

Inheritance of Gray Leaf Color in a Material Derived from a *Cucurbita maxima* Duch. x *C. moschata* Duch. Hybrid

F. López-Anido, E. Cointry, I. Firpo, S.M. García, and S. Gattuso

Fac. de Cs. Agrarias, Universidad Nacional de Rosario, CC 14, Zavalla S2125 ZAA, Argentina

Introduction. In southern Latin America *C. maxima* has been largely bred for immature fruit consumption given rise to the so-called “zapallito” varieties. This culinary use is very popular and has pre-Columbian cultural roots. It is believed that this species was domesticated from *C. andreana* Naud. (2). Commercial cultivars and landraces of zapallito present no mottled leaves, soft mature flesh and generally short internodes, giving a typical compact plant. *C. moschata* cultivars have been used for mature fruit harvest, they present vine habit, good quality mature flesh and mottled leaves.

In *Cucurbita* species interspecific crosses have played an important role in the breeding work (5), especially the crosses between *C. maxima* and *C. moschata*. They have proven to be useful in transferring good attributes from one to another and even used as commercial hybrids (6). Recently, in a *C. maxima* x *C. moschata* hybrid progeny a novel gray leaf color type was identified and its inheritance examined. The information is of importance for the potential inclusion of this leaf color variant in breeding programs.

Material and Methods. In 1995 in the Rosario National University zapallito breeding program crosses between *C. maxima* cv. Any and *C. moschata* cv. Butternut-Local were conducted in an attempt to obtain materials that could be harvested either in an immature or mature state. In 1996 the hybrid population was field evaluated in order to start a selfing scheme. A large variation was observed among plants: some resembled the *C. moschata* parent in the vine growth and mottled leaves, others presented the typical compact plant habit of zapallito. A distinctive uniformly gray leaf plant was observed (Figure 1), selfed and identified as ‘I-3’. During 1997 and 1998 S₁ and S₂ progenies were advanced showing uniform gray leaves. In 1999 and 2000 crosses were made with ‘A-10-2-2’, a uniform green leaf zapallito inbred line, obtaining F₁, F₂, BC1 and BC2 generations. The segregation study was conducted at the Experimental Field of the Rosario National University in an early sowing date (1 December 2001) and, when seeds were available, repeated in a late sowing date (13 February 2002). In each case the plants presenting normal green and gray leaf color were counted four weeks after the sowing date.

Since a similar uniformly silvery-leaf form was observed in *C. pepo* (4) and its nature due to air spaces under the epidermal layer (3), an optical microscopic examination was also conducted upon normal green and gray leaf sections. Both fresh and fixed (formaldehyde, ethanol, acetic acid, water, 2:10:1:3.5) leaves were used. Transverse sections of the leaves measuring 10 µm were prepared with a hand microtome and stained with Safranin and Fast Green (1). Sections were mounted in synthetic balsam.

Results and Discussion. Results of the segregation study are presented in Table 1. Leaf color fits a monogenic inheritance, the gray form being recessive to normal green. We propose the symbol *grl* (*grey leaf*) to designate the gene controlling this trait.

The microscopic observation failed to relate the distinctive gray leaf color to any apparent differences in air spaces among palisade cells nor between palisade cells and epidermal layer. Its nature should be further investigated.

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Figure 1. Expanded normal green (left) and gray (right) leaves.

Table 1. Goodness of fit χ^2 test for normal green and gray leaf plant segregation evaluated in an early (E) and late (L) sowing date.

<u>Generation</u>	<u>Sowing</u> <u>Date</u>	<u>No. of plants</u>		<u>Expected</u> <u>Ratio</u>	<u>χ^2</u>	<u>P</u>
		<u>Green</u>	<u>Gray</u>			
A-10-2-2	E	30	-	1:0		
	L	16	-	1:0		
I-3-14-5	E	-	49	0:1		
	L	-	42	0:1		
F ₁ (A-10-2-2 x I-3-14-5)	E	26	-	1:0		
	L	16	-	1:0		
F ₁ (I-3-14-5 x A-10-2-2)	E	31	-	1:0		
F ₂ (A-10-2-2 x I-3-14-5)	E	113	35	3:1	0.14	0.5-0.75
	L	36	15	3:1	0.53	0.25-0.50
F ₂ (I-3-14-5 x A-10-2-2)	E	27	8	3:1	0.08	0.75-0.90
BC (A-10-2-2 x I-3-14-5) x A-10-2-2	E	37	-	1:0		
	L	47	-	1:0		
BC (A-10-2-2 x I-3-14-5) x I-3-14-5	E	45	40	1:1	0.29	0.50-0.75
	L	27	25	1:1	0.08	0.75-0.90

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