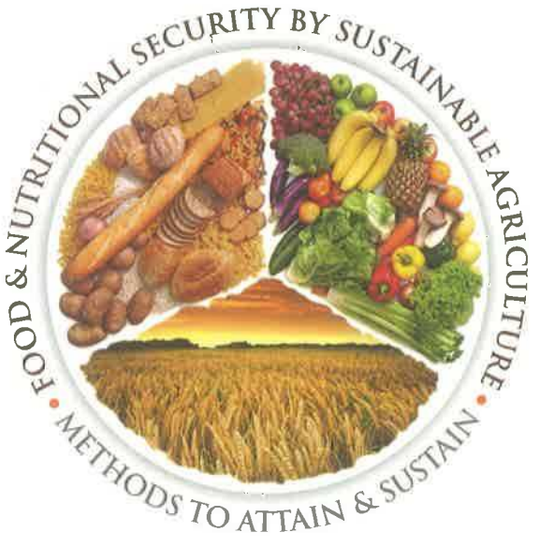

READERSHIP: the book is meant to serve the needs of all those related to the research of food science nutrition and technology, production, processing, preservation, quality and value addition methods and techniques. Will also prove beneficial for people related to biotechnology, breeding, entomology and agriculture, microbiology, crop improvement, home science and sustainable development at large.

This book contains chapters written by young enthusiastic scientists, teachers and researchers who are involved in research, teaching and extension of modern scientific agricultural principles and practices in different parts of India.

Attempts have been made to cover various aspects of modern agriculture viz. genetic improvement of crop plants, modern methods in plant breeding, seed science, ground water resources management, integrated farming systems, horticultural crops, biological control for sustainable agriculture, underutilized fruit plants health enhancing foods, role of enzymes in food processing, bioinformatics and molecular diagnostics etc., but still many facets lingering due to vast nature of agriculture itself.

The major aim of this book is to provide glimpse of important arena to enhance food and nutritional security in a sustainable way.

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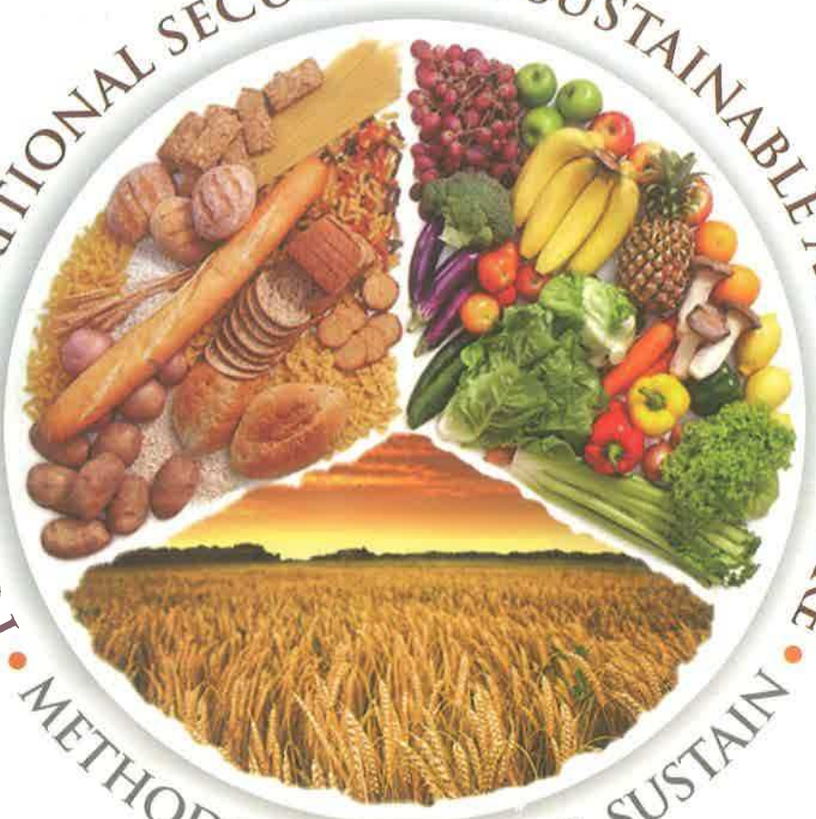

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Food and Nutritional Security By Sustainable Agriculture

Methods to Attain and Sustain

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employment and infrastructure development; water for sustainable food production and sustainable rural development; conservation and sustainable utilization of plant genetic resources; integrated pest management and control in agriculture and sustainable plant nutrition to increase food production. The absence of a coherent national policy framework for sustainable agriculture and rural development is widespread and is not limited to the some over exploited parts of the country. In particular the transitions from planned to market-oriented systems need such a framework to incorporate environmental considerations into economic activities, including agriculture. The major thrust of food security is to bring about a significant increase in agricultural production in a sustainable way and to achieve a substantial improvement in people's entitlement to adequate food and culturally appropriate food supplies. Agriculture needs to be intensified to meet future demands for commodities and to avoid further expansion onto marginal lands and encroachment on fragile ecosystems. Increased use of external inputs and development of specialized production and farming systems tend to increase vulnerability to environmental stresses and market fluctuations. Plant genetic resources for agriculture are an essential resource to meet future needs for food. Special emphasis should be placed on the minor crops and other underutilized or non-utilized species of food and agriculture. There is genetic erosion of invaluable crop species. Attempts have been made to cover various aspects of modern agriculture *viz.* genetic improvement of crop plants, modern methods in plant breeding, seed science, ground water resources management, integrated farming systems, horticultural crops, biological control for sustainable agriculture, underutilized fruit plants health enhancing foods, role of enzymes in food processing, bioinformatics and molecular diagnostics *etc.*, but still many facets lingering due to vast nature of agriculture itself .

The major aim of this book is to provide glimpse of important arena to enhance food and nutritional security in a sustainable way. The food and nutritional security to each and every human being can be assured by involving research & development initiatives, utilization of economic incentives and the development of appropriate and new technologies, thus, ensuring stable supplies of nutritionally adequate foods and thereby production for markets; employment and income generation to alleviate poverty; and natural resource management and environmental protection. The priority must be on maintaining and improving the capacity of our agricultural production system factors to support an expanding population with reducing natural resources.

Editors

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1

Genetic Improvement of Crop Plants: Conventional and Modern Techniques

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Abstract

The genetic improvement of crop plants is possible only through employing an appropriate breeding technique. The use of plant breeding technique depends on mode of pollination and reproduction of plant species e.g. selection and hybridization are used in sexually reproduced species, while clonal selection in asexually propagated plant species. The plant species/ varieties are usually derived through conventional techniques (viz. introduction, selection, hybridization etc.), which are commonly used in various breeding programmes, while some modern techniques viz. transgenic breeding and marker assisted selection etc. are also available which are equally effective for improvement of all crop species. Various techniques applied for development of new varieties and hybrids are briefly described in this section.

Plant breeding is an art, science and technology of improving genetic make-up of crop plants in relation to their economic usefulness for mankind. Various techniques/ methods of breeding used for genetic improvement of crop plants are: introduction, selection, hybridization, mutation, transgenic breeding etc.