAF). In addition, he serves as the vice chair in the Circumpolar Agriculture Conference, an organization for agriculture related research in the circumpolar region. He served as department chair from 2009 to 2012 in the Department of High Latitude Agriculture at UAF. Dr. Zhang has expertise in agronomy, soil science, waste management, and permafrost soil. Right now he is the PI for two key USDA funded projects. He is expanding his soil science expertise in the area of archaeology, and currently supervises two Ph.D. archaeology students along with other traditional soil science graduate students.