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HORTICULTURAL POTENTIALITIES OF NORTH EASTERN REGION OF INDIA — PROBLEMS OF DEVELOPMENT AND ROLE OF BOTANIC GARDENS/ARBORETA

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The North Eastern region of India comprising seven states offers favourable combination of soil and climatic conditions for cultivation of different types of horticultural crops, including fruits, vegetables, ornamental plants, tuber and rhizomatus crops and species of medicinal and other economic values. The fruits grown in these regions range from tropical and sub-tropical fruits like banana, papaya, pineapple, citrus to temperate fruits like apple, pear, peach, plum and even certain nut fruits. The region has also a rich diversity of different vegetable crops. Among the ornamental horticulture, special mention may be made about the orchids (± 600 spp.). Tuber and rhizomatous crops like tapioca, dioscorea, colocasia, sweet potato, ginger and turmeric grow abundantly, while the plantation crops like tea has considerable bearing on the economy of the region. Other plantation crops like rubber and coffee, medicinal and aromatic plants like *Solanum, Dioscorea, Cymbopogon, Mentha* etc. have already attained importance.

Botanic Gardens are playing a pivotal role in the exploitation of the world's plant resources by introducing many economically important species into cultivation and together with *ex-situ* conservation of germ-plasm materials.

It is well convincing that presently horticultural crops are well established in the world economy but the number of species involved is small. On the one hand, there is concern that the genetic pool is very narrow, often alarmingly small, the wild populations of their progenitors are rapidly disappearing due to loss of their habitats or the ecosystem as a whole. On the other hand, there is an increasing demand in introducing into cultivation some of the species that are so far only used on a local level and which might gain spectacular interest with great novelties.

Botanic Gardens/Arboreta are now faced with a great challenge. Adoption of a conservation programme would, in many cases, provide gardens with a new focus and help justifying their future development. The Experimental Botanic Gardens of Botanical Survey of India are also involved in *ex-situ* conservation of endangered, rare and threatened species of horticultural and botanical interests.

SOIL, CLIMATE AND AREAS OF NORTH-EAST REGION

In general, soil of the region is acidic type and rich in organic matters. Soil of the plains is mostly of the alluvial type, while in the hills mostly lateritic. Broadly the region is considered as high rainfall zone with the spread of rainy season for 5-6 months.

There is no systematic and accurate estimate of the horticultural crops in cultivation and the area under their coverage.

MAJOR HORTICULTURAL CROPS

(a) *Citrus*—The N. E. Region has got diverse forms of *Citrus* fruits and is considered to be the natural abode of several cultivars with prolific wild relatives of *Citrus* species. Out of all citrus types, Khasi mandarin, a high quality mandarin orange cultivar covers the largest area in the region. Pomelos and grape-fruits are also grown to a certain extent.

(b) *Pineapple*—Pineapple is one of the most important cash crops of the region. While the variety Kew or Giant Kew is the major variety of Assam,

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Meghalaya, Mizoram and Arunachal Pradesh, the variety Queen is grown to a considerable extent in Manipur and Tripura states.

(c) *Temperate fruits*—Temperate fruits like plum, peach and pear are being cultivated in the region since long and in recent past considerable efforts have been made to grow apple and certain nuts of pomological value in the region, particularly in Arunachal Pradesh. Plum is cultivated to certain extent in Meghalaya and Arunachal Pradesh, while pear is concentrated mostly in Manipur. In the rain shadow belts of Kameng and the region bordering Tibet even temperate nuts like walnut, almond, chestnut, etc., may prove to be successful.

(d) *Vegetables*—There is no reliable estimate available about the area under cultivation of vegetable crops in the region. However, in a report prepared by CFTRI, Mysore (1978), it is estimated to be about 412 thousand tones annually (Borthakur, 1981).

There exists certain areas considered as temperate rain shadow belts, particularly in Arunachal Pradesh, where favourable climate exists for the production of good quality seeds of different temperate vegetables, cole crops in particular.

