Genetics Society of America

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Dear Dr. Kaleikau:

Thank you very much for reaching out to the Genetics Society of America (GSA) for input on the draft of USDA's plant breeding roadmap. We are pleased to submit these comments of behalf of our more than 5,000 members who are working to deepen our understanding of the living world by advancing the field of genetics, from the molecular to the population level.

GSA represents scientists from all 50 states, united by a focus on understanding the operation of living systems. In developing these comments, we have consulted especially with a cross-section of our members who work in areas related to plant breeding.

We agree with USDA on the enormous potential of plant breeding to develop plant varieties that can provide a greater yield of nutritious foods and healthy environments with fewer resources in less than ideal conditions. However, we feel that the roadmap may be a missed opportunity to generate expanded interest in plant breeding. While we have no major disagreement with any of the priorities, we do not get the sense of excitement and new opportunity that would help make the document compelling to those not already engaged in this field.

In particular, we encourage greater engagement of basic researchers, including those whose work may not be specific to ongoing plant breeding initiatives. Although we understand that many USDA efforts in plant breeding are directed toward specific application, we suggest that USDA enhance its focus on expanding our fundamental understanding of genetics and plant biology. Indeed, we feel that one of the most effective ways to advance plant breeding efforts to address important challenges in a variety of systems is through fostering basic research on plant genetics. This is the same approach we emphasize to other mission-driven agencies such as the National Institutes of Health: translational research and application simply cannot occur without an expanding base of new knowledge of underlying biological mechanism to translate.

We were surprised to not see more recognition of the role of new technologies with a potential to dramatically improve the effectiveness of plant breeding efforts. As a forward-looking document, we would hope the roadmap would enthusiastically embrace and help foster the continuing development of relevant cutting-edge technologies such as CRISPR, targeted mutagenesis, and gene transfer.

Studying genotype-by-environment interactions is an important topic of ongoing research that could be highlighted as a more focused priority and one that could engage both basic and applied researchers. The combination of enhanced monitoring and precision agriculture offers an unprecedented opportunity to test different cultivars and production practices in a focused way. This will be increasingly important as we seek to understand the local impacts of climate change and the mechanisms for adaptation in specific environments.

Community consultation in the development of the roadmap is much appreciated, and we encourage USDA to continue this engagement as it establishes priorities and identifies the most promising research directions. While certain USDA programs do engage the community in peer review, others make decisions internally without the input of the wider scientific community. We suggest that allocating an increased proportion of USDA funds through peer review would increase both the productivity and efficiency of the USDA research enterprise and its integration with other related areas.

We also would welcome the opportunity for increased interaction between USDA and scientists whose research is relevant to plant breeding but who are not directly involved in these efforts. For example, USDA could benefit from engaging more basic geneticists—including the members of our Society—in working on agriculturally relevant systems and problems. Professional societies such as GSA are more than willing to facilitate ongoing conversations between USDA leaders and researchers who work in a variety of systems.

We encourage USDA to act upon its suggestion of developing and implementing mechanisms for longer term and renewable grants. When awarded through a true competitive basis, these more stable funding mechanisms help promote long-term attention to key scientific opportunities. Indeed, the National Institutes of Health has recently been moving more in this direction as a way to increase productivity and enhance researchers' ability to follow-up on promising results.

We think the document could be strengthened by identification of one or more specific goals that would be ambitious but realistic. Is there a potential for a set of grand challenges akin to the moon shot that would galvanize support for plant breeding and help the country address important national priorities?

Although there is conversation in the roadmap about the interaction among various USDA agencies, there is little discussion about the opportunities for USDA programs to partner with other federal agencies. For example, there are obvious potential connections to National Science Foundation investments in its Plant Genome Research Program or bioinformatics efforts supported by the National Institutes of Health. We also point to opportunities for partnering with private foundations and others who share USDA's commitment to strategic goals such as food security and resource conservation.

Finally, we share USDA's interest in developing a strong pipeline of scientists who will take up the study of the challenges in plant breeding. However, we did not see much specificity in the discussion of these issues in the draft roadmap. For example, are there opportunities for focused training grant or pre-doctoral fellowship programs to develop expertise in plant breeding and encourage institutions to expand their focus in this area? USDA may wish to look to other federal and private funding agencies for models. Indeed, universities with robust training programs in the biomedical and biological sciences might be in a strong position to implement similar programs to prepare researchers to pursue USDA research objectives.

Thank you again for the opportunity for GSA to offer input into your discussions. We welcome the chance for continued engagement on these and other issues.

Sincerely,

Vicki L. Chandler, PhD
President

Michael Lynch, PhD
Immediate Past President

Jasper Rine, PhD
Vice-President / President-Elect

Genetics Society of America

ABOUT GSA: Founded in 1931, the Genetics Society of America (GSA) is a professional scientific society with more than 5,000 members worldwide working to deepen our understanding of the living world by advancing the field of genetics, from the molecular to the population level. GSA promotes research and fosters communication through a number of GSA-sponsored conferences including regular meetings that focus on particular model organisms. GSA publishes two peer-edited scholarly journals: *GENETICS*, which has published high quality original research across the breadth of the field since 1916, and *G3: Genes|Genomes|Genetics*, an open-access journal launched in 2011 to disseminate high quality foundational research in genetics and genomics. The Society also has a deep commitment to education and fostering the next generation of scholars in the field. For more information about GSA, please visit www.genetics-gsa.org. Also follow GSA on Facebook at facebook.com/GeneticsGSA and on Twitter @GeneticsGSA.