Evidence for the Center of Diversity of *Cucurbita moschata* in Colombia

Linda Wessel-Beaver  
Dept. of Agronomy and Soils, University of Puerto Rico, P.O. Box 9030, Mayaguez, Puerto Rico 00681-9030

Until recently, most researchers accepted southern Mexico-northern Guatemala as the likely center of origin of *C. moschata* as proposed by Whitaker and Davis (5). However, others (1,2,6) have noted that pumpkins in northern Colombia are morphologically diverse. Nee (3) has speculated that this area might be the center of diversity of *C. moschata*. In contrast to the case of Central America, little is known (or at least documented) about the extent of genetic variability in South American *C. moschata*. Collections exist in Colombia, Brazil and Bolivia, but are largely uncharacterized. Older literature from South America is difficult to access and has been largely ignored. The literature that is available often misidentifies species making the usefulness of this information somewhat suspect. My purpose here is to document what I have learned about genetic variability of South American *C. moschata*, either by personal observation in markets, communications with colleagues, or field evaluations of germplasm collections, and thus lend support to the hypothesis that the center of diversity and domestication of this species is northern South American, and possibly the north coast of Colombia.

The large size of *C. moschata* severely limits its characterization compared to other crops. I have either grown out or observed thousands of accessions of *Cucurbita*, including well over 500 accessions of *C. moschata*. Several characteristics in materials from Colombia and Bolivia not observed in germplasm originating in Central America, has lead me to believe that further investigation into variability of South American *C. moschata* would be valuable in the understanding of this crop. Of particular interest was the frequent presence of brown seeded morphs in land races from Panama, Colombia and Bolivia, and occasional Colombian land races with extremely small (5 mm) dark seeds. Bukasov (1) reported this trait in Colombian land races. Interestingly, this trait has not been noted in Brazilian germplasm (M. A. de Queiroz, personal communication). Nothing in the literature, nor in my personal observations, indicates that this trait occurs in *C. moschata* germplasm originating north of Panama. Previous to my trip to Colombia I also noticed that fruits and plants of some Colombia accessions were particularly primitive in appearance. The fruits were small (<0.5 kg) with highly lignified and warty rinds. The plants were very viney, small leafed and indeterminate.

I visited markets in Colombia from 15 - 22 May 1999 in two areas of the country: (1.) Cali and nearby towns (including Jamundi, Santander de Quilichao, Puerto Tejada and Palmira, and (2.) Cartagena and small towns along the coastal highway between Cartagena and Baranquilla. Cartagena is located on the Caribbean coast of Colombia at the mouth of the Cauca river, while Baranquilla lies at the mouth of the Magdalena river. This is the general area where Nee (1990) suggests that the wild ancestor of *C. moschata* might be found. Cali is located in the upper Cauca Valley, an area now dedicated almost exclusively to sugarcane. However, small plots of *C. moschata* are grown all over the valley. The presence of feral *C. moschata* plants along almost every roadside is testament to how widely this crop was grown in the past. There are many important archeological sites in Colombia. Agriculture in the Americas may have its origin in areas similar to parts of the Cauca and Magdalena valleys that were once covered with tropical deciduous forests (4). Very likely *C. moschata* was part of those earliest agricultural systems.

The fruits I observed in markets around and in Cali were very variable in shape and color, but generally smooth skinned with little or no lignification. In fact, the fruits I observed at these markets were not markedly different from fruits I have seen in other places in Central America or the Caribbean, except that they may have been more commonly furrowed. However, one trait did stand out: approximately half of the fruits I observed were dark-seeded. Interestingly, the market at Jamundi had only a few
fruits (less than 10%) with brown seeds, while all fruit at the Puerto Tejada market were brown seeded.

In and near Cartagena fruits were much more primitive in appearance compared to Cali. As a group, these fruits were more primitive looking than fruits I have seen from Mexico or Guatemala. Nearly every fruit I observed was heavily furrowed and warty and often highly lignified. Seeds were brown with few exceptions. As in Cali, vendors and buyers alike seemed indifferent to variations in seed color. However, I was consistently told that people preferred the smooth, non-warty skin types and that farmers tried to select for that trait. My visit coincided with the beginning of the main growing season when *C. moschata* fruits are relatively rare in the markets of the coast. Many vendors commented that what I was seeing were the criollo, or unimproved types. Nevertheless, a great deal of farmer selection must have been carried out over the millennia since *C. moschata* was first domesticated since even these criollo fruits possessed thick (often >5 cm), fine textured and intensely orange flesh. Very attractive flesh color and thickness were observed in fruits in the Cali area as well. Brown seeded types at both locations were variable for seed size, intensity of brown color (ranging from almost black to golden brown), smoothness (from deeply etched to very smooth) and size, color and smoothness of margins.

I did not observe any wild species of *Cucurbita* while in Colombia, although I only had limited access to areas outside of markets because of the precarious security situation in that country. The area between Cartagena and Baranquilla deserves further study as a site for the possible location of the wild ancestor of *C. moschata*. Recent studies carried out in collaboration with D. Piperno and O. Sanjur (Smithsonian Institute for Tropical Research, Panama City, Panama) and T. Andres suggest that this may be *C. argyrosperma* subsp. *sororia*, or something like it. *C. sororia* was recently found in Panama (T. Andres and D. Piperno, personal communication; 4). It's previous range was thought to be the southern U.S. to Nicaragua. It is adapted to ecological conditions (hot and dry) that are similar to those found seasonally in some areas of the Caribbean coast of Colombia.

The primitive and variable appearance of *C. moschata* in Colombia, particularly on the Caribbean coast, the presence of ecological conditions favorable for the growth of a putative wild ancestor, and the side-by side occurrence of traits otherwise found only in either South or Central America, suggest that this species was domesticated in Colombia and later carried north and south.

**Acknowledgements:** I wish to thank Proyecto Atlantica, University of Puerto Rico for financial support for travel to Colombia.

**Literature Cited:**