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Selective Breeding in Producing Heat Resistant Pepper Varieties

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Abstract

- Keeping a home garden in Florida has become more and more popular over the past several years. People have realized the joy and utility of growing and maintaining their own food supply.
- The only issue is that many of the new at home gardeners do not have much experience maintaining plants. The work and understanding of growing crops can be daunting to inexperienced growers.
- Having access to plant varieties that are hardier and more resistant to the many elements of nature that plague plants makes at home gardening less stressful and more enjoyable.

Introduction

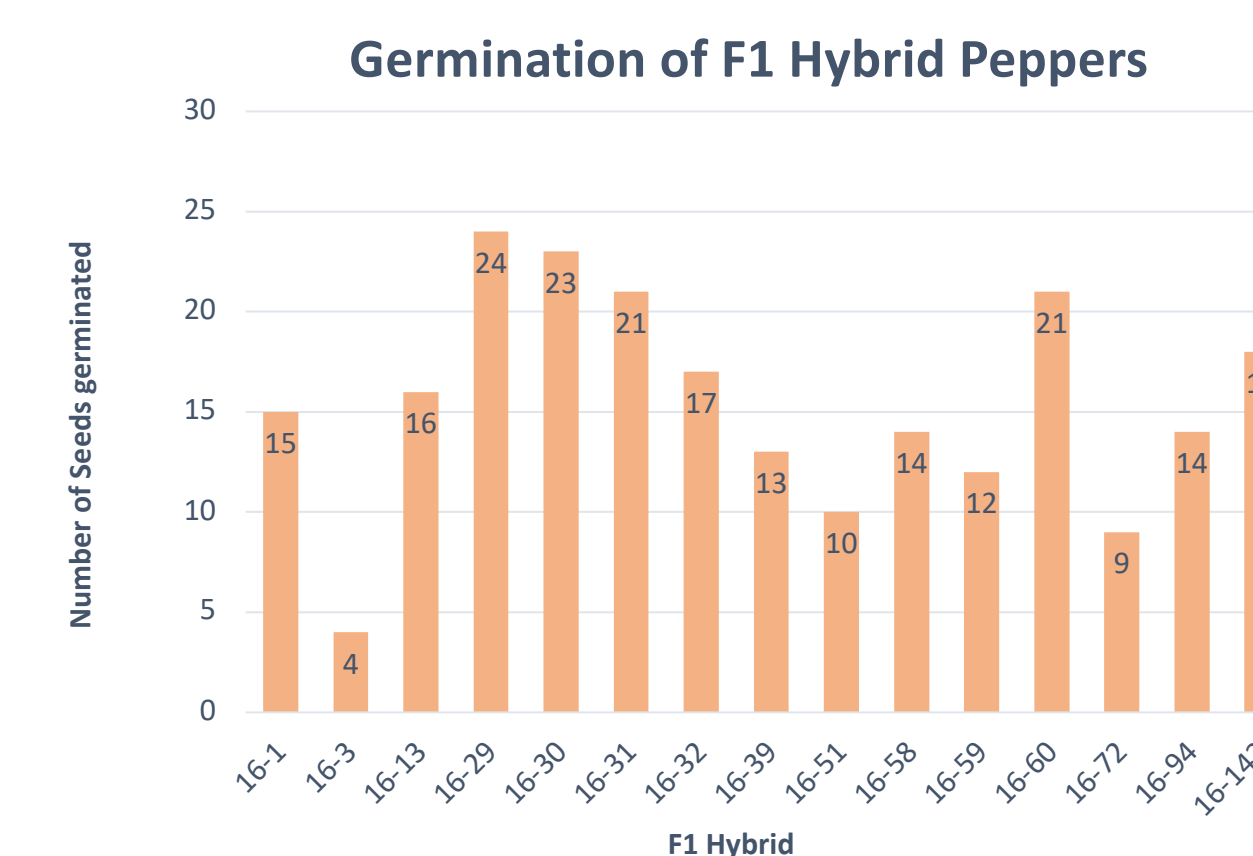
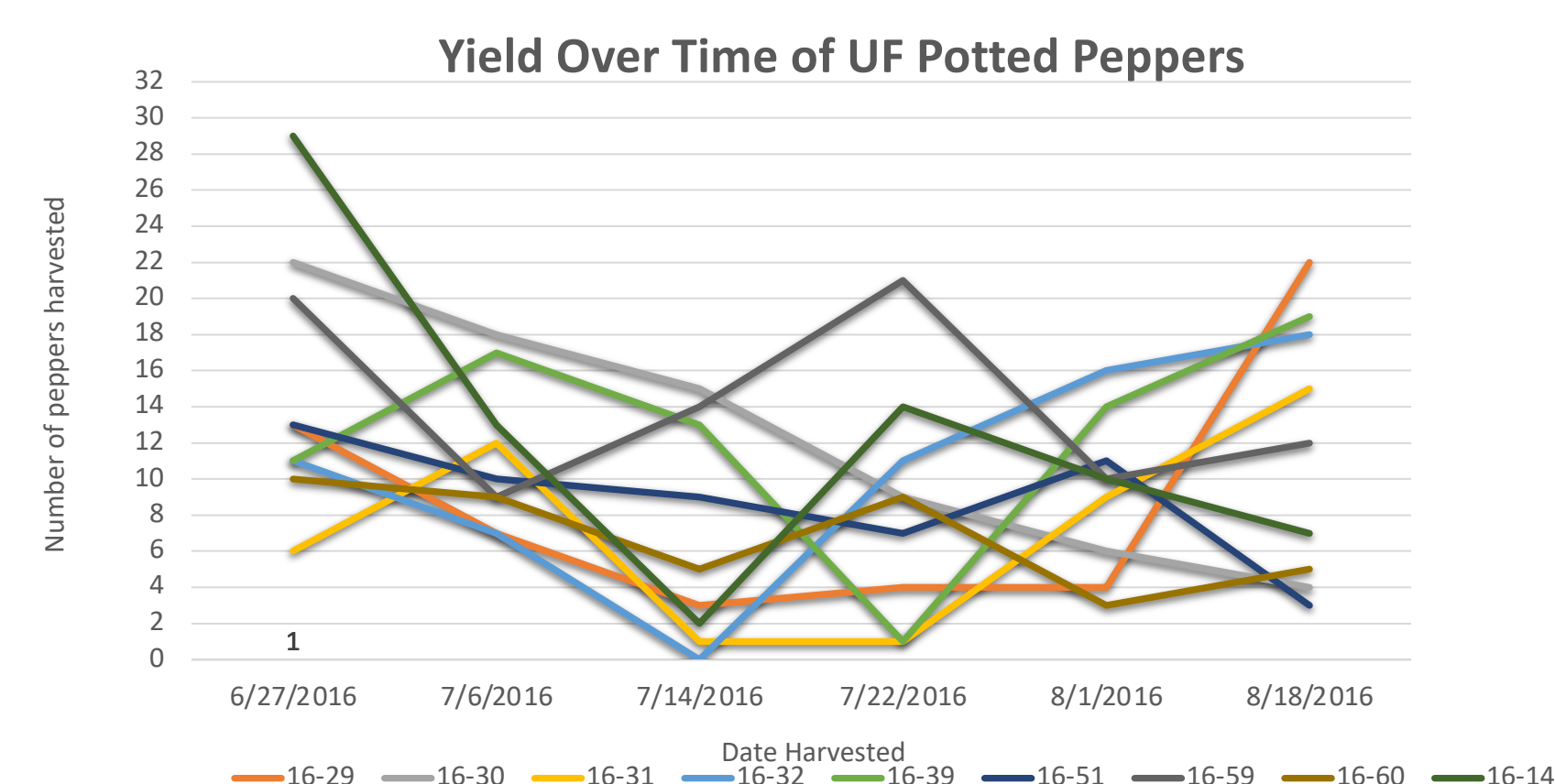
- Selective breeding is breeding of plants or animals in order to selectively develop particular characteristics in the offspring by selecting males and females with the desired characteristics for reproduction. (Bozhilova, Mariam)
- Pepper plants are a very commonly found in many gardens thorough Florida. The warm and sunny climate is perfect for them to flourish. However, many times the sun is too much for the pepper plants to handle.
- Sunscald is a common issue in many vegetable plants and is a result of lengthy and intense exposure to direct sun (Ngouajio, 2018). Both fruits, petals and stem structures can be damaged.



