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Research Article

Yield and Quality Characteristics of Lettuce Lines Developed by Mutation Breeding

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Abstract: In this study, we aimed to create genetic variation through physical mutagen application to lettuce (*Lactuca sativa* var. *longifolia*), a vegetable species whose leaves are consumed fresh, to obtain new varieties rich in nutritional content that can create market demand from this gene pool. Cervantes and Escule lettuce seeds were irradiated with effective mutation doses determined specific to the variety using a Cobalt-60 gamma ray source. Selection and inbreeding studies were performed for 4 generations, and 36 mutant lines were selected from the lines at the M_4 stage to be used in subsequent experiments. Height, diameter, weight, leaf color, water-soluble dry matter (WSDM), chlorophyll, total carotenoid, vitamin C, lutein and total phenolic content of lettuce heads were examined in 36 mutant lines selected and in 4 commercial control varieties. The differences between the data obtained were statistically significant. Mutant lines numbered 62, 66, 71, 72, 74, 77, 84, and 100 which were found to be superior in terms of both morphological characteristics and nutritional content, were selected for inclusion in yield trials as a variety of candidates. These findings represent a significant step in increasing genetic diversity in agricultural production and developing lettuce varieties with higher yield and nutritional value.

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1. Introduction

Lettuce and salads (*Lactuca sativa* L.) are among the vegetable crops that most commonly and quickly meet the need for fresh vegetables in human nutrition. They were among the first vegetable types to be cultivated and produced both commercially and as garden vegetables in many countries. It is one of the most widely grown cool-climate vegetables, particularly in Europe, Asia, Central and North America (Ellialtıoğlu et al., 2023). Salads and lettuces belong to the *Asteraceae* (*Compositae*) family, which includes 1 600 genera and 25 000 species and is thought to be the largest plant family. There are more than 100 *Lactuca* species, and the number of chromosomes is 2n = 2x = 18. Lettuce and salads are classified as lettuce, leaf lettuce, and head salad (atom), salads whose stems are consumed, and salads whose seeds are consumed (Günay, 1995; Mou, 2008; Hassan et al., 2021). Türkiye's total lettuce and salad production is reported to be 577 773 tons in 2023, ranking 7th in world production (FAO, 2024;