Effects of Polyploidy Induction by Colchicines on Morphological Traits of Troyer Citrange Rootstock (*Citrus sinensis* cv. Troyer Citrange)

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Abstract

Background and Objectives

Citrus is one of the most important and useful fruits in the world. They are usually propagated by grafting on suitable rootstocks such as Troyer citrange. In plants especially fruit trees, synthetic induction of polyploidy makes fruit rootstocks more robust, dwarf, with thicker leaves, stems and higher scion yield. The aim of this study was to investigate the best polyploidy induction treatment by colchicine on dwarfing Troyer citrange rootstock and to evaluate its morphological effects.

Materials and Methods

The experiment was conducted in a greenhouse in Kerman. Four concentrations of colchicines (0.5, 1 and 1.5%) and control (0%) were used in two phases. In the first phase, 96 seeds were soaked in different concentrations of cholchcines for 30 h and planted in pots. In the second phase, when seeds reached the four leaves stage, meristems were treated by cholchicines. The experiment was arranged in completely randomized design (CRD) with four replications.

Results

The results showed that guard cells size, length, width of stomata and secretary vesicles size of colchicine-treated seedlings significantly increased compared to the control. However, lower density of leaves stomata and secretary vesicles in treated plants were observed. Some morphological changes such as leaves thickness, color increase and seedlings dwarfism were detected in treated plants. Moreover, some minor abnormalities on leaves such as asymmetry, lack of lateral leaflets, serrated leaflets existence were evident. The most effective treatment for polyploidy induction was 1% colchicine.

Discussions

Synthetic induction of polyploidy by cholchicine is commonly practiced by fruit breeders because it is inexpensive and effective. High concentrations of colchicine are toxici for seeds may be due to prevention of mitosis in the cells. Moreover, larger stomata size can improve efficiency of photosynthesis. Although the treated seeds or seedlings with 1 and 1.5% colchicines had lower height and stomata density, they are more robust and stronger than control which can be very valuable in rootstock breeding.

Keywords: Polyploidy, Troyer citrange, Colchicine, Stomata size and density, leaf Secretary Vesicles.