

# Performance of Current Broccoli Varieties Under Eastern U.S. Conditions

Phillip Griffiths<sup>1</sup>, Mark W. Farnham<sup>2</sup>, Mark Hutton<sup>3</sup>, Jeanine Davis<sup>4</sup>, Wythe Morris<sup>5</sup> and Thomas Björkman<sup>1</sup>

<sup>1</sup>Department of Horticulture, Cornell University NYSAES, Geneva, NY, <sup>2</sup>U.S. Vegetable Lab, USDA ARS, Charleston, SC, <sup>3</sup>Highmoor Farm, University of Maine, Monmouth, ME, <sup>4</sup>Horticultural Science, North Carolina State University, Mills River, NC, <sup>5</sup>Carrol County Extension, Virginia Cooperative Extension, Hillsville, VA

Current broccoli varieties are too sensitive to climatic conditions to support an expanded year-round industry. We identified existing and newly released varieties with the most promise, and established a research network for vigorous breeding and release of varieties for Eastern production, and for releasing new varieties specifically targeted to eastern production.

## The Issue



Head deformities in popular varieties.



New genotype

Broccoli uses environmental clues to coordinate head development, but the cues are sometimes absent in the warm and humid conditions that prevail in the Eastern growing season. The unsynchronized development results in unmarketable heads.

## Approach

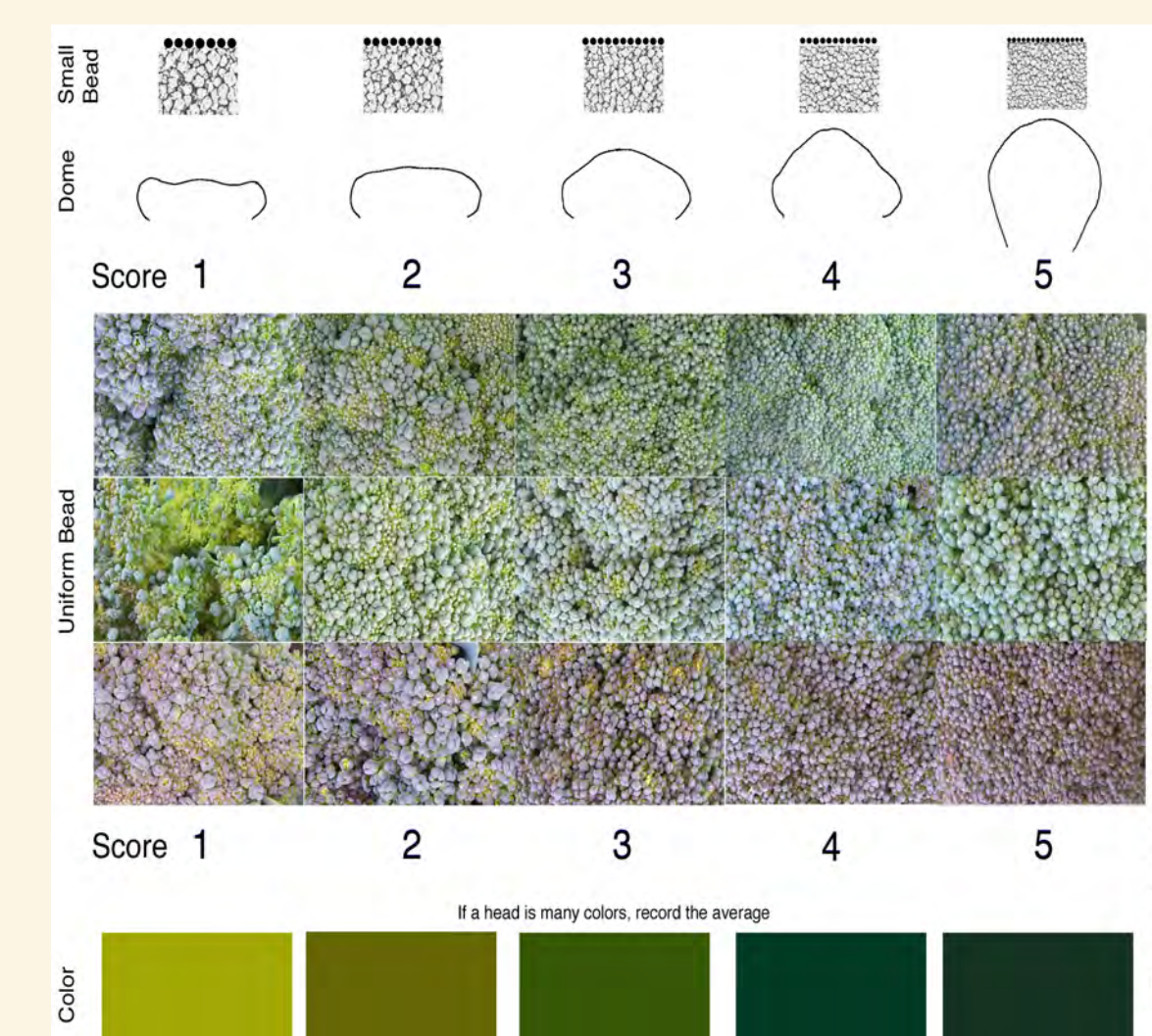
For the first year of this project, we evaluated current and pending varieties at five locations representative of Eastern growing conditions. Our goal was to determine:

