

Gynoecy Gender Genius

Key to increasing cucurbit yields is in flower sexual morphology: Part One

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The Cucurbitaceae family contains many commercially important crops. In Europe only five cucurbit species are popular and widely commercialized (cucumber, melon, watermelon, pumpkin, squash), compared to South, Southeast Asia and Africa, where no less than twenty cucurbit species are cultivated and consumed.

The need to increase and improve yields in all regions of the world is growing in sync with rising demand for food and an increasing number of cultivation challenges and opportunities.

In recent years, although higher-yielding F1 cultivars in various types of crops have made a significant contribution to the world's food supply, mastering production of such pure hybrid seeds will continue to be a significant challenge for breeders.

Key to improving and increasing yields is understanding the plant's transition between vegetative and reproductive growth, flowering per se. Inflorescence structure; pollination; fertilization; seed and fruit setting – these are major reproductive traits that influence yield.

Most angiosperms develop hermaphrodite flowers, and thus can self-pollinate with little

or no assistance from pollinators; however, about 10% of vascular plants display different flower sexual morphology, dictating more complexity in pollination and thus productivity.

Cucurbits are one such family. Most cucurbit species – bitter melon and watermelon for example – are monoecious, which means they exhibit male and female flowers on the same plant. Some species, such as parwal (pointed gourd) and gac, are dioecious, which produce male and female flowers on separate plants.

Some cucumbers, which are primarily grown in glass houses, are gynodioecious, which means they only bear pistillate flowers (female); furthermore, there are androdioecious species, which bear only staminate flowers (male), but these are rare.

Some muskmelons are andromonoecious plants that exhibit both male and perfect bisexual flowers (hermaphrodite). With these plants, pure hybrid seed production can be difficult and expensive since emasculation (the removal of male organs from hermaphrodite flowers) is required.

How the gender of a flower or plant is determined is an important factor in plant developmental biology. Under-



Most cucurbits are monoecious, which means they have pistillate or female flowers (cucumber pictured), as well as male flowers on the same plant. Gynoecious plants only bear female flowers.

standing this process also has practical applications, as the gender of a flower or plant often limits how the plant is bred and cultivated.

Hence, researchers are beginning to obtain promising results in their efforts to manipulate sexual morphology of

certain crops – specifically by promoting unisexual flower development and parthenocarpy in cucurbits, as it may be possible to increase yields significantly.

In Part Two, we will explore such techniques in more detail.



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BenchBio has obtained the worldwide license for generating the gynoecious trait in any cucurbits from INRA, using a non-GM method. For more information: W: benchbio.com E: manash.chatterjee@gmail.com