

What is plant breeding?

History and Modern Plant Breeding

Plant breeding has existed for thousands of years, since humans have been growing plants for food. Today, it can be done in a variety of ways and is utilized by gardeners, farmers, biotechnology companies and individuals alike. On a very basic level, this involves taking two parent plants with the desired characteristics and cross pollinating them. If the cross is successful, then the first offspring will be produced from the seeds of the parent plants. These offspring are called F1's (F= filial). Then, self pollination of the F1 offspring produces the F2 offspring. This is where we begin to see segregation of the different traits we are looking for.

Global Importance

As our worldwide population of 7.6 billion is rapidly increasing, with 9.8 billion projected for 2050, plant breeding will be crucial in aiming to feed the increasing number of people on Earth. Selecting for specific traits in agronomic crops can increase yield by reducing pest damage and increasing disease resistance, drought tolerance and sustainability in production.

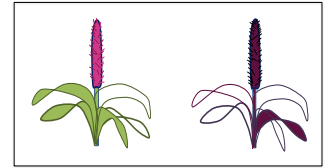


*Mature ornamental pearl millet plant
(cred: Alyssa Converse)*

Pearl Millet Food, Fuel and Fun

Ornamental Pearl millet (*Pennisetum glaucum*) is an annual, monocotyledonous plant that is used in landscapes and gardens across the world. While it has been developed for ornamental purposes at the University of Nebraska-Lincoln within the last 25 years, pearl millet as an agronomic crop has been cultivated for thousands of years. It is largely grown in arid regions of the world, including Africa and South Asia where rainfall, soil moisture and nutrient availability are low. Subsistence farming of the crop in these regions is common and provides food, feed and fuel for industry and individuals. Because pearl millet does not require a lot of care in terms of water and fertilizer, it thrives as an ornamental in places like the American Midwest.

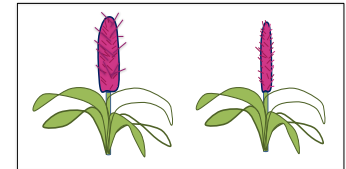
Foliage color



Height



Head characteristics



Selecting for different traits

How does the breeding process work?

To develop different ornamental cultivars of pearl millet, various traits are selected for such as foliage color, height and head characteristics in order to achieve a desired overall aesthetic. For the purpose of our study, the traits we looked for were trichomeless vs trichomes, virescent vs green foliage and purple along the leaf margins.

Plant Breeding as a Career

Plant breeding is a diverse field that can lead to many interesting and rewarding careers. Breeding is needed for virtually every marketable plant that is sold today, from house plants to flowers to vegetables sold in grocery stores. Studying this area of innovation grants you the capability to improve people's lives all around the world, especially in third world countries where improved agriculture is a matter of life or death.

To go into a career in plant breeding, common degrees that can be pursued at the collegiate level include horticulture, plant biology, plant sciences, and agronomy. All of these are offered at UNL and many different universities across the country.



Mature plants in the field (cred: Dr. Keenan Amundsen)

Career Example: Research Associate

Starting a career in plant breeding can lead to many different outcomes. One in particular is a research associate. In terms of education, a bachelor's, master's and doctoral degree specialized in plant breeding or a similar field is required. You can work for a university or private company and job duties might include: analyzing DNA and physical characteristics of plants, managing greenhouse/field/lab/breeding procedures, communicating results with superiors and the public through data presentations and peer-reviewed journals, writing grant applications and delegating tasks for team assistants. Other common positions are bioinformatics specialist, research geneticist and breeding program manager.

Credits

Thank you to Dr. Keenan Amundsen for providing mentorship on this project. Projects made possible by CASNR Department of Agronomy and Horticulture, National Institute of Food and Agriculture of the USDA, UNL Office of Graduate Studies, and APS associates.



(Cred: Dr. Keenan Amundsen)

PLANT **N**
BREEDING
BASICS

Alyssa Converse, UNL 2017