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ROOTSTOCKS BREEDING AND BREEDING PROGRAMME IN APPLE

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ABSTRACT

Rootstock breeding in apple is major aspect to enhance the superiority and this may possible through identification of problems and prioritizing breeding objectives based on those problems are essential first steps in a rootstock improvement program. We should remember that all tree fruits, incorporating resistances to critical diseases and pests will facilitate to reduce the pesticide application and promote to fruit production. Now a days many fruit crops having rootstocks which are resistance to biotic and abiotic stress like, resistant to drought, cold, phytophthora diseases, wind, high temperature, salt, viruses and nematodes. Although all rootstock improvement programs now rely on conventional breeding methods, through application of genetic engineering, the Mailing 26 apple rootstock has been successfully transformed from being highly susceptible to fire blight to being moderately resistant.

KEYWORDS: Apple, Identification of problem, Rootstock breeding, Reduce pesticide application,

INTRODUCTION:

Apple (*Malus domestica* Borkh.) is widely cultivated worldwide. Apple is an important fruit crop of temperate region and also called as king of temperate fruits which are mostly grown in Himachal Pradesh and Maharashtra etc. In 2017, the world apple planting area reached 4.93 million hectares, with a total production of 83.14 million tons. Asia, Europe, and America are the main producing areas, accounting for more than 90% of the world's apple production (Food and Agriculture Organization, FAO, Apple rootstock breeding has achieved great progress worldwide. The focus and important research areas of apple rootstock breeding through five aspects: parent selection and setting of crosses, target genes and marker-assisted breeding, root configuration-guided breeding, apomictic resource utilization, and the application of genetic engineering.

A. Rootstocks Breeding in Temperate Fruit Crops:

Rootstocks of fruits are the major components to development of new technology in modern horticultural crop production and they play a crucial role in determining orchard efficiency. There are many rootstock breeding projects are working to improvement. There are some major characteristics of ideal rootstock like

- Dwarfing in nature
- Higher fruit quality and yielding
- Resistant to biotic and abiotic stress
- Longevity of plants
- Precocious

- Wider adoptable
- Graft compatible
- Ability to free standing
- Easy to multiplication etc.

1. IMPROVEMENT PROGRAM IN APPLE

Apple is the king of temperate fruits which is the most crop in higher in area and production in all fruit crop production. The breeding and development program of temperate fruits crop was started by Horticulture Research International- formerly East Malling Research Station..

a) Challenges in Apple Rootstocks:

- Rootstock having Lack of precocity
- Lack of resistant to Phytophthora root rot
- Lack of winter hardiness
- Root suckering
- Susceptibility to fire blight
- Burrknots

b) Major exotic rootstocks:

Rootstock	Characteristics
EMLA 106	Semi dwarfing and good choice for red delicious
EMLA111	Tolerant to drought, 2/3 size of standard tree
EMLA7	Winter hardy and well anchored
Geneva 30	Similar to EMLA 7
Geneva 65	Same in size of M27 and collar rot resistant
M9 Pajam1	Good fruit setting and adapt in ant density
Budogovasky 9	Winter hardiness and resistant to collar rot
M9 NIC 29	More survival % in orchard and similar to M9, 337
Supporter 4	Better efficiency and frost resistant
Ottawa series	Resistant to latent virus

c) Some important rootstock breeding programmers:

Countries Breeding Program	Series	Objectives	Rootstocks
Canada breeding program		Hardiness, yield efficiency, Precocity, dwarfing ability	Ottawa 3, V-2, V-4
USA rootstock breeding		Better anchorage and Easier propagation	Alnarp and Robust-5 MAC-9
Polish apple rootstocks	Polish (P) series	Cold hardiness	P-1, P-2, P-22, P-14, P-16, P-59, P-60,
Geneva Apple Rootstocks	Geneva(G) series	Fire blight, Phytophthora resistant and tolerance to apple replant disease resistance to cold hardiness	G-11, G-30, G-65, G212, G-202, G-16,
Russian Breeding programme	Budagovskij	Winter cold tolerant	B-9, B-490, B-491
Sweden Breeding programme	BM Series	Cold hardiness	Bemali

REFERENCES

An et al., 2017a H. An, H. Dong, T. Wu, Y. Wang, X. Xu, X. Zhang, Z. Han Root growth angle: an important trait that influences the deep rooting of apple rootstocks.

Guo et al., 2019 T. Guo, N. Wang, Y. Xue, Q. Guan, S. van Nocker, C. Liu, F. Ma Overexpression of the RNA binding protein MhYTP1 in transgenic apple enhances drought tolerance and WUE by improving ABA level under drought condition. Plant Sci, 280 (2019), pp. 397-407.