UNIVERSITY 1 OF
Nebraska
Lincoln

INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES
AGRICULTURAL RESEARCH DIVISION
Office of the Dean

Jeff Jacobsen, PhD
NCRA Executive Director

August 21, 2020

Dear Jeff,

It is my pleasure to write in support of the formation of a new Multistate Hatch Committee that focuses on the science of plant phenomics. Given the importance of emerging plant phenomics technologies to success of the Agricultural Genome to Phenome Initiative, and the significant investment and momentum in plant phenomics at many of the institutions of the North Central Region, the Multistate Committee platform can be leveraged for a new level of important collaborations and impacts.

For example, at the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln we have made multi-million dollar investments for the development of three state-of-the-art High Throughput Plant Phenomics Facilities: the HTS LemnaTec Chamber for scanning small plants, the 3D Greenhouse LemnaTec Scanalyzer with 672 pots capacity and up to 2.5 m plants, and the one-acre Spidercam Field facility. Our vision is to help bring together transdisciplinary teams of researchers, extension specialists, educators and industry partners from across the North Central Region and beyond, to form a consortium focused on advancing the science of plant phenomics towards the understanding of the genome to phenome connection.

Technological innovations in the past decade resulted in two major advances in plant science, the development of next-generation sequencing and high-throughput phenotyping. Despite the significant knowledge that these technologies have generated, the scientific community is recognizing that many phenotypes can be highly polygenic and sensitive to the genetic (G) by environment (E) interactions. Therefore, how the phenotype of a plant is encoded in its G*E interaction is in many cases incomplete. To address this issue, it is critical to incorporate multiscale large phenomic data and apply emerging computational tools such as artificial intelligence (AI) into the analysis. To this end, we envision that this committee will focus on priorities that include the development and testing of new sensing technologies, development of AI process driven models and computation tools for big data, create and manage interoperable data bases to address the genome to phenome challenge, advance agricultural sciences in the region, create solution-based tools and technologies for stakeholders, engage with and transfer knowledge to stakeholders, and train next generation students.

High throughput plant phenomics is essential in efforts to achieve global food security for a growing population under the constraints of dwindling natural resources and climate variability, extremes and change. Developing and validating effective precision tools for these initiatives will require real systems approaches, and the Multistate model can provide a platform for bringing together transdisciplinary

teams across institutions to create innovation and achieve greater impacts than could otherwise be possible.

Thanks in advance for the consideration of this request, and please do not hesitate to contact me if you think I can provide additional information.

Sincerely,

Archie C. Clutter
Dean, Agricultural Research Division
Director, Nebraska Agricultural Experiment Station