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Constrains on Seedless Watermelon Development

Since the demand for the seedless watermelon is increasing in the international market, there is a need for the development and production of the seedless hybrids. The seedless watermelons have high commercial value currently and also in future. Plant breeding programmes needs more precise and advanced techniques for the improvement especially in the watermelon crop improvement such as tetraploid development. Tetraploid development is the first and typical phase for the seedless watermelon hybrid development. Generation of meiotically stable tetraploid lines development and stabilization is a big and tedious task in the seedless watermelon development programmes.

INTRODUCTION

Watermelon (2n = 2× = 22) is an annual vine herb of the Cucurbitaceae family. It is widely cultivated during the summer and also called as king of fruit in summer. Currently, the special breeding methods should be adopted for the development of new varieties and hybrids to reach goal of crop improvement programmes. Development of hyperploidy plants can be a clever way to improve the watermelon and specially the development of tetraploid watermelon lines are useful in the generation of seedless hybrids. Both in national and international market, seedless watermelons are getting high demand. Seedless watermelons are a viable commercial fruit in the international market currently. The demand made by the consumers internationally not only due to its seedless nature of the watermelon fruits, but also due to more sweetness of the seedless fruits when compared to the diploid seeded varieties.

MAJOR CONSTRAINS ON THE TETRAPLOID DEVELOPMENT

The development of seedless watermelon has been hampered by its cost and needs of proper technical screening process. Hyperploids or polyploids can be induced by the aqueous colchicine solution on the shoot tip of the diploid seedlings or by seed soaking treatment with colchicine. The viability of the seeds after the cochicine treatment is drastically affected or shows late germination.

In shoot tip treatment, the plants shows mortality according to the concentration of the colchicine and treatment frequencies. In tetraploid development programme, the success rate is less than 5% in most cases. The most commonly using methods for the screening and determination of hyperploid plants are chloroplast count and flow cytometry analyses. Even though these techniques are reliable and efficient, are cumbersome when a large population is subjected to the screening and filed evaluations. Sometimes, the formation of chimeras will leads to the misdirection of the screening process. Besides, the fertility of the newly generated tetraploids will be very low and it leads to poor seed development. Due to the thick seed coat nature and high moisture content of the tetraploid having positive correlation on poor seed germination. Since the watermelon is a monoecious crop, unisexual male and female flowers present in the same plant. Due to the monoecious nature of the crop, the cross pollination predominates in this crop and it needs précised self-pollination by a technical person to ensure the self-pollination. In newly generated polyploids, the chromosomal segregation may be uncontrolled one. Consequently there is much possibility for the production of the sterile gametes. Production of sterile gametes is a deleterious process for the plant and it could not able to produce viable seeds. Then in the plant generation, could not able to advance the generation for the trait stabilization or stabilization of meiotic divisions in the germ cells. Thus, the big hurdles in the tetraploid watermelon development are the generation of meiotically stable cochicine mutant to taste the seedless watermelon in future.

CONCLUSION

To overcome the constrains *viz.,* cost, self-pollinating process, difficult in maintaining and screening of large population, multiple batches of small C_1 population will be generated again and again upto reach the target.