

Turkish Doubled Haploid Onion (*A. cepa* L.) Lines

Ali Ramazan ALAN^{1,2}, Arzu KASKA^{1,3}, Esra ASLAN^{1,2}, and Fevziye CELEBI TOPRAK^{1,2}

¹Plant Genetics and Agricultural Biotechnology Application and Research Center (PAU BIYOM), Pamukkale University, Turkey

²Pamukkale University, Department of Biology, Denizli, Turkey

³Pamukkale University, Department of Science and Mathematics, Denizli, Turkey
aalan@pau.edu.tr

Aim of the study: Onion (*A. cepa*) is one of the most important agricultural crop cultivated and consumed all around the world. However, there is a strong demand for F1 hybrids, which can provide higher yield and more uniform marketable crop. Development of hybrid onion varieties require pure lines that can be used as parents. Onion is a highly heterozygous biennial species. Therefore, production of homozygous inbreds may take many years. In onion, gynogenesis-based doubled-haploid (DH) technique can provide completely homozygous lines in one generation. In this study, findings obtained from 8 years of Turkish DH onion production studies will be discussed.

Material and Methods: Plants materials used in this study represent OP land races collected from different onion production regions of Turkey. OP onion land races were maintained at PAU BIYOM *Allium* improvement program. Ten DH onion lines developed from various OP land races were used in this study. For simplicity, DH onion materials were categorized according to their bulb colors as red, white, and yellow. A red DH line was used as male parent in the cross with a yellow bulbed female to produce an experimental F1 hybrid. These materials were compared with their donors and parents under greenhouse and field conditions.

Results: Gynogenesis induction experiments yielded hundreds of gynogenic onion plants from all types of donors included in this research work. Ten of them were fecund and provided selfed seeds. DH lines did not show any indication of inbreeding depression and they were similar to their donors in many features. Some of the red DH lines outperformed their donors in bulb size and weight while yellow and white DH lines did not differ significantly from their donors. Plants of experimental F1 hybrid line grew uniformly and produced red bulbs. Bulb features such as shape and size were intermediate between parental lines. Our findings suggest that Turkish DH onions developed in our research program can be used as parents in the production of new F1 hybrid lines.

Acknowledgements: This research was supported by PAU BIYOM.

Key words: *Allium cepa*, DH, Gynogenesis, F1 hybrid.