OTHER HORTICULTURAL CROPS

Among other horticultural crops of great economic importance, ginger is grown widely in Meghalaya and Mizoram. The region is rich in wild relatives of ginger, dioscorea and curcumas. There exists a very good scope for cultivation of turmeric and different tuber crops like tapioca, sweet potato and the dioscoreas in the entire region. Although no estimate is available about the area and production under tuber crops (except potato) in the region, they are grown to a considerable extent in the hills and they form a part of food of different tribal communities of almost all the N.E. Region states. The potato grows very well in the hills and only in Meghalaya about 8 per cent of the total cultivable land is under potato. Good quality seed potato is being produced in the hills.

Plantation crops like tea, having great impact on the agricultural economy of the region, is grown in Assam and Tripura and the production accounted for is nearly 54 per cent of the total production of the country.

The plantation crops — rubber and coffee are considered to be promising crops of the region (Joseph and Murti, 1981). Presently, nearly 260 ha. in Assam and Meghalaya, are under experimental rubber plantations. Recommendations have been made for commercial cultivation of rubber in selected areas of the region and also for the introduction of certain high yielding clones. Coffee has also been tried in different selected sites of the region. In Mikir hills and North Cachar hills of Assam about 160 ha. are reported to have been under coffee cultivation with the average yield of about 500 kg. clean coffee per ha. Other states like Manipur, Meghalaya and Mizoram have also started planting coffee.

The region abounds in a variety of medicinal and aromatic plants such as *Rauvolfia, Dioscorea, Coptis, Aconitum, Solanum, Adhatoda, Cassia, Cymbopogon, Atropa, Pterospermum, Sida, Mentha, Adananthera, Michelia, Stephania,* etc. which may prove a boon to the herbal drugs industry in the region (Chopra *et al.* 1956).

Apart from the plants of horticultural interest, the region is also very rich in many economically important plants. Bamboos are one of the most important plants of this region. Out of about 20 genera and 130 species available in India, this region has about 16 genera and 80 species. The species worth mentioning are—*Bamboosa tulda, B. pallida, B. khasiana, B. balcooa, Dendrocalamus hookeri, D. hamiltonii, D. stricta, Arundinaria callosa, A. hirsuta, Cephalostachyum capitatum, Melocanna bambusoides, Chimanobambusa polystachya,* etc.

A few economically important trees in N.E. region are *Dipterocarpus, Schima, Shorea, Mensonia, Sterculia, Phoebe, Amoora, Pinus, Oak, Canarium, Albizia, Cinnamomum, Acacia, Terminalia, Aquillaria,* etc., having a promising status for horticultural industry (Haridasan and Rao, 1987).

This region rears many primitive horticultural

species like *Magnolia, Exbucklandia, Pealiana, Tetracentron,* etc. and the locality of the only endemic insectivorous plant *Nepenthes khasiana.* The region is prolific in wild relatives of many important economic plants (Citrus, Banana, Sugarcane, Paddy, Chilly, Jute, Piper, Zingiber, Curcuma, Dioscorea, etc.) and the genetic diversity met within these plants is enormous and thus the origin of many cultivated plants of the present day is being attributed to this region.

ORNAMENTAL HORTICULTURE

Among the ornamental horticulture orchids exhibiting a wide range of diversity in size, shape, structure, number, density, colour and fragrance of the flowers form a very noticeable element of the vegetation of the region. Orchids are useful as showy ornamental plants and also as long lasting bewitchingly beautiful flowers. Some of the native orchids are useful as sources of breeding materials. Besides aesthetic roles, a few of them have medicinal value and some other are of aromatic uses. The best long-lasting and promising ornamental orchids are the species of *Aerides, Arachnanthe, Coelogyne, Cymbidium, Dendrobium, Renanthera, Rhynchostylis, Vanda* (Epiphytes) and *Paphiopedilum* and *Phaius* (Terrestrial).

