On the crossing of cucurbits

L. H. Pammel

Iowa State College

Follow this and additional works at: http://lib.dr.iastate.edu/bulletin

Part of the Agriculture Commons, and the Agronomy and Crop Sciences Commons

Recommended Citation

Available at: http://lib.dr.iastate.edu/bulletin/vol2/iss19/4
ON THE CROSSING OF CUCURBITS.

BY L. H. PAMMEL.

In 1891 the writer read a paper before one of the Horticultural Societies of Iowa,\(^1\) in which the statement was made that melons and cucumbers do not “mix,” nor do pumpkins and melons. He was vigorously assailed by horticulturists for teaching such doctrines. I quote from several horticulturists.\(^2\) Hon. Geo. Van Houten remarked: “I must correct the statement in regard to the crossing of melons and pumpkins and squashes. They will mix.” Mr. Elmer Reeves related his experience when a boy “in having his melons spoiled by sowing seed from those planted near squashes.” In discussing this question with many horticulturists in the State and out, the opinion seems to be almost universal that “mixing” does occur. My brother, who grows many cucurbits in Western Wisconsin, believes that pumpkins and squashes will “mix,” and that melons and cucumbers will “mix.” While I have not endeavored to get the opinion of seedsmen on this question, I believe, as a general thing they caution those who grow cucurbit seeds for them, not to plant the different species too closely. In a discussion of this subject before the American Association of Agricultural Colleges and Experiment Stations, Dr. Neale stated that watermelons were affected by the Calabash (\textit{Lagenaria vulgaris}) in such a way that the melons had an extremely bitter taste, so much so, that it served as a warning to keep away such as desired to take melons. I am inclined to discredit these general statements and the experiments made elsewhere and here at Ames confirm the position I have taken on this question.

In this paper nothing more than some preliminary statements can be made in as much as it will be necessary to grow the cucurbits another year before conclusions can be made on

---

\(^2\)Discussion on the above paper, p. 445.
all of the points. This paper must be considered as supplementing the excellent work of Naudin,3 Bailey,4 Sargeret5 and Munsen.6 To Naudin belongs the credit of having thrown much light on the subject of Cucurbitaceae. During many years he experimented with a large number of varieties from different places. He found that the different species did not "mix," and that when hybrids were produced they yielded either no seed or sterile seed. Prof. Bailey remarks: "Many careful hand pollinations have been made between these two classes of fruits (Cucurbita maxima and C. pepo) and in no case have seeds been procured. Sometimes the fruit will develop for a time and in two or three instances a summer crookneck pollinated by a turban squash has developed till half grown and has persisted until the end of the season, but it was seedless. All our experiments show that Cucurbita pepo and C. maxima do not hybridize." In speaking of the sterility of seed when Cucurbita pepo, C. moschata and C. maxima are crossed, Durwin7 says: "Many naturalists at the present day lay far too little stress, in my opinion, on the test of sterility; yet it is not improbable that distinct species of plants, after a long course of cultivation and variation, may have their mutual sterility eliminated, as we have every reason to believe has occurred in domestic animals. Nor in the case of plants under cultivation, should we be justified in assuming that varieties never acquire a slight degree of mutual sterility." M. M. Vilmorin—Andrieux8 says: "And we may remark that we do not know any form of gourd that should necessarily be considered a hybrid between any two of these species," i. e., pumpkins (Cucurbita pepo) and squash (C. maxima). But Thomas C. Gentry,9 speaking about hybrids between C. pepo and the Orange Gourd (C. ovifera) a native of the southwest, and closely related to the pumpkin, if not the origin of the same, says: "Here, it is evident, is a case of hybridism, brought about through the agency of bees, whereby a cross between two closely allied species has been affected in an eminently successful manner, if the size, quality and profusion of the fruit are any criterion."

5 Memoires sur les Cucurbitacees, 1856. See Darwin Animals and Plants, etc.
6 Annual Report, Maine State College Agricultural Experiment Station, Pt. II, 1893.
8 The Vegetable Garden. English Translation, p. 281.
To insure, if possible, a perfect intermingling of the varieties of melons, cucumbers, pumpkins, and squash, they were planted as follows: Watermelons, various varieties, in one row; second row musk and sugar melons and Sweet Sugar Pumpkins, followed by a row of American Turban and Bush Scalloped, Italian Striped and Improved Long Green Cucumber. Then a row of several varieties of cucumbers, Perfect Gem Squash and New Mediterranean. The fifth row was planted with common pumpkin, watermelon and citron. The sixth row with musk melons, Dipper Gourd and Hubbard Squash. The seventh, Marrow Squash, New Prolific Marrow and Vegetable Marrow and Dipper Gourd. The eighth with common pumpkin.

The above plan gave excellent facilities for the vines of pumpkin (*Cucurbita pepo*), squash (*C. maxima*), watermelon (*Citrullus vulgaris*), musk and sugar melons (*Cucumis melo*), and cucumbers (*Cucumis sativus*), to grow together, they were, in fact, perfectly intermingled.

