Production Technology of Spices

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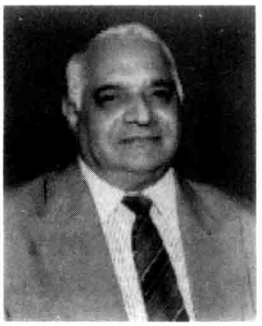
Dedicated to Students without whose suggestions this book would never have seen the light of the day



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Foreword

Known from times immemorial, India is recognized as the store house of spices. In every agro-ecological zone some invaluable spices are found. There is no other geo-political region to match this land at least in this front. Spices export from India measures to 2.36 lacs tonnes, valuing Rs. 2025 crores (1999-2000).

Spices require especial attention for protecting their identity along with prudent use for the national economy. Indian Institute of Spices Research, Calicut and Indian Spices Board have come up well to trigger the various components of spice industry, resulting into the development of improved varieties, their management etc.

In order to give momentum for trained human resources, the availability of literature/information on any subject is a basic need. This is very pertinent in respect of spices, which lack properly compiled handy information. I congratulate the authors for their efforts to bring out this useful work.

I hope the book caters to the needs of the scientists and farmers engaged in spices development.

(P.L. Gautam)

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Foreword

Spices are the most fascinating vegetation, holding a significant position in human life. This 'mouth watering' ingredient is an essential component of human food. The world had identified India as the 'land of spices' which is the largest producer and exporter of spices. India is also the leading consumer of spices. The present Indian production of all spices together is 30.2 lac tonnes, from 25 lacs ha land. The valuation of this produce is 19% of horticultural export and 1.24% of the total export from India.

Despite these facts, we cannot afford to become complacent. The spice world market is becoming tough due to challenges thrown by many other countries. Some of the threats are concerning high production, quality production, economical means of value addition etc. This necessitates a concerted effort to sustain supremacy of India in spices production and export. This will need a useful interaction among scientists, farmers and the policy makers.

The authors have done a commendable job bringing out a comprehensive treatise on breeding, production and all other related aspects of spices which have remained largely neglected by the scientific community. The book is nicely fashioned to attract and enthuse the students and the researchers of spices, as well as the farmers and the industrialists. Foreseeing the call of time, they have focused more on post harvest management and value addition techniques to these commodities, whose implementation will swing back India in the international trade of spices.

This book will definitely fulfil the cherished dream of all those working in the field of horticulture at large and spices in particular. I am confident that this book will prove to be a glorious landmark in chain of books in horticulture and shall be quite handy as a complete updated text book on this subject. I am sure it will be accepted well by the undergraduate and post graduate students majoring in Horticulture and Vegetable Science. The book very well fits in the recently revised post graduate curriculum for higher education on agriculture by the Indian Council of Agricultural Research. I congratulate the authors for this stupendous task which I am sure shall fulfil the aspirations of students, researchers, farmers and the entrepreneurs having interest in spices.

(Hari Har Ram)

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Preface

The association of spices and mankind is prehistoric and multifarious. They were used as curatives, body toners, aphrodisiacs, medicines, drugs, bio-control agents, preservatives, contraceptions, food additives, flavouring and colouring agents, cosmetics and so on. Documenting proofs of their use, crop husbandry, properties are observed in Ayurveda and Yunani systems of medicine developed almost from the beginning of human civilization. Even the mummies in the pyramids were embalmed with spices before the burials. In the past Babylonians had the knowledge of spice husbandry which they practiced in their kitchen gardens.

India was rightfully proclaimed as the "Land of Spices", indicating the largest natural collection of this treasure. India is the biggest producer of black pepper – the king of spices and cardamom – the queen of spices, thus it may not be out of place to designate India the capital of "Spice Kingdom". Relatively recently in the fifteenth century, Vasco-da-Gama set out on his exploration for the "Golden bird" and had reached Calicut, India in May 1498. He found spices to be more valuable than gold, diamond, coal and soon took that as the loot from this land. Perhaps that had attracted the East India Company to enter into trade in India. These are some permanent evidences highlighting the value and place of spcies in the society.

