Establishing Priorities for Public-Sector Research on the Alliums

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In the 2008 Farm Bill, the USDA established a new competitive grant program, the Specialty Crops Research Initiative (SCRI), to specifically fund research on fruit, vegetable, nut, and ornamental crops. This program required stakeholder input to establish research priorities prior to consideration for funding. In 2006, my laboratory completed a web-based survey of growers, processors, and researchers to identify the most important challenges to sustainable production of the Alliums (primarily garlic and onion) in North America. After completing the survey, we held a stakeholder meeting to prioritize specific pests or problems as targets for research proposals to programs such as SCRI. This prioritization has been used by the US research community and helped to win competitive funding from the SCRI, such as:

- “Ensuring US onion sustainability: breeding and genomics to control thrips and Iris Yellow Spot Virus” funded in 2008 with Michael Havey (USDA-ARS and University of Wisconsin) as principle investigator (PI);
- “Advancing onion post-harvest handling efficiency and sustainability by multimodel quality sensing, disease control, and waste stream management” funded in 2009 with Charlie Li (University of Georgia) as PI;
- “IPM-PIPE and innovative disease diagnostic tools for onion growers” funded in 2010 with Howard Schwartz (Colorado State University) as PI.

Research on our SCRI project has focused on the insect thrips (Thrips tabaci) and thrips-vectored Iris yellow spot virus (IYSV). Diverse accessions from the USDA onion germplasm collection, as well as commercial cultivars and elite breeding lines, were evaluated for damage by thrips and IYSV in field trials in Colorado and New Mexico by Drs. Howard Schwartz (Colorado State University) and Chris Cramer (New Mexico State University). Better performing populations were identified and many of these onions have lower amounts of wax on their leaves, which is associated with slower build-up of thrips and reduced spread of IYSV. Although this foliage type does not condition resistance to IYSV or thrips, its deployment represents part of an integrated approach to reduce losses by these pests. My lab has identified molecular tags associated with less-waxy foliage and these markers are being used to transfer this avoidance mechanism into elite onions for commercial production.

As we look to the future, growers, processors, seed producers, and researchers must continue to prioritize important challenges to Allium production, in order to focus resources and gain maximum benefit from ever declining and more competitive federal research dollars. At the 2012 National Allium Research Conference (NARC), a discussion was held to update the 2006 prioritization and the results are shown in the figure below. Prioritized traits placed in the upper left quadrant have evidence of beneficial genetic variation; understanding the inheritance of these traits will aid in their rapid incorporation into commercial cultivars. For prioritized items in the upper right quadrant, there is little knowledge about beneficial genetic variation. Although the relative positions of individual traits were made by consensus of participants at the 2012 NARC, we are still seeking input from the broader stakeholder community. Three new traits (Stemphyllium leaf blight, salt tolerance, and water-use efficiency) were added in 2012 and need prioritizations relative to other items. The figure is available from the website shown at the bottom. Please feel free to critically review this prioritization and offer your perspectives regarding these challenges to sustainable Allium production. Emails regarding this prioritization are welcome (mjhavey@wisc.edu).

At the time of writing, it is not clear if the SCRI will be renewed in the next farm bill. If not, this would be a great detriment to stakeholder-driven research on the Alliums and other horticultural crops.
Figure showing the prioritization of traits for public-sector research. The y-axis indicates the priority of the trait based on stakeholder input; the x-axis indicates whether or not there is any known beneficial genetic variation to address the problem.