- How good are the best current varieties?
- Are there traits that are consistently missing?
- Is maintaining uniform buds associated with some undesirable trait, e.g. large buds?

## Materials and methods

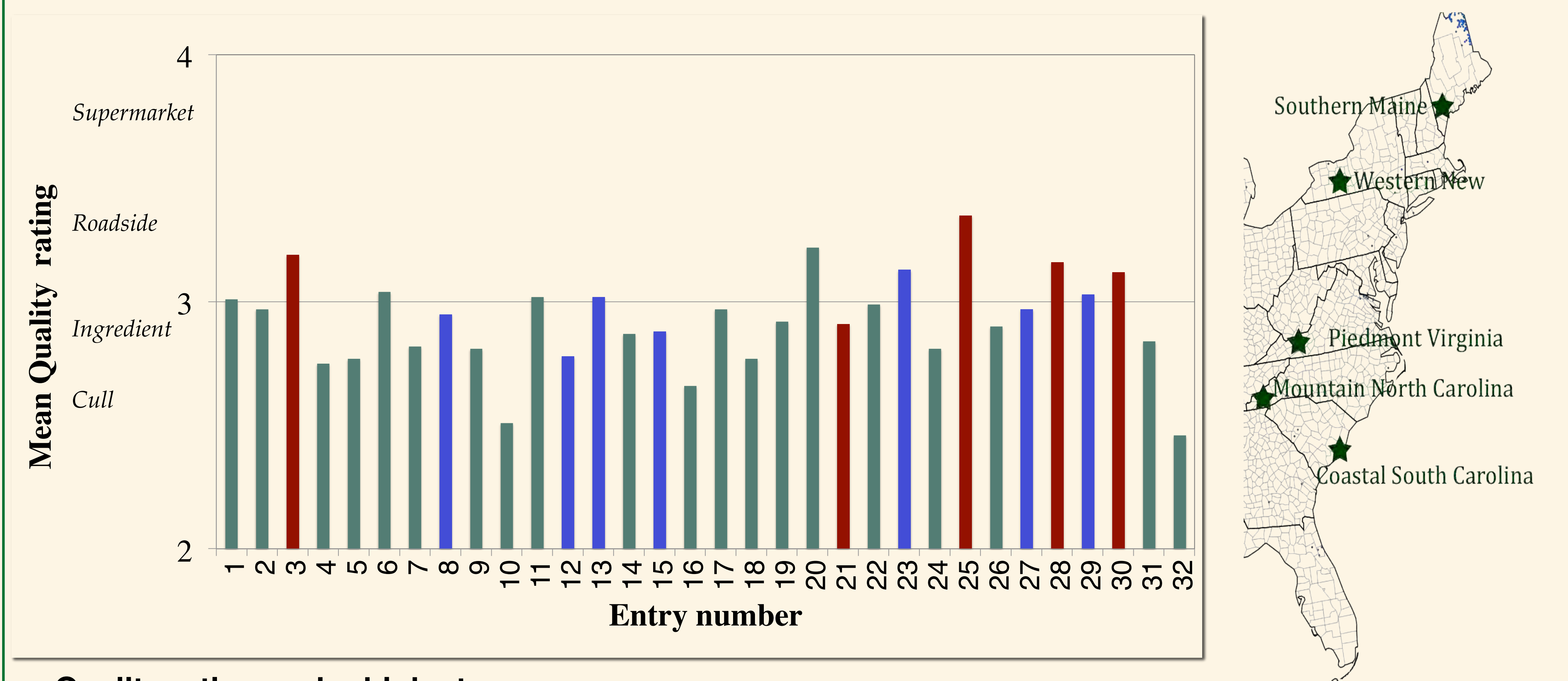
Trials were placed in five locations representing the range of environments most likely to support an expanded broccoli industry. Evaluators used a common scale to evaluate eleven traits that are common head-quality defects under eastern growing conditions.