With passage of time traditional ways of spice cultivation has improved, to embark upon more production and increased returns. Here around 63 different spices *can be grown out of a possible 109 the world over. This had prompted to initiate* research on spices by 1940. Research on spices grew but was largely random. The ICAR had rightly conceived the necessity of systematic research on spices, which had emerged as an All India Co-ordinated Spices and Cashew Improvement Project in 1971. Subsequently, the Indian Institute of Spices Research was founded in Calicut, by ICAR in 1995. Further a National Research Centre of Seed Spices was established at Ajmer in the year 2000. It has helped in generating valuable research information on 12 important crops involving 14 different states of the country.

Still for the students of Horticulture or Vegetable Sciences information on spice husbandry, vis-à-vis industry is difficult to reach. Authors had felt a great necessity of composite information on spices. This latest urge had provoked them to take a vow to write a book exclusively on spices, assimilating the existing facts. It is felt that this maiden effort is likely to have countless shortfalls, needing immediate corrections and improvements. Readers are ardently requested to freely indicate the corrections and suggestions for their incorporation in the second edition to safeguard the interest of spices in India.

This venture took shape because of the invisible pressure of dear students, studying the course "Spices and Condiments". Authors value the forthright encouragement of Hari Har Ram, Head, Department of Vegetable Science. A few friends like Dr. Y.V. Singh, Professor, Vegetable Science, Dr. J.P. Tiwari, Head, Department of Horticulture; Km. Alka Verma, Mr R.K. Dubey, Ph.D. Scholars, Vegetable Science need special appreciation for never allowing the zeal of the authors to go low. We are grateful to Sh. A.N. Sharma, retired Business Manager; Dr. V.K. Sharma, Professor and Head, Surgery and Radiology and his wife Dr. Anita Sharma, Asstt. Professor, Deptt. of Microbiology of this University, my younger brother Akhilesh, son Rajiv and niece Namita for their very affectionate support and encouragement for completion of this manuscript. Authors sincerely acknowledge the help received from Dr. S.K. Malhotra, Scientist, NRC Seed Spices, Tabiji, Ajmer and IISR, Calicut for getting accessing some invaluable research information.

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1 Introduction

According to International Organization for Standardization (ISO), there is no clear cut division between spices and condiments and both are clubbed together. Term 'Spices and Condiments' applies to such natural plant or vegetable products or mixture thereof, in whole or ground form, as are used for imparting flavour, aroma and pungency and for seasoning of foods.

Spices and condiments relate to the natural, aromatic plant components or mixture thereof, used for flavouring, seasoning and imparting aroma or flavour to food. The term applies equally to the spices in the whole, broken or ground form.

Spices are well known appetizers and they add tang and flavour to otherwise insipid foods. They are used in pharmaceutical, perfumery, cosmetics and several other industries. They are also used as colourant. Some of them possess antioxidant properties, work as preservative (in pickles and chutneys) and have anti-microbial and antibiotic activities. Spices intensify salivary flow and the secretion of amylase, neuraminic acid and hexosamines. Saliva (rich in ptyalin) facilitates starch digestion in the stomach, rendering the carbohydrates-rich meal more digestive. Spices activate the adreno-cortical function and fortify resistance and accelerate thrombolysis, also diminish markedly the stroke volume, blood pressure and stroke frequency. They cleanse oral cavity from food adhesion and bacteria, check infection and caries and protect the mucous membrane against thermic, mechanical and chemical irritation.

Economic Importance

Spices are traded in different forms such as whole, essential oils, oleoresin, curry powder, ground paprika and a variety of spice mixtures. About 85-90 per cent are exported in whole form. Spice oil contains aroma of the product and is used in soft drinks, perfumes, toilet goods etc. Ginger oil is the most important item accounting for 69 per cent of the oil export. Others are black pepper oil, celery seed oil, cardamom oil etc. Oleoresin contains pungency, flavour and aroma of the spices used in meat processing, food industries etc. Pepper oleoresin accounts for about 65 per cent of the total oleoresin export followed by oleoresins of ginger, capsicum, turmeric, celery, fenugreek and cardamom etc.

Nutritional Importance

Spices influence our health as they enrich our diet by supplying minerals, vitamins and other components. Iron is supplied by cumin, coriander, fenugreek, asafoetida,

turmeric, mace, black pepper, tamarind etc. whereas calcium is available from cumin, coriander, asafoetida, mace, turmeric, pepper and clove. Coriander, cumin, fenugreek, chillies, nutmeg, turmeric, garlic, mace, tamarind, clove and small cardamom are the sources of phosphorous. Potassium is found in turmeric, coriander, fenugreek, cumin and the sources of sodium are coriander, cumin, fenugreek and turmeric.

