Chapter

5

DOUBLED HAPLOID PRODUCTION IN MELON

Nebahat SARI[1]
İlknur SOLMAZ[2]

INTRODUCTION

Melon (*Cucumis melo* L.; 2n = 2x = 24) is a member of the Cucurbitaceae family having high monetary value. This cucurbit crop is sensitive to frost and mostly cultivated in tropic and subtropic climate zones throughout the world. Melon total production is 27.349.214 tonnes worldwide and China is the leading producer country (12.788.218 tonnes) followed by Turkey (1.753.942 tonnes) (FAO, 2018). Among the genus Cucumis, melon is known to be the most polymorphic species commonly in terms of fruit traits. According to recent taxonomic data two subspecies has been classified within *C. melo*, as subsp. *melo* and subsp. *agrestis.* Nineteen different groups have been identified within these species as: acidulus, agrestis, ameri, cantalupensis, chandalak, chate, chinensis, chito, conomon, cassaba, dudaim, flexuosus, ibericus, inodorus, indicus, kachri, makuwa, momordica and tibish. (Pitrat, 2016; Hoogvorst et al., 2020). These groups have high levels of diversity in fruit shape, fruit size, fruit and rind color, fruit texture, flavour, aroma and ripening behaviour.

Commercial melon production is done with OP and hybrid cultivars mainly belong to cantalupensis, reticulatus and inodorus groups. Hybrid melons are developed by traditional breeding methods however, Pitrat et al. (1999) reported that recovery of new melon varieties using classical hybridisation techniques are usually slow due to narrow gene pool (Thakur et al., 2019). Several hybrid

[1] Prof. Dr., Çukurova University, Faculty of Agriculture, Department of Horticulture, Adana, Turkey (Retired), nesari@cu.edu.tr
[2] Assoc. Prof., Çukurova University, Faculty of Agriculture, Department of Horticulture, Adana, Turkey, isolmaz@cu.edu.tr

for the diagnosis of human cancer cells, has started to be used for the diagnosis of haploid plants in the 1980s. Flow cytometry has been used successfully in determining ploidy in carrot, melon, watermelon, and then this device has been used for rapid chromosome counts in many haploid plant species (Sari et al., 1999; Weber et al., 2005; Li et al., 2020).

CONCLUSIONS

Melon is one of the most produced Cucurbit crops with an increasing monetary value. It is extensively cultivated in most parts of the world in open fields or in greenhouses. Commercial OP and hybrid (F1) melon cultivars mostly belong to inodorus, reticulatus and cantalupensis groups which are generally achieved by traditional breeding methods. Hybrid cultivars are developed by crossing two homozygous lines which are obtained by several selfing cylces. For the development of inbred pure line in melon at least 7-8 generations of selfing is needed which is time consuming and labor cost. Nevertheless, this process can be shortened by using haploid (H) and doubled haploid (DH) technology. Induced haploid plants can be derived from androgenesis, gynogenesis and parthenogenesis pathways. Early attempts for haploid melon induction via anther or ovule culture were not found successful, however few studies reported gynogenic plants recovered by ovary culture. So far irradiated pollen technique (in situ induced parthenogenesis) is the most efficient technique to generate haploid lines in melon and currently used in breeding programmes.

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