Participating seed companies were asked to supply strong material. The trials were conducted under confidentiality agreements that preclude revealing the identity of varieties in this context.



## Performance of current material

In the summer heat, commonly planted varieties (blue) varieties did not consistently produce supermarket-grade heads. Those selected by the seed companies as potential new contenders (red) performed better, whereas other varieties available to eastern growers did worse (green). Therefore, growers are accessing the best available material, but better-adapted varieties will soon be available.



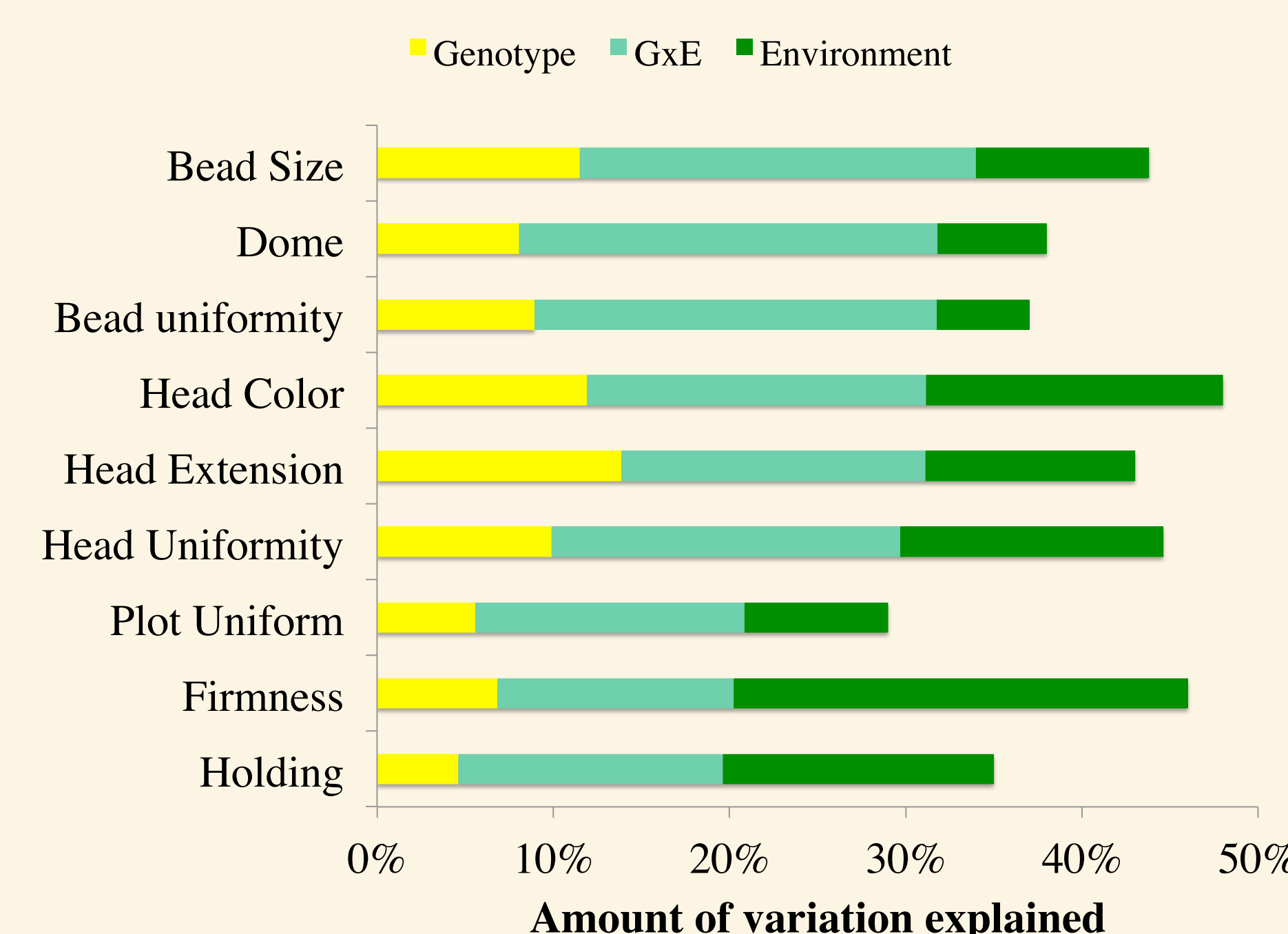
### Quality rating under high stress

Mean ratings for all traits and sites on the stressful planting date  
 Blue= current hybrid with market share. Green = other seed company entries. Red = candidates for release.  
 Quality scale is interpreted by the corresponding market acceptability

