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## **Biotechnology in Watermelon**

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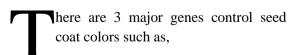
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### ABSTRACT

Water melon [*Citrullus lanatus* (Thunb.)] belongs to family Cucurbitaceae and origin Africa. The fruits contain 95% water, 0.2% protein, 0.3% minerals and 3.3% CHO per 100g fresh weight. It is also a rich source of iron. The seed kernels are also used in various sweets and other delicious. The unripe fruits are also cooked as a vegetable in some parts of India. The sweet, juicy pulp of the ripe fruit is eaten fresh throughout the tropics and subtropical regions. The fruit has cooling effect and is used as an expectorant, diuretic and stomachic and is allaying thirst. It is a common man's fruit relished by both rich and poor alike.

### INTRODUCTION

#### **Genetic Information for Watermelon**



- 1. red (r)
- 2. white (w)
- 3. tan (t)

- By the interaction of genes, it is produce six phenotypes: black (RR TT WW); clump (RR TT ww); tan (RR tt WW); white with tan tip (RR tt ww); red (rr tt WW); and white with pink tip (rr tt ww)
- Fruit shape is controlled by a single, incompletely dominant gene, resulting in fruit that are elongate (OO), oval (Oo), or spherical (oo)



## Table 1: Summary of genes identified inwatermelon related to different functions

water meton related to unrelent functions		
Sr.	Category	Types of genes are involved in
No.		different functions
1.	Vine	Y1 gene for yellow leaf
	genes	
		gf gene for light green color
2.	Flower	ms-1 gene for male sterile
	genes	
		ms-dw gene for male sterile dwarf
3.	Fruit	Sp gene for spotted fruit
	genes	
		go gene for golden yellow color
		Flesh colors are involved:
		B gene
		C gene
		i-C gene
		Wf gene
		y gene
		y-o gene
4.	Disease	zym-FL gene for resistance to
	resistant	Zucchini yellow mosaic virus
	genes	

# Genetic Transformation Systems for Watermelon

- Insertion of bacterial, fungal and virus resistance genes through recombinant DNA technology would facilitate the development of new disease resistant genotypes without significantly altering the genetic composition and desirable phenotypic qualities of accepted cultivars with high fruit quality (Guis *et al.*, 2013).
- Transgenic watermelon rootstock resistant to Cucumber green mottle mosaic virus (CGMMV) has been developed using a DNA encoding the CGMMV coat protein gene (CGMMV-CP), and successfully transformed a watermelon rootstock named 'gongdae' (Lin *et al.*, 2012).

# Plant Regeneration Systems for Watermelon

• The plant regeneration systems in vitro for watermelon have been reported for the several times. The use of shoot tip explants has a potential application for the propagation of elite triploid cultivars and tetraploid watermelon breeding lines production. Many attempts have been made to adapt tissue culture procedures for the propagation of triploid genotypes (Rubaiyat *et al.*, 2013).

## Future Techniques for Improvement of Watermelon

- These new techniques and their features are:
- 1. Zinc finger nuclease (ZFN)
- 2. Oligonucleotide directed mutagenesis (ODM)
- 3. Cisgenesis and intragenesis
- 4. RNA-dependent DNA methylation (RdDM)
- 5. Grafting (on GM rootstock)
- 6. Reverse breeding
- 7. Agro-infiltration
- 8. Synthetic genomics

Among new techniques, ODM, cisgenesis/ intragenesis, and agro-infiltration were the most commonly used for developing crops and reached them at commercial development phase (Thakur *et al.*, 2019).

#### CONCLUSION

As fruits production, watermelon is top most level by weight worldwide. In fruits including apple, strawberry, orange, grape, etc, the advanced technologies are applied very much for their improvement. Therefore, it is more urgent now to improve melon fruits production due to its yield at the highest level. Using selection breeding classical system, watermelon has improved by a few characteristics, especially with seedless or low



seeded watermelon production that released to farmers. Using breeding based on the transgenic technology, no variety or cultivar for watermelon is released to growers although many researches has been carried out as well as reported, especially on disease resistant traits.

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