A New Male Sterile Mutant Identified in Watermelon with Multiple Unique Morphological Features

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Only a few genes controlling male sterility have been reported in watermelon (1). A new spontaneous male sterile mutant was identified in our breeding program from a cross between 'Yellow Doll' and 'Cream of Saskatchewan'. The original cross was made in 2005, and the F_1 was selfed and backcrossed in 2006. The F_2 were grown in the greenhouse in the fall of 2006 to collect phenotypic data. Eight out of 40 plants in the F_2 population showed the male sterile phenotype, which appears to fit a 3:1 segregating ratio suggesting a single recessive gene (χ^2=0.53). However, no mutants were observed in either parents or the F_1.

There were several other morphological features that were unique to the male sterile plants (Fig. 1). The number of leaf lobes was much fewer than normal plants. Seedlings appeared to grow much slower and had a spindly appearance compared to their non-male sterile counterparts. The male sterile mutants also had much longer internodes than non-male sterile plants, and the growth rate of the male sterile mutants appeared to be much slower than normal segregants. The leaf lobing was much less on mutant plants and appears to be less than that reported for the dwarf male-sterile watermelon (*ms-dw*) (2). The curvature of the leaf was also more convex compared to non-male sterile plants. The stem above the first node exhibited a mild fasciation in mature plants, which gradually returned to the normal angular stem above the second node. Microscopic evaluation of anthers from the male sterile mutants revealed that the pollen sac did not dehisce. The female flowering pattern appeared normal. Although we were not able to obtain pollinated fruit from this population, we suspect it is because the plants were old by the time we noticed the male sterility. Reserve seed from this population has been planted in the greenhouse and sib mating appears to be successful.

This mutant appears to be different from the other reported male sterile mutants because of the multiple morphological features that are affected. If this mutant is proven to be unique we will propose *ms-3* as the name for this new gene. This new mutant could be a valuable genetic source for watermelon breeding since it appears that seedlings can be identified that carry the male sterile trait. Progeny from the original cross, as well as fertile F2's have been planted for further evaluation of this unique trait in watermelon.

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Literature Cited:

1. Guner, N. and T. C. Wehner. 2003. Gene list for watermelon. Cucurbit Genetics Cooperative Report 26:76-92.
2. Huang H., X. Zhang, Z. Wei, Q. Li and X. Li. 1998. Inheritance of male-sterility and dwarfism in watermelon [*Citrullus lanatus* (Thunb.) Matsum. and Nakai]. Scientia Horticulturae 74:175-181.

Figure 1. Male sterile mutant in watermelon showing anthers that failed to dehisce. Normal leaf lobing can be seen in a fertile sibling in the background.