

HORTICULTURAL DEVELOPMENT IN THE HINDU-KUSH HIMALAYAN REGION

Editor

S.S. TEAOTIA



The present book gives the stage of development of horticulture in the horticultural important countries of the region, viz., India, Pakistan, China (Tibet and Himalayan region), Nepal and Bhutan which were represented at an International Expert Meeting on horticultural development in the Hindu Kush-Himalaya. The themes covered are production and productivity of horticultural crops, diversification of horticulture through ancillary horticultural programmes and marketing and utilisation of horticultural produce. The strategies proposed by different countries for the future may give an important message for the scientific development of horticulture in the region. It also proposes for organising an E.E.C.-type cooperation of the Hindu Kush-Himalaya countries to cover marketing and development of horticulture to meet the demand of the non-temperate region of Asia and western countries.

**Horticultural Development
in the
Hindu Kush-Himalayan
Region**

Proceedings of:

INTERNATIONAL EXPERT MEETING
on
HORTICULTURAL DEVELOPMENT
in the
HINDU KUSH-HIMALAYAN REGION
(19-21 June, 1989)



Organized by
INTERNATIONAL CENTRE FOR INTEGRATED MOUNTAIN
DEVELOPMENT (ICIMOD)
MINISTRY OF AGRICULTURE, HMG, NEPAL
and
FOOD AND AGRICULTURE ORGANIZATION (FAO)
OF THE UNITED NATIONS

© 1993, International Centre for Integrated Mountain Development-
(ICIMOD), Kathmandu

ISBN 81-204-0750-4

Published by Mohan Pramlani for Oxford & IBH Publishing Co. Pvt.
Ltd., 66 Janpath, New Delhi 110 001. Typeset by Laserwords, Madras,
processed and printed at Baba Barkha Nath Printers, N-48 Kirti Nagar,
New Delhi 110 015.

1-Y3-10

Foreword

The unsustainability of agriculture and the pressure of population has increased the importance of horticultural development throughout the Hindu Kush-Himalayan Region. Agro-climatic conditions are suitable for the establishment of various types of horticulture, but its full potential has not been realised because of the various problems faced and the lack of technical back-up or support systems. In the interest of integrated development, and considering the fragile condition of the Himalayan Region, it was considered appropriate to exchange experiences in horticultural development amongst the countries of the Region. ICIMOD, being the only central agency to monitor the integrated development of the Himalayan Region, organized an International Expert Meeting on Horticultural Development in collaboration with the Ministry of Agriculture/HMG, Nepal, and the Food and Agriculture Organization (FAO) of the United Nations.

The present volume of papers, presented by the horticulturists of the Region at the first International Expert Meeting on Horticultural Development in the Hindu Kush-Himalayas, is important because it records the evolution of the commercialisation of a farming system under fragile and difficult mountain conditions. Although the meeting concentrated more on the stage of horticultural development in each individual country, attention was also given to integrated development, thus covering aspects such as marketing and post-harvest operations. The role of ancillary horticultural activities was also highlighted because of their importance in the context of the small and marginal farms that dominate the Himalayan Region. The unique features of the discussions are well-reflected in the earlier Expert Meeting Summary Report and this volume provides the full and edited versions of the Expert Meeting Papers.

It is hoped that horticultural programmes and information exchange on horticultural development will increase and improve in the best interest of the scientific development of mountain horticulture. In the meantime, on behalf of the joint sponsors of this international expert meeting, I would like to express our thanks to those who contributed country papers and to all those, most notably Dr. S.S. Teotia of ICIMOD, who

have worked hard both in the organization of the workshop and in the arduous but rewarding tasks associated with the editing and publication of the papers presented here. Special appreciation is extended to Prof. L.R. Verma and Mrs. Dr. Uma Partap of ICIMOD for critically reading this manuscript.

I would like to express my appreciation of the efforts of the former Director of ICIMOD, Dr. Colin Rosser, for the efficient organization of the Meeting.

E.F. TACKE
Director, ICIMOD

Preface

The climatic conditions of Hindu Kush-Himalaya are suitable for the cultivation of a variety of horticultural crops such as fruits, vegetables, potatoes, mushrooms, flowers, spices and medicinal plants. So far, only fruits and vegetables and potatoes have been grown for a commercial market, though in a limited area. The numerous small and marginal farmers are yet to be attracted to these crops. The main reason for their reluctance is their lack of resources and know-how.

