Bulletin UASVM Horticulture, 68(1)/2011
Print ISSN 1843-5254; Electronic ISSN 1843-5394

# Total Phenolics Content in Interspecific Families between Common and Scarlet Eggplants

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SUMMARY

The fruit flesh of common eggplant (*Solanum melongena* L.) presents a high antioxidant capacity as a result of the high content of phenolic compounds, mostly chlorogenic acid and its conjugates (Whitaker and Stommel, 2003). Other cultivated and less known species of eggplant include the African gboma (*S. macrocarpon* L.) and scarlet (*S. aethiopicum* L.) eggplants (Daunay, 2008). Interspecific hybrids between *S. melongena* and *S. aethiopicum* are not difficult to be obtained and the seed germinates without problems. These interspecific hybrids are very vigorous but highly sterile, although on occasion backcrosses to both parents can be obtained when using the hybrids as female parents. *S. aethiopicum* is characterized by a low content in phenolics (Stommel and Whitaker, 2003; Prohens *et al.*, 2007), and therefore, *S. melongena* could be a source of variation for improving the phenolics content of *S. aethiopicum*. Two *S. melongena* parents, two *S. aethiopicum* parents, the four possible interespecific hybrids, and two backcross generations to *S. melongena*, as well as two backcross generations to *S. aethiopicum* (Tab. 1) were planted in an open field in Valencia (Spain) and were grown using the standard horticultural practices for common eggplant. Ten plants for each of the parents and hybrids were used. For the backcross generations, the number of plants was variable due to a limited number of seeds available, in particular for backcrosses to *S. melongena* (Tab. 1). All plants of the parents produced many fruits, all of which were seeded. However, most of the plants of the interspecific hybrids did not produce fruit and in all cases were seedless and smaller than those of any of the parents. Also, several plants of the backcrosses, although less frequently than in the case of the interspecific hybrids, did not produce fruit (Tab. 1). Fruits of the backcrosses were also generally small. Total phenolics content was measured for each individual plant that produced fruit in a bulked sample of fruits according to the Folin-Ciocalteu procedure (Singleton and Rossi, 1965). The results show that *S. melongena* parents had a much higher content in phenolics than *S. aethiopicum* parents, with values between three and four times higher in *S. melongena* than in *S. aethiopicum* (Tab. 1), which agrees with previous results (Stommel and Whitaker, 2003; Prohens *et al.*, 2007). The interspecific hybrids showed values very similar to those of *S. aethiopicum*, suggesting a dominance of the alleles for low content in phenolics from *S. aethiopicum*. The backcrosses to *S. aethiopicum* also present values very similar to those of the recurrent parent *S. aethiopicum*, which is further evidence of the dominance of alleles for low content in phenolics. As indicated before, few plants (four) were available for the backcrosses to *S. melongena*; however, in all cases they presented values higher than those of

the interspecific hybrids and similar to those of the parents. It remains to be investigated if this recovery of the content of phenolics in these backcrosses is caused by the fact that these plants were homozygous for the *S. melongena* alleles affecting this trait, or if there is an important genetic background effect in the expression of the genes affecting total phenolics content. This will require populations larger than those we had available. Overall, the results show that it may be difficult to incorporate the high phenolics content of *S. melongena* into the genetic background of *S. aethiopicum* using conventional approaches. In this respect, the use of introgression lines of *S. melongena* into the genetic background of *S. aethiopicum* may be a useful way to obtain materials of *S. aethiopicum* with higher content in phenolics and well as to elucidate the genetic control of these traits in eggplants. Also, the fact that backcross plants to *S. melongena* present high values, similar to those of the recurrent parent, indicates that introgression of traits from *S. aethiopicum* into *S. melongena* can be readily done without a negative effect on the high phenolics content of *S. melongena*, as has been demonstrated by Mennella *et al*. (2010).

Tab. 1

Number of plants evaluated for parental (*S. melongena* and *S. aethiopicum*), interespecific hybrids, and backcross generations and average total phenolics content ±SD

| Generation | Number of plants (n) | Number of plants with fruit (n) | Phenolics content ($mg \cdot kg^{-1}$) |
|---|---|---|---|
| *S. melongena* | | | |
| M1 | 10 | 10 | 533.2±132.0 |
| M2 | 10 | 10 | 656.6±82.1 |
| *S. aethiopicum* | | | |
| A1 | 10 | 10 | 161.7±59.6 |
| A2 | 10 | 10 | 180.1±31.6 |
| Interspecific hybrids | | | |
| M1×A1 | 10 | 7 | 180.4±27.2 |
| M1×A2 | 10 | 2 | 191.2±133.6 |
| M2×A1 | 10 | 0 | --- |
| M2×A2 | 10 | 2 | 261.2±60.0 |
| Backcrosses to *S. melongena* | | | |
| (M1×A1)×M1 | 1 | 1 | 701.9 |
| (M2×A2)×M2 | 4 | 3 | 493.1±13.9 |
| Backcrosses to *S. aethiopicum* | | | |
| (M1×A2)×A2 | 19 | 8 | 146.2±52.9 |
| (M2×A2)×A2 | 27 | 15 | 171.6±56.4 |

**Keywords**: backcrosses, introgression, phenolics content, *Solanum aethiopicum*, *Solanum melongena*

Acknowledgements. This contribution has been partially funded by the Ministerio de Ciencia y Tecnología (AGL2009-07257). Seeds of the materials tested were provided by Dr. John R. Stommel.

## REFERENCES

1. Daunay, M. C. (2008). Eggplant. In: J. Prohens and F. Nuez (Eds.). Handbook of plant breeding: Vegetables II:163-220, Springer, New York, NY, USA.

2. Mennella, G., G. L. Rotino, M. Fibiani, A. D'Alessandro, G. Francese, L. Toppino, F. Cavallanti, N. Acciarri and R. Lo Scalzo (2010). Characterization of health-related compounds in

eggplant (*Solanum melongena* L.) lines derived from introgression of allied species. J. Agric. Food Chem. 58:7597-7603.

3. Prohens, J., A. Rodríguez-Burruezo and F. Nuez (2007). Total phenolic concentration and browning susceptibility in a collection of different varietal types and hybrids of eggplant: implications for breeding for higher nutritional quality and reduced browning. J. Amer. Soc. Hort. Sci. 132:638-646.

4. Stommel, J.R. and B.D. Whitaker (2003). Phenolic acid composition of eggplant fruit in a germplasm core subset. J. Amer. Soc. Hort. Sci. 128:704-710.

5. Whitaker, B.D. and J.R. Stommel (2003). Distribution of hydroxicinnamic acid conjugates in fruit of commercial eggplant (*Solanum melongena* L.) cultivars. J. Agric. Food Chem. 51:3448-3454.