

Preface

Vegetable oils have gained in importance during the past few decades resulting in the doubling of the world oil crop production in the last 25 years. Oil crops have been increasingly used as raw materials for food, livestock feed and non-food industrial applications. Plant breeding has played an essential role in supporting these developments: Breeding for higher yield and oil content allowed for an increase in oil production per unit area, whereas breeding for better oil quality has improved both the human health value of vegetable oils as well as the suitability of particular oils in specific industrial applications. Moreover, newly developed unique oil qualities are opening new opportunities in agricultural production and processing.

Cereals, legumes or forages each represent relatively homogeneous groups of crops belonging to one or a few plant families with similar botanical characteristics in which comparable breeding procedures could be used. In contrast, oil crop species have been developed in various botanical families from both the monocots and dicots. Thus, oil crops are a highly diverse set of species from short season annuals to perennials with a life span of over 2000 years. Consequently, breeding methods used for oil crop improvement include clonal breeding, pure line breeding, improvement of open-pollinated populations as well as hybrid breeding. In particular, the breeding procedures and techniques include almost every activity from simple mass selection and hybridization to specialized biotechnologies such as *in vitro* propagation or genetic engineering. Despite the differences at the species and breeding levels, some major breeding goals are remarkably similar, which justifies treating them in one volume such as: high oil content, altering fatty acid composition to suit the needs for either human consumption or non-food utilization, and a high quality of by-products. In addition, issues such as the biosynthetic pathways of particular fatty acids and their manipulation, QTL analysis for quality characters, genetic diversity, or oil and fatty acid analytics during selection are of common interest to all oil crop breeders. Therefore, this volume was prepared as a state-of-the-art compilation and a major reference text on oil crop breeding, which has been lacking for several decades. While the information accumulated in this volume is of primary interest to plant breeders, valuable insights are also offered to agronomists, molecular biologists, physiologists,

plant pathologists, food scientists and university scholars from the comparative treatment of various oil crop species.

Apart from an introductory chapter on oil crop breeding and a chapter highlighting genetic modification of vegetable oils, this volume presents 17 chapters devoted to breeding of particular oil crop species. Oil crops with world-wide distribution such as soybean, sunflower, oilseed rape and related brassicas are presented side-by-side with tropical and subtropical species such as cotton seed, peanut or castor, the perennials oil palm, coconut and olive, minor oil crops of regional importance such as safflower, poppy, oil pumpkin or maize, and new oil crops such as lesquerella and cuphea. Origin and domestication, varietal groups, genetic resources, major achievements and current breeding goals, breeding methods, techniques and biotechnologies, and seed production are addressed depending on their relevance in a particular crop.

Each crop chapter has been written by outstanding experts in their respective fields. Whenever possible authors from different institutions or countries worked together on particular chapters, which contributed to broadened and well-balanced views on particular species or topics.

The editors acknowledge the excellent contributions of all chapter authors who devoted much time and effort in delivering their part to this high quality volume. The editors extend heartfelt thanks to the staff at Springer, particularly to Hannah Schorr and Jinnie Kim, for their highly professional support during all stages of the publishing process. Moreover, the editors would like to thank Editors-in-chief of the Springer series *Handbook of Plant Breeding*, Professors Jaime Prohens, Fernando Nuez and Marcelo Carena, both for considering a volume exclusively devoted to oil crops and for their helpful input throughout the preparation of this volume.

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