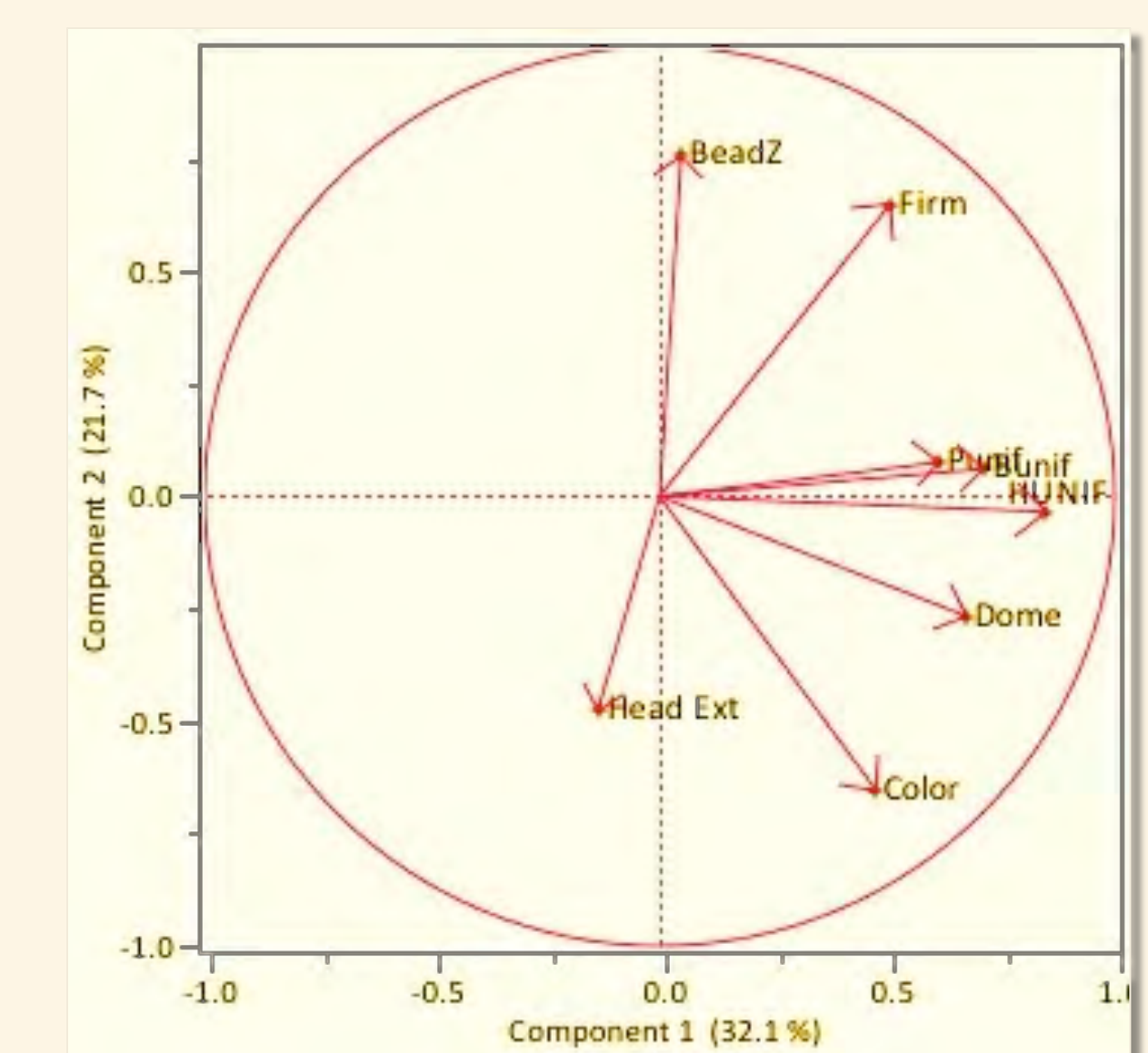
Location of trial sites

## Future prospects

The promise of breeding suitable varieties is strong. The seed companies had useful material in the pipeline that was released in 2012 as a result of this project. The essential traits appear not be associated with undesirable traits. The project continues with public experimental hybrids and new commercial hybrids specifically targeted to the east.



**Genetic basis of variation.** Bead uniformity had high GxE, rather than high E, and is therefore amenable to breeding. A low G was anticipated because simple phenotypic selection has been ineffective.



**Association among phenotypes.** The three uniformity traits were positively associated with each other, but were relatively independent of bead size. Thus there is prospect for future breeding to improve uniformity without increasing bead size. As expected small beaded varieties appeared lighter in color.



## Acknowledgement

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