Sunscald on a bell pepper fruit. (Ngouajio Lab, MSU)

Hypothesis

- Selective breeding is an effective method for producing a more heat resistant strand of pepper in Florida.
- An initial screening of inbred pepper lines led to approximately 300 individual F1 hybrid crosses. After seeding, germination ratings and selections, 146 of the F1 crosses were put into field and container trials.

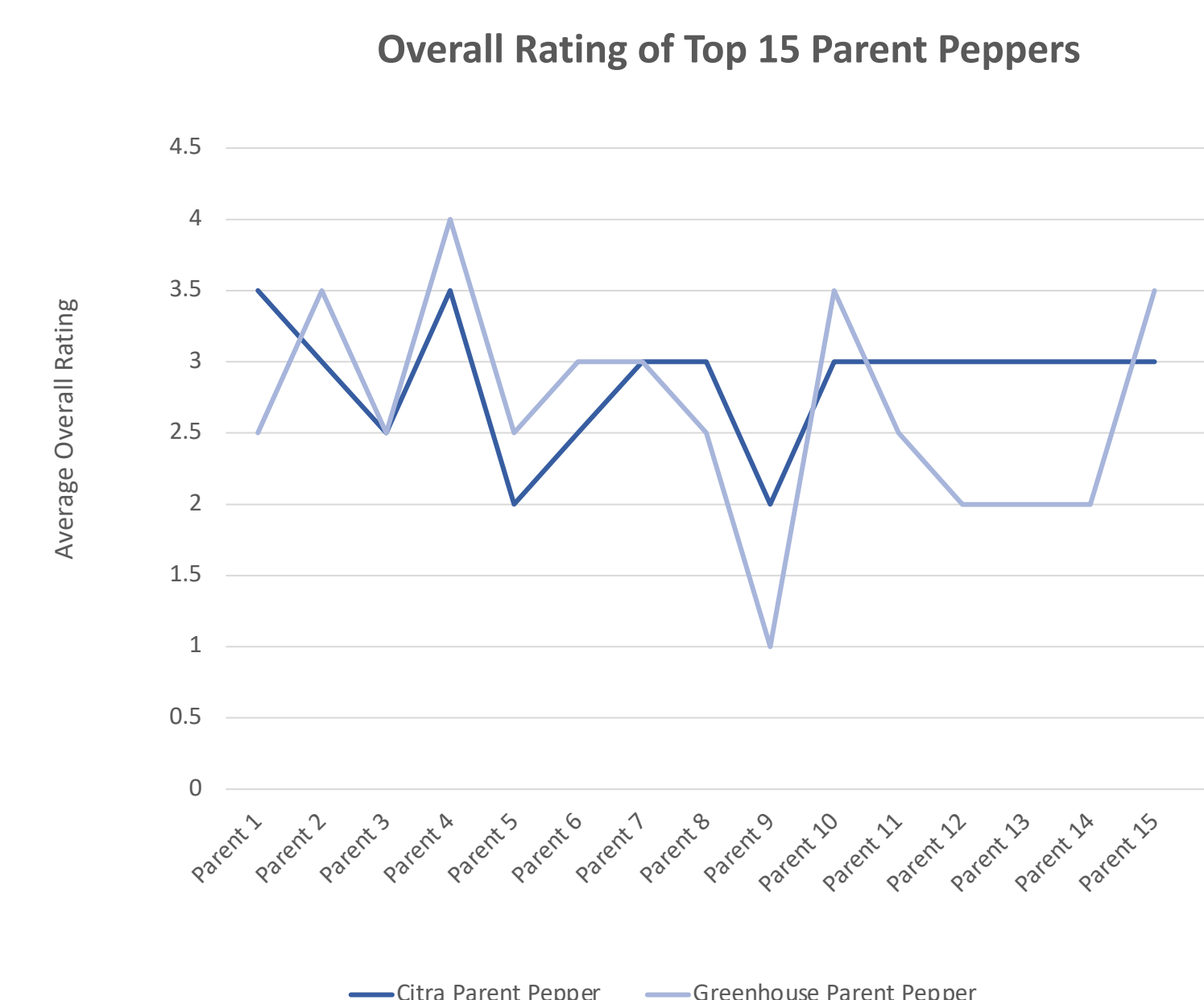


Results

After the process of running inbred crosses through field trials and selecting the best of those to test new F1 varieties in greenhouse and field environments, 15 final F1 varieties stood out from the rest, scoring highly in the vigor, branching, fruit yield and longevity areas.



The most heat resistant F1 variety, thriving while the rest of the varieties have rotted, become overrun with pests or lost all canopy.



$$\text{Average Overall Rating} = \frac{1}{4N} \sum_{p \in P} V_p + B_p + Y_p + L_p$$

Where:
V = Vigor
B = Branching
Y = Fruit Yield
L = Longevity

All scores are rated 0-5.
P is the set of all plants in a particular variety
N is the number of plants in variety P

What to Look for

- Early wilt and early water stress in varieties
- An overabundance of pests attracted to a specific variety.
- If several crosses which are doing poorly have and parent in common.
- All physical aspects of the plant (height, width, leaf size, number and weight of ripe fruit)



Conclusions

- The process of selective breeding is a successful method for breeding new strands of pepper plants that are extremely heat resistant compared to current varieties.
- The experiment outlined produced a very strong variety of pepper plant that was able to withstand severe heat conditions while producing large amounts of fruit and remain healthy.
- Selective breeding with pepper plants was enjoyable and very informative. Next steps would be to implement selective breeding techniques with other Florida plants that suffer from heat such as tomatoes and cucumbers.

Resources

Mathieu Ngouajio, Michigan State University Extension. "Hot and Sunny Days Promote Sunscald in Peppers and Other Vegetables." *MSU Extension*, 4 Oct. 2018, www.canr.msu.edu/news/hot_and_sunny_days_promote_sunscald_in_peppers_and_other_vegetables.

Dr. Mariam Bozhilova Forest Research Institute, BAS. "Difference Between GMO and Selective Breeding." *Difference Between Similar Terms and Objects*, 24 June 2019, www.differencebetween.net/science/difference-between-gmo-and-selective-breeding/.