A comparative study on morphological and fruit quality traits of diploid and polyploid carambola (*Averrhoa carambola* L.) genotypes

Yulin Hu, Dequan Sun, Huigang Hu, Xuedong Zuo, Tong Xia and Jianghui Xie

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Abstract

Artificially induced polyploid crops are generally associated with improved agronomic characteristics. Triploids and tetraploids previously created from the diploid carambola (*Averrhoa carambola* L.) cultivar 'B17′ (2n = 22) were used as experimental materials. The plody level of this new genetic material was checked by the combination of flow cytometry and by chromosome counting. The morphological characteristics and fruit quality of diploid and polyploid carambola were evaluated under field conditions. The results revealed that plants of different ploidy levels demonstrated significantly different phenotypic traits. Compared with their diploid counterparts, polyploids in general had greater vigor and biomass. Triploid and tetraploid plants produced stronger branches and petioles, more leaflets, thicker and larger leaves, larger pollen grains and flowers, bigger and heavier fruits as compared with that of diploid plants. However, a great decrease in the number of flowers was observed in polyploid plants, with 50% reduction in the triploids as compared with the diploids. Furthermore, the majority of pollen from triploid plants was abnormal with collapsed structure and two different types of pollen grains were observed in the tetraploids using scanning electron microscope. Additionally, a general improvement in the quality of polyploid fruits was found when compared with diploid ones. In particular, the shelf life of polyploid fruits was much longer than their diploid counterparts. A comparative study was conducted among parental diploid carambola plants and their triploid and tetraploid deliverable offsprings based on morphological, physiological and agronomical traits. This study is expected to contribute into the breeding process for the production of new polyploid carambola varieties which will be characterized by special agronomical characteristics, better quality and longer self life period of their fruits.