In certain countries of the Region, with the creation of some infrastructure for the extension and back-up of research, horticulture development has become a sustainable farming system which is supposed to be a basic need for the preservation of fragile mountains. To boost horticulture development, some countries have given it priority in their development plans.

Horticulture development involves heavy long-term expenditure which is not easily available to the developing countries of the Region. However, with the recent availability of resources and the emphasis on systematic development, some successful stories are available for certain crops, which can be profitably repeated in other areas with similar conditions. This would not only save the expenditure of evolving a new technology but also help in the speedy economic development of the area.

This book contains the present status of horticultural development in the Hindu Kush-Himalaya Region. Some of the strategies proposed for the future development may be helpful in the expansion of the programmes throughout the region. Thrust on ancillary programmes has also been highlighted which may create a lot of local employment potential which is specific to the area. The marketing and utilisation aspects, which are the backbone of the economic development of the mountains, have been clearly brought out in the book.

S.S. TEAOTIA

Introduction

The Himalayan region is known to possess the richest flora in the world. Most horticultural species have been in use in various forms for hundreds of years to meet the needs of the people. It was in the last century that, with the expanding population and the consequent need for more food, importance was given to growing more cereal crops. Extensive deforestation caused by the unplanned use of land resulted in serious soil erosion and soil degradation. Now, with the overuse of land, its fertility has depleted and agriculture has become unsustainable in large plants of the Hindu Kush-Himalayan Region.

During the past few decades the importance of horticulture crops has been realised in the Hindu Kush-Himalayas. Promotion of horticulture is included in the national priorities of most of the countries of the region. In addition to refurbishing the mountain economy, horticulture helps to promote environmental conservation in the region. Mountain horticulture also supplements the national food grid by providing fresh and processed fruits and vegetables and nuts. However, due to the lack of a proper infrastructure, difficult terrain, and want of suitable knowledge, proper emphasis has not been given to this important occupation.

Some horticultural crops have very specific agroclimatic and soil requirements. Cultivation is, therefore, limited to certain areas only; the Hindu Kush-Himalayan Region has features that are favourable for the development of certain horticultural crops. There are other crops which have greater adaptability and can be grown in various locations, provided the basic requirements are met wholly or partially, either naturally or artificially.

In the Hindu Kush-Himalayan Region both temperate and subtropical fruits can be grown successfully. In certain areas, even tropical fruits such as mangoes, pineapples, lychees, and bananas are cultivated, but such cultivation is localised. In temperate regions, fruits and nuts; such as apples, peaches, pears, apricots, plums, cherries, walnuts, pecans, hazelnuts, and almonds; as well as berries, e.g., strawberries, raspberries, loganberries, and currants are grown at different elevations. At lower

elevations, subtropical fruits, such as citrus fruits, pomegranates, and stone fruits, have been grown successfully.

Temperate fruits have a monopoly in the Region because they can only be grown under temperate conditions and therefore do not compete with the kinds of fruit grown on the plains. Sub-tropical and tropical fruits have the additional advantage of maturing later because of the lower temperatures and, therefore, give a better economic return to the farmer because they can be marketed. It is also observed that hill fruits have a better colour and taste.

Apples and citrus fruits are two important crops which have been cultivated off-season on a commercial scale in the Hindu Kush-Himalayas. While there is emphasis on the cultivation of apples in India (Western and Central regions), Pakistan, and China (Tibetan region), Nepal and Bhutan are preparing master plans for the wide-scale cultivation of citrus fruits in their middle-hill regions. Substantial investments will be required in the initial stages and for maintenance in the gestation period. In certain areas these crops have been planted without considering their all-round requirements, and this has created serious problems, especially to small-scale and marginal farmers.

Besides fruits, vegetable cultivation creates employment and generates income as their cultivation is labour-cum-capital intensive in nature and there are appreciable financial returns. Diverse agroclimatic and soil conditions in the Himalayan mountains are congenial for growing a wide range of temperate and sub-tropical vegetables. Among the temperate vegetables, cabbages, cauliflowers, capsicums, tomatoes, and beans are important crops which have scope for providing "off season" supplies to the plains. Two or three crops can be grown in a year at different elevations. There is also scope for raising vegetable seeds in temperate conditions. There is a selection of good quality vegetables (cabbages, cauliflowers, and carrots [Nantis]) producing better seeds in cool temperate conditions, and the mountain regions are ideal for raising the seeds of these vegetables. There is a great deal of demand for the seeds, both in the hills and on the plains, in winter which is the main season for the cultivation of temperate vegetables in the plains.

