

Qualitative Genes for Use in Development of Elite Watermelon Cultivars

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Plant breeders interested in developing elite cultivars of watermelon (*Citrullus lanatus* (Thunb.) Matsum. & Nakai) need to make use of qualitative genes to provide top performance. For example, a cultivar similar to 'Allsweet', but with improved single gene traits, might have the following genotype (desired genotype shown in parentheses). Seed color is non-dotted black (*DD RR TT WW*), seed size is short (*ll ss*), seed type is non-cracked (*CrCr*), and non-Egusi (*EgEg*). Leaf shape is lobed (*NlNl*), with no seedling leaf variegation (*SlvSlv*), green (not yellow) leaf color (*ylyl*), not delayed green leaf color (*DgDg*), and no defects, for example, not juvenile albino (*JaJa*). The vines are tall (*Dw-1Dw-1 Dw-2Dw-2 Dw-3Dw-3*) and have tendrils (*TlTl*). Flowering habit would be monoecious (*AA*), with yellow flower color (*GfGf*), and plants would be male fertile (*GmsGms Ms-1Ms-1 Ms-2Ms-2*) except for the female parent inbred used for hybrid production.

Fruit of the cultivar are non-bitter (*susu*), elongate shaped (*OO*), have a non-furrowed fruit surface (*FF*), and non-explosive rind (*EE*). The fruit rind pattern is striped (*g^sg^s*), not pencilled (*PP*), not mottled (*MM*), not spotted (*spsp*), and not golden yellow (*GoGo*). Flesh color is red (*YY*), not canary yellow (*cc*), and not white or yellow (*wfwf bb*). Disease resistance is for anthracnose race 1 (*Ar-1Ar-1*), anthracnose race 2 (*Ar-2¹Ar-2¹*), *Fusarium* wilt race 1 (*Fo-1Fo-1*), gummy stem blight (*dbdb*), powdery mildew (*PmPm*), and zucchini yellow mosaic (*zymzym*). Insect resistance is for fruit fly (*FwrFwr*) and red pumpkin beetle (*AfAf*). Stress resistance is for cool temperature resistance (*CtrCtr*).

Other watermelon cultivar types include large size fruit with elongate shape and

narrow stripes as in 'Jubilee', large size fruit with elongate shape and solid gray rind, as in 'Charleston Gray', medium size fruit with round shape and medium width stripe as in 'Crimson Sweet', and icebox fruit size with round shape and dark solid color as in 'Sugar Baby'.

A cultivar such as 'Jubilee' would have the genotype *OO* (elongate fruit) and *g^sg^s* (striped rind pattern). 'Charleston Gray' would have the genotype *OO* (elongate fruit) and *mm* (greenish white mottling of the fruit skin). 'Crimson Sweet' would have the genotype *g^sg^s* (striped rind pattern) and *oo* (round fruit shape). Sugar Baby would have the genotype *GG* (solid dark green rind pattern) and *oo* (round fruit shape).

Elite cultivars could be made available with new flesh colors. The genotype would be *YY* for light red, *y^oy^o* for orange, *yy* for salmon yellow, *CC* for canary yellow, and *WfWf BB* (or *WfWf bb*) for white flesh. The qualitative genes listed above can also be incorporated into seedless cultivars to improve the quality. Flesh colors other than red (canary yellow and orange) have already been incorporated into seedless cultivars now available commercially.

It would not be sufficient to incorporate just qualitative genes into an elite cultivar. Important quantitative traits would include rapid seed germination at low temperature, early maturity, high fruit yield, crisp fruit flesh, high flesh sugar content, and excellent flavor.

Literature Cited

1. Guner, N. and T. C. Wehner. 2003. The genes of watermelon. *Cucurbit Genet. Coop. Rpt.* 26: 76-9