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Nota di contenuto	Chapter. 1. The utilization of speed breeding and genome editing to achieve zero hunger -- Chapter. 2. Multiomics approach for crop improvement under climate change -- Chapter. 3. The intervention of multi-omics approaches for developing abiotic stress resistance in cotton crops under climate change -- Chapter. 4. Big data revolution and machine learning to solve genetic mysteries in crop breeding -- Chapter. 5. Applications of multi-omics approaches for food and nutritional security -- Chapter. 6. Applications of high throughput phenotypic phenomics -- Chapter. 7. Basil (Ocimum basilicum L.) : Botany, Genetic resource, Cultivation, Conservation, and Stress factors -- Chapter. 8. Multi-Omics Approaches for Breeding in Medicinal Plants -- Chapter. 9. Applications of some nanoparticles and responses of medicinal and aromatic plants under stress conditions -- Chapter. 10.

Sustainable agriculture through technological innovations -- Chapter. 11. Sustainable Rice Production under Biotic and Abiotic Stress Challenges -- Chapter. 12. Emerging Techniques to Develop Biotic Stress Resistance in Fruits and Vegetables -- Chapter. 13. Genome editing in crops to control insect pests -- Chapter. 14. CRISPR revolution in gene editing, targeting plant stress tolerance and physiology -- Chapter. 15. Genomics for Abiotic Stress Resistance in Legumes -- Chapter. 16. Genetic and molecular factors modulating phosphorous use efficiency in plants -- Chapter. 17. Recent Trends in Genome Editing Technologies for Agricultural Crops Improvement -- Chapter. 18. Recent trends and applications of omics based knowledge to end global food hunger -- Chapter. 19. Nutritional enhancement in horticultural crops by CRISPR/ Cas9: status and future prospects -- Chapter. 20. Physiological interventions of antioxidants in crop plants under multiple abiotic stresses -- Chapter. 21. Proteomics and its scope to study salt stress tolerance in quinoa -- Chapter. 22. Sustainable Cotton Production in Punjab: Failure and its Mitigating Strategies -- Chapter. 23. Biosafety and biosecurity in genetically modified crops.

Sommario/riassunto

Access to food with enough calories and nutrients is a fundamental right of every human. The global population has exceeded 7.8 billion and is expected to pass 10 billion by 2055. Such rapid population increase presents a great challenge for food supply. More grain production is needed to provide basic calories for humans. Thus, it is crucial to produce 60-110% more food to fill the gap between food production and the demand of future generations. Meanwhile food nutritional values are of increasing interest to accommodate industrialized modern lives. The instability of food production caused by global climate change presents another great challenge. The global warming rate has become more rapid in recent decades, with more frequent extreme climate change including higher temperatures, drought, and floods. Our world faces various unprecedented scenarios such as rising temperatures, which causes melting glaciers and the resulting various biotic and abiotic stresses, ultimately leading to food scarcity. In these circumstances it is of utmost importance to examine the genetic basis and extensive utilization of germplasm to develop “climate resilient cultivars” through the application of plant breeding and biotechnological tools. Future crops must adapt to these new and unpredictable environments. Crop varieties resistant to biotic and abiotic stresses are also needed as plant disease, insects, drought, high- and low-temperature stresses are expected to be impacted by climate change. Thus, we need a food production system that can simultaneously satisfy societal demands and long-term development. Since the Green Revolution in the 1960s, farming has been heavily dependent on high input of nitrogen and pesticides. This leads to environmental pollution which is not sustainable in the long run. Therefore, a new breeding scheme is urgently needed to enable sustainable agriculture; including new strategies to develop varieties and crops that have high yield potential, high yield stability, and superior grain quality and nutrition while also using less consumption of water, fertilizer, and chemicals in light of environmental protection. While we face these challenges, we also have great opportunities, especially with flourishing developments in omics technologies. High-quality reference genomes are becoming available for a larger number of species, with some species having more than one reference genome. The genome-wide re-sequencing of diverse varieties enables the identification of core- and pan-genomes. An integration of omics data will enable a rapid and high-throughput identification of many genes

simultaneously for a relevant trait. This will change our current research paradigm fundamentally from single gene analysis to pathway or network analysis. This will also expand our understanding of crop domestication and improvement. In addition, with the knowledge gained from omics data, in combination with new technologies like targeted gene editing, we can breed new varieties and crops for sustainable agriculture.