

Germplasm Innovation by Interspecific Crosses in Pumpkin

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Abstract. Wide cross compatibility was used to cross four species in *Cucurbita*, and the expression of their botanical traits in the F₁ was studied in 1998-2000. The results showed that the F₁ hybrids among them could be achieved by repeat pollination at the bud and flowering stage. The F₁ plants exhibited heterosis in vegetative growth, disease resistance, and showed a wide variety in botanical traits. There were metaxenia effects on taste of flesh and the color of pumpkin.

Introduction. There is extensive pumpkin cultivation in China, but research about pumpkins is sparse and germplasm for breeding is very limited. Interspecific crosses are an effective way to create new germplasm. The aim of this research was to produce additional pumpkin germplasm for breeding work.

Materials and Method. In this experiment *Cucurbita moschata*, *C. pepo*, *C. maxima* and *C. argyrosperma* were used for interspecific crosses through artificial pollination. *C. moschata* cultivars used for maternal parent were Huang Niutui, Bate, Dongsheng, America Huangyou, Japanese squash etc. To overcome crossing barriers for interspecific hybridization, the repeat pollination, bud pollination, and mixed pollen pollination methods were used, and the resulting fruit and seed set were determined. The number of surviving plants and the change in characters were investigated in F₁ and BC₁ generations. After the F₁ generation, segregating progenies were selected according to our breeding objectives.

Results and Analysis. Results of this experiment are given in Table 1.

C. moschata x *C. pepo*. Crossing barriers existed between these two species. The percentage of seed setting is 1%-2%, and the embryo was not developed normally.

C. moschata x *C. maxima*, The percentage of seed set was about 40%-50% and the percentage was

different with different cultivars. The highest number of normal seeds per fruit is 197 and the lowest was 13. Almost all seeds were not well filled-out. Seed coat was similar to that of the paternal parent.

C. moschata x *C. argyrosperma*. The percentage of seed set was about 10%. The highest number of seeds per fruit was 90 normal seeds (using a Russian cultivar). The color of the seed coat was different with different cultivars.

C. moschata x *C. moschata*. There was no crossing barrier. The size and number of seeds per fruit was different with different cultivars. The percentage of seed set was above 90%.

C. argyrosperma x *C. pepo*. Percentage of seed setting is about 10%. The seed coat is similar to that of the paternal parent. The color of a few seeds varied.

C. argyrosperma x *C. maxima*. There was no crossing barrier between them. The percentage of seed set was about 60-70%. The seed plumpness was poor and about 30%-40% of seeds were not perfect. Seed coat varied.

C. argyrosperma x *C. moschata* D. The percentage of seed set is about 10-25%. Usually there were 60-70 seeds in a fruit.

Discussion. By means of repeat pollination, bud pollination, and mixed pollen pollination, it was possible to obtain interspecific F₁ seed in *Cucurbita*. Heterosis was evident in the progeny, and new germplasm can be obtained through these interspecific crosses. In the test of interspecies cross, different cultivars within a species performed differently. This result is similar to those reported by Lin Depei^[3].

Table 1. Result of interspecies hybridization in pumpkin

<u>Combination</u>	<u>No. of flowers crossed</u>	<u>No. of fruit set</u>	<u>No. of normal seeds</u>	<u>No. of survival plants in F₁</u>	<u>Fertility of F₁ backcross</u>
<i>C. moschata</i> x <i>C. pepo</i>	75	11	17	5%	A few seeds
<i>C. moschata</i> x <i>C. maxima</i>	25	4	407	70%	A few seeds
<i>C. moschata</i> x <i>C. argyosperma</i>	25	7	175	Almost 0	A few seeds
<i>C. moschata</i> x <i>C. moschata</i>	100	63	1782	96%	—
<i>C. argyosperma</i> x <i>C. pepo</i>	75	9	164	15%	Fertility
<i>C. argyosperma</i> x <i>C. maxima</i>	5	2	231	30%	Fertility
<i>C. argyosperma</i> x <i>C. moschata</i>	25	6	383	56%	—

Lin Depei^[3] and an FAO report (1983) reported that *C. moschata* was on a central position in the interspecies relationship of annual pumpkin. Whitaker believed that crossing between pumpkin and true squash is incompatible. Our experiments

found that *C. moschata* x *C. maxima* and *C. argyosperma* x *C. maxima* were cross compatible, similar to the results of Li Bingdong^[4]. Thus, it would appear that *C. maxima* may be used as a bridge for interspecies crosses.

Literature Cited

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