Though spices are not good sources of vitamins but mace, coriander, pepper, chilli, clove, cumin are the sources of Vitamin A (carotene) and thiamine is found in chillies, cumin, nutmeg, fenugreek, mace, coriander. Chillies, cumin, coriander, fenugreek, garlic and small cardamom are the sources of riboflavin and niacin is available in cumin, chillies, turmeric, pepper, mace and nutmeg. Chillies and garlic are the suppliers of Vitamin C. Nutmeg substitutes the oil in vegetable preparations as it is highly fatty (86.4%). Flour of fenugreek is good for preparation of chapatti along with wheat flour to form nutritious and delicious diet. Turmeric is universally consumed with boiled milk by women during postnatal period as a nutritious drink. Curry powder is a ground mixture of about 5-20 different nutritious spices of which turmeric, coriander, cumin and chillies are the main ingredients while ginger, black pepper, cinnamon, clove, etc. are also added in it. It is used to flavour vegetables and meat preparations.

Medicinal use

The ancient Aryans considered spices as a powerful remedy for various disorders in human beings. Even today in Unani, Homeopathy and Ayurvedic system of medicines most of the spices are used as ingredients in medicinal drug preparations. Medicinal uses of different spices in greater details are dealt with individual spices.

Other uses

Nutmeg, vanilla, clove, pepper, cumin, celery etc. and their oils are used in perfumery or in soap making. Turmeric is used for dyeing. Turmeric, clove, fenugreek, nutmeg and others are used for the manufacture of vanishing cream, toothpaste, hair tonic etc. About 75 per cent of world exports of clove are consumed by Kretek Cigarette Industry in Indonesia. Nutmeg, mint and clove are employed to flavour tobacco. Dry ginger and ginger powder are used for manufacturing of brandy, wine and beer.

2 History

History of spices is a story of adventure, exploration, conquest and fierce naval rivalry. In the medieval times, the word 'India' confined up a vision in the minds of foreigners as a land of 'Maharajas', 'diamonds', 'fine textiles' and of course spices too. It was the lure of Indian spices which attracted the Dutch navigator, Vasco-de-gama to come to India (journey 24,000 miles) braving the turbulent seas and took two years travel to reach Calicut (Malabar coast, Kerala), the then tiny part of Arabian Sea. Lots more French and English sailors followed the search of spices.

Centuries before the birth of Greece and Rome the sailing ships carried Indian perfumes, spices and textiles to Mesopotamia, Arabia and Egypt. It was the lure of these commodities that brought many sailors to the sores of India. Long before the Christian era, the Greek merchants thronged the markets of South India buying spices among other precious things. The people of those time used spices, as we do today, to enhance the flavour of their foods. Spices were also used, as flavour disguisers masking the taste of the tainted food that was still nutritious, but would, if unspiced have to be thrown away. Some spices were used for preserving meat for a year or so without refrigeration. In sixteenth century, clove was used to preserve food as it contains a chemical called 'eugenol' that inhibits growth of bacteria. Mustard and ground mustard were also found to have preservative qualities. When spices were not available people went hungry due to lack of preserved food to carry them over winter.

Records about spices in India may be traced in Vedas dating back around 6000 BC. Black pepper is mentioned in Yajur Veda and turmeric in Atharva Veda. It is said that origin, growth and use of garlic and onion was known to Manu Rishi. Around 4000 BC, Valmiki too mentioned the use of spices in Ramayana. The body of King Dashrath was preserved with spice oils and balms.

India, China, Babylon, Egypt, Greece and Rome used to use spices in quite early days. Medicinal properties of saffron, dill, fennel, cumin and cardamom were known by Assyrians and Babylonians even around 3000 BC. Egyptians used spices for perfumes, balms and oils. In second and first millennia BC, the trailers of Arabia, Felix had the monopoly of spices between East and West. Joseph was sold by his brother to a company of Ishmaelite who came from Gilead with the camels bearing spicery, going to carry it down to Egypt about 1730 BC. Holy testament Bible gives dishes of spices.

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