There are opportunities for the development of ancillary horticultural crops in the Hindu Kush-Himalayas because of the suitable agroclimatic conditions. In India, floriculture and mushroom cultivation have been given some priority and, in certain areas, they have become popular, although the cultivation of these crops has still to gain impetus in other countries of the region. However, the cultivation of spices and medicinal plants and the practice of apiculture are carried out all over the region with varying degrees of success. There is a need to develop technologies on different aspects of these undertakings before they can be launched commercially.

With the increase in production of horticultural crops, especially fruits, vegetables, and potatoes, marketing has become a serious problem in the Himalayan mountains. The markets are far away from the production areas and the produce has to pass through different types of climates before reaching the market. Marketing of horticultural produce includes not only the commercial transactions of buying and selling but also physical distribution. This physical distribution includes all the handling and forwarding activities such as harvesting, collecting, grading, packaging, storing, and subsequent dispersal through the markets to the consumers. In addition, there are various other auxiliary functions of marketing such as pre-harvest information, market finance and administration, marketing intermediaries, market training, and extension and research.

Fresh fruits and vegetables are perishable commodities and their physical distribution and marketing often cause substantial losses through loss of quality, physiological and pathological spoilage, or due to a glut in the market. These physical losses frequently occur in the countries of the Hindu Kush-Himalayan region because of inappropriate or inadequate application of the correct pre-harvest or post-harvest practices and considerations. Further, there are no official standards for the marketing of horticultural produce. The standard applied to fresh produce can be described as common acceptance of the practice of classifying a product and offering it for sale in context of quality.

The development of horticulture in the Hindu Kush-Himalayas is of recent origin. The technology adopted for the cultivation of different crops is mostly based on technology borrowed from western countries. The agroclimatic conditions in the region are quite different from those of the west. It would, therefore, be appropriate to evolve a suitable technology applicable to local conditions. Some initiatives have already been taken to establish institutes in the Himalayan region which will ultimately cater to regional requirements and address the problems faced by the horticultural industry. However, it would be beneficial if exchange of knowledge in the region took place frequently and if results were made available for implementation in the field.

Against this background, the International Centre for Integrated Mountain Development (ICIMOD), together with the Ministry of Agriculture/Nepal and the Food and Agriculture Organization of the United Nations (FAO), sponsored the International Expert Meeting on Horticulture from 19th to 21st June, 1989, in Kathmandu. The purpose of the meeting was to review the present status, future prospects, and constraints and to suggest sound strategies for the development of horticulture in the Hindu Kush-Himalayas.

The specific objectives of the Horticultural Expert meeting were:

- to facilitate a systematic exchange of experiences in horticultural development in the Hindu Kush-Himalayan region;
- to facilitate discussion on the linkages involved in production and processing technologies, marketing organization and extension services, and the economic management of input supply and marketing systems;
- to assess the environmental issues in large-scale horticultural development in mountain areas; and
- to examine the role of mountain horticulture, within national strategies, as a component of a sustainable farming system.

S.S. TEAOTIA

Contents

<i>Foreword</i>	v
<i>Preface</i>	vii
<i>Introduction</i>	ix
<i>Contributors</i>	xv
Expert Meeting Discussions	1
<i>S.S. Teaotia</i>	
Conclusions and Recommendations	15
Part 1: Production and Productivity of Horticultural Crops	
1 Development of Mountain Horticulture in the Indian Himalaya <i>R.M. Pandey and S.S. Teaotia</i>	21
2 Apple Cultivation in India <i>H. Singh</i>	49
3 Present Status of Horticulture Development in Himachal Pradesh <i>K.C. Azad</i>	75
4 Horticulture Development in Uttar Pradesh Hills <i>J.N. Seth</i>	103
5 Horticultural Development in Nepal: Progress, Potential and Problems <i>H.P. Gurung</i>	115
6 Vegetable Development in Nepal: Present Status, Future Strategy, and Constraints <i>S.S. Rekhi, B.B. Shah and S.B. Aryal</i>	139
7 Horticultural Development in Bhutan <i>D.K. Wangchuk</i>	167

- 8 Development of Horticulture in the Mountain Regions of Pakistan: Progress, Potential and Constraints 187
Zahur Alam
- 9 Horticultural Development in the Himalaya and the Hengduan Mountains, China 247
Zheng Du, Li Gaoshe, Jiang Hong

