



S. K. Tyagi  
Arun R. Khire

# *Vegetable Crops* at a Glance

For JRF, SRF, NET, ARS, SAU's M.Sc.  
& Ph. D. Entrance Examinations



# **Vegetable Crops**

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at a Glance

## ABOUT THE AUTHORS



**S. K. Tyagi** is working as Scientist (Horticulture) at Krishi Vigyan Kendra, Khargone (M. P.). He did his B.Sc. (Ag) and M.Sc. (Ag.) in Horticulture during the year 1999 and 2001, respectively from JNKVV, Jabalpur (M.P.). He has more than 13 years of experience in the field of horticulture research and extension and contributed 15 research papers published in international and national peer reviewed research journals, 25 papers presented in international and national Conferences/ Symposiums/Seminars. He has contributed 10 books and 135 popular articles.



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# Preface

Precise database pertinent to related subject is an essential prerequisite to get through competitive examinations. The competitive examinations have become procedure of recruitment and admission for higher studies such as **JRF, SRF, NET, ARS, SAU's M. Sc. & Ph. D. entrance examinations**. All these examinations are mostly based, on objective type questions' and students always look for study material that is realty to use and. easy to grasp. Thus, one has to prepare him/her very strongly for these competitive exams and for the success there is a need to read authentic and authorized reading materials. It was long felt need of the aspirants that there should be a vast collection of recent information and data related to **Vegetable Crops** in a single book. Keeping this in mind the manuscript has been prepared Humble efforts have been made here to compile basic and applied knowledge of these crops, which will be of immense value and help for all those who want, to pursue career in this field.

This book, is a single compendium which deals with all aspects and facts of Vegetable Crops which may meet the requirements of all those who are preparing for JRF, SRF, NET, Ph.D., ARS, and other competitive examinations.

The book has been compiled on the basis of available information for guidance and not for legal purposes. Readers are also advised to visit, the latest botanical and zoological names site [www.sp2000.org](http://www.sp2000.org).

However, I have put my best efforts in preparing this book, but if any error or whatsoever has been skipped out, I. will by heart, welcome your suggestions with the hope that this book, will be extremely useful for the students.

**S.K. Tyagi**  
**A.R. Khire**





# Syllabus

**National Eligibility Test Conducted by ASRB, New Delhi**

## **SUBJECT: VEGETABLE SCIENCE**

### **Unit 1. Production Technology of Cool Season Vegetable Crops**

Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties/hybrids, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post harvest management, plant protection measures and seed production of potato, Cole crops, cabbage, cauliflower, knoll kohl, sprouting broccoli, Brussels sprout, root crops: carrot, radish, turnip and beetroot, bulb crops: onion, garlic, peas and broad bean, green leafy cool season vegetables.

### **Unit 2. Production Technology of Warm Season Vegetable Crops**

Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties/hybrids, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post harvest management, plant protection measures, economics of crop production and seed production of: tomato, eggplant, hot and sweet peppers, okra, beans, cowpea, and cluster bean, cucurbitaceous crops, tapioca and sweet potato, green leafy warm season vegetables.

### **Unit 3. Breeding of Vegetable Crops**

Origin, botany, taxonomy, cytogenetics, genetics, breeding objectives, breeding methods (introduction, selection, hybridization, mutation), varieties and varietal characterization, resistance breeding for biotic and abiotic stress, quality improvement, molecular marker, genomics, marker assisted breeding and QTLs, biotechnology and their use in breeding in vegetable crops, issue of patenting, PPVFR act. Potato and tomato, eggplant, hot pepper, sweet pepper, and okra, peas, beans, amaranth, chenopods and lettuce, gourds, melons, pumpkins and squashes, cabbage, cauliflower, carrot, beetroot, radish, sweet potato and tapioca.

## **Unit 4. Growth and Development**

Cellular structures and their functions; definition of growth and development, growth analysis and its importance in vegetable production; physiology of dormancy and germination of vegetable seeds, tubers and bulb; role of auxin, gibberellins, cytokinins, and abscissic acid; application of synthetic hormones, plant growth retardants and inhibitors for various purposes in vegetable crops; role and mode of action of morphactins, antitranspirants, anti-auxin, ripening retardant and plant stimulants in vegetable crop production; role of light, temperature and photoperiod on growth, development of underground parts, flowering and sex expression in vegetable crops; apical dominance, physiology of fruit set, fruit development, fruit growth, flower and fruit drop; parthenocarpy in vegetable crops; phototropism, ethylene inhibitors, senescence and abscission; fruit ripening and physiological changes associated with ripening; plant growth regulators in relation to vegetable crops. Sex expression in cucurbits and checking flower and fruit drops and improving fruit set in solanaceous vegetables; growth analysis techniques in vegetable crops.

## **Unit 5. Seed Production**

Introduction; modes of propagation in vegetables; seed morphology and development in vegetable seeds; floral biology of these plant species; classification of vegetable crops based on pollination and reproduction behaviour; steps in quality seed production; identification of suitable areas/locations for seed production of these crops; classification based on growth cycle and pollination behaviour; methods of seed production; comparison between different methods e.g. seed to seed vs. root to seed method in radish; seed multiplication ratios in vegetables; pollination mechanisms; sex types, ratios and expression and modification of flowering pattern in cucurbits; nursery raising and transplanting stage; seed production technology of vegetables viz. solanaceous, cucurbitaceous, leguminous, malvaceous, cole crops, leafy vegetables, root, tuber and bulb crops and spices; harvesting/picking stage and seed extraction in fruit vegetable; clonal propagation and multiplication in tuber crops e.g. potato, sweet potato, colocasia, tapioca; seed-plot technique in potato, tuber seed production; hybrid seed production technology of vegetable crops, TPS (true potato seed) and its production technique; hybrids in vegetables; maintenance of parental lines; use of male sterility and self incompatibility in hybrid seed production, environmental factors related to flowering/bolting in vegetable crops; Share of vegetable seeds in seed industry; importance and present status of vegetable industry; intellectual property rights and its implications, impact of PVP on growth of seed industry.

## **Unit 6. Systematics of Vegetable Crops**

Principles of classification; different methods of classification; salient features of international code of nomenclature of vegetable crops; Origin, history, evolution and distribution of vegetable crops, botanical description of families, genera and species covering various tropical, subtropical and temperate vegetables; Cytological level of various vegetable crops; descriptive keys for important vegetables; Importance of molecular markers in evolution of vegetable crops; molecular markers as an aid in characterization and taxonomy of vegetable crops.

## **Unit 7. Production Technology of Underexploited Vegetable Crops**

Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties/hybrids, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post harvest management, plant protection measures and seed production of: Asparagus, artichoke and leek; Brussels sprout, Chinese cabbage, broccoli, kale and artichoke; Amaranth, celery, parsley, parsnip, lettuce, rhubarb, spinach, basella, bathua (chenopods) and chekurmanis; Elephant foot yam, lima bean, winged bean, vegetable pigeon pea, jack bean and sword bean; Sweet gourd, spine gourd, pointed gourd, Oriental pickling melon and little gourd (kundru).

## **Unit 8. Post Harvest Technology of Vegetable Crops**

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