Viable Seed Production of Temperate *Cucurbita moschata* Germplasm When Pollinated by *C. argyrosperma*.

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Cucurbita moschata Duchesne and *C. argyrosperma* Huber are closely related squash species and are known to be partially inter-fertile. These species commonly produce viable hybrid seed when *C. argyrosperma* is the maternal parent. This cross has been manually made via hand pollination by several researchers (3,4,9,10). A natural pollination experiment also showed that *C. argyrosperma* could set a high percent of fruit and viable seed in a field with only *C. moschata* as a pollen source (7). Gene flow between the species has also been demonstrated using isozyme and DNA techniques (1,2,5). Viable seed production with *C. moschata* as a maternal parent has very rarely been produced using tropical *C. moschata* germplasm (Wessel-Bever pers comm.). It is thought that the majority of *C. moschata* cytoplasm is incompatible with *C. argyropserma* nuclear genes (8). Embryo rescue techniques have also been used to produce viable F1 hybrids with *C. moschata* as the maternal parent (6). Here reported is the apparently easy production of viable seed by a temperate *C. moschata* variety when pollinated by *C. argyropserma*.

In January 2008, seed of *C. moschata* 'Butterbush' and *C. argyrosperma* 'Green Striped Cushaw' were planted in the pollinator free University of Connecticut Ecology and Evolutionary Biology department greenhouse. No other *C. moschata* cultivars were planted at this time in the greenhouse. The intent was to pollinated 'Green Striped Cushaw' with pollen from 'Butterbush' to begin a breeding project to create a bush cushaw type with higher beta carotene content for use by the urban Latino community in the northeastern U.S. The sequence of flowers initially did not allow for the intended cross but the reciprocal did present itself, though the literature did not support the chances of viable seed production. The 'Butterbush' was pollinated with the 'Green Striped Cushaw' on April 6, 2008. Two flowers were pollinated one in full anthesis and one bud pollinated the day before complete maturation. Both fruits set and developed normally. The lack of pollinators and other *C. moschata* cultivars eliminate the possibility of these fruits and the subsequent seeds being a product of an accidental self or cross. Later in May the 'Green Striped Cushaw' did eventually produce a female flower and was pollinated with 'Butterbush'. The fruits were harvested approximately 70 days after pollination. Surprisingly the 'Butterbush' seeds appeared mostly developed and viable. The fruit produced from bud pollination contained 88 seeds of which 55 appeared viable. The normally pollinated fruit contained 80 seed with 43 apparently viable. In July the 'Green Striped Cushaw' fruit was harvested and it had three very plump viable seeds and over 100 empty seed coats. Eight seeds from each 'Butterbush' fruit were planted, 5 germinated from the bud pollination, and 6 from the normal pollination. All three seeds from the 'Green Striped Cushaw' fruit germinated. The F1's produced with *C. moschata* as the maternal were immediately recognizable as hybrids, with cotyledons that were approximately twice as long as pure 'Butterbush' seedlings, the plants at fruiting have vines approximately 8ft long with

silver streaked leaves also indication *C. argyrosperma* parentage. When the F1's flowered they were sibbed or selfed. The male flowers produced abundant pollen and the hand pollinations have produced fruit but are not yet mature. These fruit are green striped and at approximately 10 pounds are about two to three times larger then typical 'Butterbush' fruits. These F1's have also been backcrossed to *C. argyrosperma* and have produced fruit.

Hybridization of these two species with *C. moschata* as the maternal parent may be useful in two ways: 1) increasing the chances of making F1 hybrids between the species in breeding programs and 2) introducing novel cytoplasmic genes into *C. argyrosperma* which could have an agronomic benefit. Additionally this cross may give us insight into biological isolation barriers between the species. The negative interaction between the tropical *C. moschata* cytoplasm and the *C. argyrosperma* nuclear genes may be an effective mechanism that allows C. *moschata* to remain distinct where the two species are commonly interplanted. *Vice versa* the acceptance of temperate *C. moschata* germplasm of *C. argyrosperma* pollen may represent a barrier breakdown in plants that have not generally been interplanted with the other species perhaps for generations. Additional investigation is needed to determine if 'Butterbush' is unique in its ability to easily accept *C. argyrosperma* pollen or if this is a common widespread trait in temperate *C. moschata* varieties.

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