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Authors: Tokatlidis, I. Professor, DUTH

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Abstract

This manual presents a new approach to plant breeding based on the inviolable rule of plant selection in the absence of competition. The new methodology is analyzed comparatively with the typical one applied under competition between genotypes. The text includes four sections with individual chapters (general part, breeding principles, breeding methods, and special breeding issues). The general part focuses on the mode of plant reproduction and its implications for genetic evolution, the type of varieties and stages of cultivar development and commercialization, and the nature and expression of complex quantitative traits. Breeding principles include the creation and protection of genetic variability, factors that affect the genotype selection efficiency (particular emphasis is placed on the role of competition between individual plants in either the crop or breeding experiment), and experimental models used in plant breeding with a focus on the honeycomb breeding designs invented for selection in the absence of competition. Breeding methods include mass selection, pedigree selection, hybridization, backcrossing, polyploidy and generation of doubled haploid lines, applied in both regimes of allo-competition and nil-competition; in addition, the molecular approach to plant breeding is described. Finally, two special chapters refer to the need for continuous (non-stop) selection procedures, the first as a means of landrace diversity stewardship to upgrade and exploit their genetic variability, and the second concerning a conservation breeding to prolong longevity and commercial acceptance of elite cultivars.

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