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DETECTION OF INDUCED TETRAPLOIDS IN WATERMELON CULTIVARS

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ABSTRACT

Polyploidy was induced in three varieties of watermelons (*Citrullus lanatus* (Thunb.) Matsum and Nakai) by colchicine treatments. Colchicine treatments of 0.2 and 0.3 per cent treatments to shoot apices of six to seven day old seedlings of the three varieties viz., Arka Manik, Sugar Baby and Triumph for four consecutive days were effective in inducing polyploidy. Polyploid plants have larger stomata and pollen grains and reduced pollen fertility than their respective diploids. Flow cytometry revealed DNA content of 100 to 112 ml DNA per cell in diploids while that was 225 to 268 ml DNA per cell in polyploids.

Key words : Watermelon, Induced polyploidy, Colchicine, Flow cytometry.

Watermelon [*Citrullus lanatus*(Thunb.) Matsum and Nakai] having the chromosome number of 2n=22 is a vegetable fruit crop containing high amount of water alongwith sweet taste i.e. dessert fruit mainly grown in tropical and subtropical areas during summer season. Development of seedless watermelon fruit has been emphasized in watermelon. The seedless watermelon cultivars could not be popularized perhaps due to unavailability of the seedless cultivar, which is mainly dependent on stability of tetraploids (autotetraploid) parent. Induced tetraploids in different cultivars may behave differently. Thus, tetraploidy need to be induced in different cultivars. The present investigation on induced polyploidy in three cultivars of watermelon viz., Arka Manik, Sugar Baby and Triumph and confirm its polyploidy level on the basis of histological observations and DNA content of the cells which was calibrated by Flow cytometry.

MATERIALS AND METHODS

Seeds of the watermelon cultivars viz., Arka Manik, Sugar Baby and Triumph were used for polyploidy induction during October 2002.

Seedling treatment :

Seeds of the three watermelon varieties were soaked in water for 24 h so as to facilitate better germination and were sown in the field with 2 x 1m spacing. Five seeds were sown per hill. The absorbent cotton swab was placed between emerging cotyledons of six to seven days old seedlings covering the apical bud. The apical bud thus covered was treated with aqueous solution of colchicine. Care was taken to keep the cotton swab wet for the entire duration of 96 h by adding the colchicine by means of a dropper as and when required. The colchicine concentrations of 0.1, 0.2 and 0.3 per cent were attempted with each treatment consisted of 40 seedlings. The cotton swab was removed and the apical buds were washed with distilled water at the end of treatment.

The five plants showing stunted growth, thicker and dark green leaves with larger stomata with less frequency of stomata were suspected to be polyploids. Seeds obtained from the suspected polyploid plants were further sown in the field during February 2003 to raise C_1 generation. The polyploid plants alongwith their diploid controls were studied for histological characters.

Flow cytometry :

Polyploidy was ascertained by Partec ploidy analyzer at Directorate of Oil seeds Research, Hyderabad. Leaves of suspected polyploid plants alongwith their diploid parents collected in polythene bags were taken to Hyderbad and studied within 36 h DNA was extracted by cutting the leaves in Cystain UV extraction buffer. The Cystain UV staining buffer was added to DNA extract in a test tube, which was placed in ploidy analyzer to obtain fluorescent peaks. DNA content was worked out on the basis of peaks.

RESULTS AND DISCUSSION

Colchicine treatment to shoot tip gave 2.5 to 5.0 per cent polyploids in all the three watermelon cultivars (Table 1). Colchicine treatment of 0.3 per cent gave 5 percent