

Physiological Disorders of Vegetable Crops

By
K.L. Bhat

2009
DAYA PUBLISHING HOUSE
Delhi - 110 035

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ISBN10 81-7035-591-5
ISBN13 978-81-7035-591-5

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Published by : **Daya Publishing House**
1123/74, Deva Ram Park
Tri Nagar, Delhi - 110 035
Phone: 27383999
Fax: (011) 23260116
e-mail : dayabooks@vsnl.com
website : www.dayabooks.com

Showroom : 4760-61/23, Ansari Road, Darya Ganj,
New Delhi - 110 002
Phone: 23245578, 23244987

Laser Typesetting : **Classic Computer Services**
Delhi - 110 035

Printed at : **Chawla Offset Printers**
Delhi - 110 052

PRINTED IN INDIA

— *Dedicated to* —

**The pestilence, forbearance and resoluteness
of tiny patriotic community of Kashmir,
who inspite of the onslaughts, have come out
of it with renewed pride in their
spiritual, cultural and educational traditions
and the ethos they cherish.**

Preface

Vegetables form an important part of our diet. They contain a number of nutritionally important compounds such as vitamins, minerals, carbohydrates and proteins. They often attract the consumer for their aesthetic qualities like flavour, colour and texture and contain a high percentage of water. Consequently, they exhibit relatively high metabolic activity when compared to other plant derived foods as seeds.

Vegetable production increased more rapidly than other crop production. This was due to improved facilities for production, processing and distribution to educational and promotional programmes dealing with the importance of vegetables in diet and to the rising purchasing power, changing food habits and life styles. The quality of vegetables that we consume is influenced by deficiency or excess of mineral elements, hormonal imbalance, improper

pollination or fertilization, injuries due to adverse climatic and growing conditions and some physiological factors. Sometimes more than one factor may be responsible for physiological disorder. Almost all major vegetable crops are prone to various types of disorders affecting different plant organs thus rendering them unfit for human consumption, therefore, control of disorder is essential for profitable production of the crop. Physiological disorder is the breakdown of tissue that is not caused by either invasion by pathogen or by mechanical damage but may develop due to adverse environment, especially temperature or to nutritional deficiency during growth and development. These disorders may develop during growth, storage or in transit thus render the produce unmarketable. Examples of physiological problems in vegetable crops are blossom-end rot of fruit (a leather like decay of the blossom-end of several vegetable fruits associated with calcium deficiency). Secondary growth of potatoes and bolting of many biennial and perennial crops (a pre-mature flowering that occurs when the crops are exposed to inappropriate day lengths or temperatures). The production of premature flower stalk (bolting) in spinach and ensuing seed production can render the plant unmarketable. This can occur when spinach is grown under long days and warm conditions. Other disorders that effect the economical production of the crop are sun scald, puffiness, cat face, growth cracks, blotchy ripening (tomato), chlorosis & cracked stem (celery), hollow heart, black heart & greening of potato, russet spotting (lettuce and sweet potato), buttoning, whiptail & browning (cauliflower), splitting & doubling of bulbs in onion, albinism (straw berry), red heart (lettuce), high and

low temperature during developmental phase and after harvest also render the produce unfit for market.

Therefore, increased production of vegetables will have significance provided they reach the consumer in good condition, that is without any blemish or misshapen, this can be possible only when they are grown under adequate and balanced nutrition essential for sustaining crop productivity. For this reason, the soil critical level of a nutrient defined for a vegetable may not apply to another crop species.

Therefore, an attempt has been made in this book to provide scientific knowledge on the role of both major and minor nutrients, adverse climatic and other related factors in the growth and development of physiological disorders of vegetable crops, making them unfit for human consumption. In this endeavour many sources such as books, bulletins, scientific papers, journals etc. related with the topic have been consulted, and have tried to give as much information as I could regarding symptoms, causes, and role of elements and temperature associated in the development of these disorders.

The author will welcome suggestions and criticisms on the contents of the book and constructive suggestions if any for further improvement will be included in revised edition.

Kanaya Lal Bhat

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Chapter 1

Introduction

Physiological disorders refer to the breakdown of tissue that is not caused by either invasion by pathogens *i.e.* disease causing organisms or by mechanical damage or may refer to non-parasitic or inanimate disease of fruit and vegetable crops. They may develop in response to an adverse environment, especially temperature, or to a nutritional deficiency during growth and development of vegetables. Adequate supply of nutrients, pollution free soil environment and optimum temperature and moisture favour normal growth of the plants. Any deviation from these conditions results in expression of disorders of various magnitudes. The deficiency or excess of any of the nutrient element, heavy metals, soluble toxic salts in the irrigation water, toxic gaseous pollution in the air, unsuitable prevalent temperature, moisture and soil pH have direct effect on plant growth. A number of vegetable crops are highly sensitive to these adverse conditions and depict varied