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A REVIEW

Clonal propagation in apple

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Abstract : Clonal propagation is to select a source of superior plant characteristics and to reproduce population of progeny with identical genotypes. Most of the fruit plants are heterozygous in nature if they are propagated through seed their unique characteristics are changed. Propagation through cuttings is the most common means of clonal regeneration of number of horticultural crops. Adventitious root formation is pre-requisite to successful cutting propagation. Vegetatively raised clonal rootstock, on other hand are not only uniform but they are also precocious, productive and resistant to biotic and abiotic factors. Thus in apple the use of clonal rootstock has become an acceptable practice of eliminating variability arising from the use of variable seedling rootstocks and of reducing tree size and increasing precocity and productivity. In this review, the scattered information on clonal propagation of apple through growth regulators, bio-inoculants, pre-conditioning (blanching and girdling) on rooting of cuttings and pre-conditioning treatments with IBA is enlightened. This could eventually be helpful in drawing the attention of the researchers and scientists to work on it, besides would be benefitted by utilizing the knowledge reviewed in this paper.

Key Words : Apple, Growth regulators, Bio-inoculants, Blanching, Girdling, Clonal propagation

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INTRODUCTION

Apple is the most important fruit crops of the temperate region. It is a member of family Rosaceae is native to South West Asia, which occupies nearly 47.11 lakh hectare area with 702.97 lakh metric tonnes production in the world (NHB, 2011). India ranks 7th in the world with a production of 28.91 lakh metric tonnes from an area of about 2.89 lakh hectare (NHB, 2011). In India apple is mainly grown in North Western Himalayan region comprising states of Jammu and Kashmir, Himachal Pradesh and Uttarkhand. Himachal Pradesh on account of its production has been designated as "Apple Bowl of India". Clonal propagation of rootstocks through cuttings is of special significance as it is additional tool to increase the production of rootstocks. Whereas, during grafting top portion of rootstock (> 80 %) goes waste. If this part is converted into plantlets through cuttings the multiplication rate of rootstock can be increased manifold. As the old plantations are declining, there is an increase in the demand of quality planting material which has necessiated the need for development of an easier, quicker and economical method of propagation. Hardwood cuttings in apple rootstocks have been very successful (Howard, 1971), as they result in true to type, uniform in growth, quick, less expensive, require less space and skill. According to Frey *et al.* (2006) multiplication through stem cuttings is based upon number of factors such as age, condition, health of mother plant, time of planting, rainfall, humidity, temperature, rooting media and after care. Various pre-conditioning treatments such as blanching and girdling have been reported to improve rooting capacity of cuttings (Hartmann *et al*., 2009). Blanching is practiced where stock plants are initially grown in light and then shaded either entirely or at a localized area usually the base of the stem. Banding of MM106 shoots for 7 days promoted rooting, negated the inhibitory effect of high IBA (Sun and Bassuk, 1991). In case of girdling, outer tissue of vascular cambium (bark, cortex and phloem) is disturbed (Hartmann *et al.*, 2009). Using these techniques of girdling

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