This intermingling was desirable in order to test the point frequently made by many that watermelons taste like pumpkins when growing close together. I was told that hand pollination would not give as good results as the natural method.

Growers of Cucubits hold quite different opinions in regard to the effect of "mixing." Some believe the effect is seen the first year, while others believe it can only be detected the second year. Our experiment was unfavorable in some respects, a late season and the destruction of most of the melons by boys, but such as remained had no traces of pumpkin. The Perfection Gem (*Citrullus vulgaris*) grew right among Sweet Sugar Pumpkin vines and Perfect Gem Squash, both belonging to the species *Cucurbita pepo*. Two of the perfect ripened specimens tested by Mrs. Pammel, Miss Pamme and myself were pronounced excellent, showing no trace of pumpkin flavor. I might have been prejudiced; but the rest of the family knew nothing of this experiment. They were not told that they were grown among pumpkins.

---

9The writer has been told that Georgia watermelons owe their valuable shipping qualities to the fact that they are grown in proximity to pumpkins, thus giving them a thicker rind.
So far as the work has been carried out only two questions can be answered: I—Immediate effects of crossing; II—Impotency of pollen.

In all of the varieties grown in the field where pollination was brought about by insects no immediate effects were observed. Some of the varieties showed great variability, especially *Cucurbita pepo* and *C. maxima*. This variability was due to the character of the seed planted. In some cases the varieties are not sufficiently stable or perhaps they showed the effects of a previous cross. These variations were noticeable especially in the Nest Egg Gourd, Perfect Gem, Long Warted and Vegetable Marrow. The Hubbard Improved Vegetable Marrow, American Turban squashes and the Sweet Sugar and common pumpkins came true to the type. In all of these the deviations were traced to plants coming from distinct seeds and in no case was any immediate effects of crossing observed.

About four hundred careful hand pollinations were made by myself and Mr. Stewart, assisted by two students, Messrs. Carver and Brown. Out of this number quite a number set and produced perfect fruit. These fruits fully bear out the general statement that there is no immediate effect on the fruit either in shape, size or quality, nor is there any difference in the seed.

Prof. Bailey remarks: "It is commonly said that it occurs in pumpkins and squashes also; but it certainly does not. There has never been any immediate influence whatever in any cases except such as were due to imperfect development caused by insufficient or impotent pollen. In other words the effects of the cross are seen only in the offsprings of the fruits."

**IMPOTENCY OF POLLEN.**

Many interesting experiments have been made to show that self-fertilization does not occur. Red Clover (*Trifolium pratense*) has, perhaps received more attention than most plants and many experiments have been recorded which all show that pollen taken from the same flower and applied to the pistil will not produce seed.\(^\text{10}\) In some cases plants are
so impotent that even when the pollen comes from the same plant but another flower fertilization will not occur.

Experiments have also been made with cucurbits. Prof. Bailey\(^{11}\) says: "My attention was first called to this subject in 1889, when some twenty or thirty squash flowers were pollinated from flowers on the same plant. A number of seeds grew to maturity but they invariably produced poor seeds. This year the subject was carefully examined, 185 squash and gourd flowers of some fifty varieties were individually pollinated, 163 of them did not produce fruit, the remaining twenty-two carried fruits to maturity, but in every case the seeds were thin and worthless.

It is not generally known that many of our musk melons (\textit{Cucumis melo}) produce perfect flowers. Profs. Bailey\(^{12}\) and Munson \(^{13}\) have both recorded the fact. I found that several varieties like the Montreal Improved and Miller's Orange Cream produce perfect flowers. At Ames quite a number were covered to see if self-fertilization would occur, but in no case was there any development. Dr. Halsted\(^{14}\) also covered ten musk melons and in no case did fruit set. In this case it is not stated whether the flowers are perfect.

In regard to the general results of crossing it should be stated, that the time of making the pollinations is important. Morning is most favorable for the work. With few exceptions no "crosses" could be produced between the different species and further observations must be made on what appear to be hybrids between Nest Egg Gourd and Hubbard Squash. In some cases it was a very difficult matter to prevent the Striped Cucumber Beetle from getting into the covered flowers. Of all the varieties crossed the easiest and most successful work was obtained with the Nest Egg Gourd a form of \textit{Cucurbita pepo}, and this is variable form as gardeners know. Details of the work cannot well be presented here, but they are important and we refer the reader to the report of American Association of Agricultural Colleges and Experimental Stations.

\(^{11}\)Third Annual Report Cornell Agricultural College Experiment Station, p. 183.
\(^{12}\)Lec. p. 183.
\(^{13}\)Lec. p. 43.
I think from this work we may fairly conclude that under natural conditions the different species of cucurbits will not produce hybrids as a rule. The several cases in which fruit has been produced may be due to the accidental carrying of pollen by insects. Another season will decide.