Part 2: Horticulture Research and Diversification by Ancillary Horticulture Programmes

- 10 Horticultural Research in the Himalayan Hill Region of India 291
K.L. Chadha
- 11 Genetic Resource Issues in Horticultural Developmental Approaches of the Hindu Kush-Himalayan Countries 341
Tej Partap
- 12 Seabuckthorn Resources and Its Underexploited Potential in the Himalayan Region 377
Lu Rong-sen
- 13 The Role of Beekeeping in the Development of Horticulture in the Himalayan Mountains of India 389
L.R. Verma
- 14 Potential of Floriculture in the Hindu-Kush Mountains 411
Vishnu Swarup
- 15 Role of Prices and Markets in the Development of Horticulture 431
R.L.N. Nasol
- 16 Post-harvest Practices as affecting Marketing of Fruits and Vegetables in Himalayan Mountain Regions in India 447
J.C. Anand and O.P. Grover
- 17 Role of the Himachal Pradesh Horticulture Produce Marketing and Processing Corporation in the Development of Horticulture in Himachal Pradesh 483
R.S. Rana
- 18 Marketing Development and High Value Hill Agriculture: Some Observations on the Experience in the Bagmati Zone, Nepal 509
Mahesh Banskota

Contributors

Alam, Zahur

Senior Programme Agriculturist, Aga Khan Rural Support Programme, Gilgit, Pakistan.

Anand, J.C.

Post Harvest Technologist, B-74, Kalkagi, New Delhi 110019, India.

Aryal, S.B.

Vegetable Development Division, Khumaltar, Kathmandu, Nepal.

Azad, K.C.

Director Horticulture, Himachal Pradesh, Shimla, India.

Banskota, Mahesh

International Centre of Integrated Mountain Development, G.P.O. Box 3226, Kathmandu, Nepal.

Chadha, K.L.

Deputy Director General (Horticulture), Indian Council of Agricultural Research, Krishi Bhawan, Dr. Rajendra Parsad Road, New Delhi 110001, India.

Grover, O.P.

National Horticulture Board, Government of India, Gurgaon, 122001, 422, Sector 14, P.O. Box 300, New Delhi, India.

Gurung, H.P.

Director General (Horticulture), H.M.G. Nepal, Kathmandu.

Harbans, Singh

Agriculture and Horticulture Commissioner (Ret'd), B4/44, Azad Apartments, Sri Arbindo Marg, New Delhi 110016, India.

Jiang Hong

Institute of Geography, Chinese Academy of Sciences, Beijing, China.

Li Gaoshe

Institute of Geography, Chinese Academy of Sciences, Beijing, China.

Lu Rong-sen

International Centre for Integrated Mountain Development, G.P.O. Box 3226, Kathmandu, Nepal.

Nasol, R.L.N.

Marketing Expert, FAO, Kathmandu, Nepal.

Pandey, R.M.

Horticulture Commissioner, Government of India, Ministry of Agriculture (Dept. of Agriculture and Cooperation), Krishi Bhawan, New Delhi 110001, India.

Partap, Tej

International Centre for Integrated Mountain Development, G.P.O. Box 3226, Kathmandu, Nepal.

Rana, R.S.

Managing Director, Himachal Pradesh Marketing Corporation Ltd. (Ret'd), 8628, Sector C, Pocket 8, Vasant Kunj, New Delhi 110037, India.

Rekhi, S.S.

Chief Technical Advisor and Senior Seed Production Specialist, FAO Fresh Vegetable and Vegetable Seed Production Project, Kathmandu, Nepal.

Seth, J.N.

Director Horticulture, Uttar Pradesh, Ranikhet (Almora), India.

Shah, B.B.

Chief, Vegetable Development Division, Khumaltar, Kathmandu, Nepal.

Swarup, Vishnu

Director Research and Development, Indo-American Hybrid Seeds, Flat No. 214, Palika Bhawan, R.K. Puram, Sector XIII, New Delhi 110066, India.

Teaotia, S.S.

International Centre for Integrated Mountain Development, G.P.O. Box 2336, Kathmandu, Nepal.

Verma, L.R.

International Centre for Integrated Mountain Development, G.P.O. Box 3226, Kathmandu, Nepal.

Wangchuk Dasho Khandu

Director General, Department of Agriculture, Royal Government of Bhutan, Thimpu, Bhutan.

Zheng Du

Institute of Geography, Chinese Academy of Sciences, Beijing, China.