Rhododendrons—an important horticultural group with showy flowers are under constant threat of depletion in nature. A few *Rhododendron* species which are extremely rare are confined to limited pockets in N.E. Region *eg.*: *Rhododendron bulu* and *R. mishmiense* in Mishmi Hills; *R. concinnoides, R. cephalanthum* var. *crebreflorum, R. kasoense* in Dalai valley, Assam; *R. inaequale* and *R. iteophyllum* in Khasi Hills; *R. bauhiniflorum* in Naga Hills and *R. macabeanum* and *R. wattii* in Manipur need immediate measures for conservation and protection.

Hedychium is another group of interesting ornamental plants with potential horticultural value. Out of 29 species reported from India, 21 species occur in Meghalaya, of these 12 species are endemic. The concentration, number and distribution pattern indicates that this region could be the centre of speciation for this genus. Thus it requires protection by way of conservation and germ plasm collection.

Some other species of potential horticultural value *viz. Jasminum* spp. (*J. rottlerianum, J. dispermum, J. attenuatum,* etc.); *Lobelia* spp. (*L. pyramidata, L. rosea, L. colorata,* etc.), *Agapates* spp. (*A. saligna, A. variegata, A. angulata, A. macrantha,* etc.) are seen day by day depleting in nature.

The floristic wealth of wild relatives and related types of agri-horticultural plants in India is estimated to be about 250 species, of this, about 80 species are either endemic/threatened or endangered due to over exploitation and majority of these are concentrated in N. E. Region.

Other ornamental plants more popular in the region are Begonias, Dahlias, Gladiolus, Iris, Lilies, Marantas, Defenbeckias etc.

PROBLEMS OF HORTICULTURAL INDUSTRY

Poor cultivation practices.

Absence of suitable infrastructure :

(i) Problems of transport and marketing ;

(ii) Problems of processing :

(iii) Inadequate research and development organisations.

Depleting forest resources due to habitat disturbances, biotic interference, deforestation, state developmental activities, over exploitation of some plants and natural calamities, thus contributing to the genetic erosion of valuable wild horticultural wealth.

ROLE OF BOTANIC GARDENS/ARBORETA

In India there are about 45,000 plant species and due to habitat loss, the biological resources are fast shrinking. It is said that 60 hectares of forests are lost every minute throughout the world. Even before the species are described many organisms become extinct due to the loss of habitats. Species once lost is lost for ever with its evolution through several million years. When habitat is lost, plant population get fragmented, they lose their genetic flow, species

and genetic viability and ultimately they are on the threshold of extinction.

Botanic Gardens serve as "refugia" for plants driven to the verge of extinction due to habitat loss. The Indian Botanic Garden at Howrah perhaps the largest botanic garden in Asia, established in 1787 and occupies an area of 275 acres, is a heritage garden of this country. For nearly two centuries, the Indian Botanic Garden has been a centre of botanical and horticultural research. The foot-prints of its activities are imprinted in the sands of Indian Science and in the economic scenario of the country. It has the richest living collections of palms, water lilies, bamboos, and a number of other endangered species and species of horticultural interest. The Great Banyan Tree which is about 260 years old still young has witnessed the saga of scientific activities.

Under the developmental activities of Botanical Survey of India, the Eastern Circle, Shillong has two Experimental Gardens/Arboreta : on a 5 acre slopping hill area of "WOODLANDS" ground at Shillong and on a 25 acres of land at Barapani. In these gardens various interesting plants including the primitive flowering plants like *Aesculus assamica, Maggletia insignis, Podocarpus neriifolia, Taxus baccata, Magnolia grandiflora, Exbucklandia populnea,* etc. and the unique insectivorous plant *Nepenthes khasiana* are nurtured. A number of rare, threatened and endangered orchid species at National Orchidarium and Experimental gardens, 40 species of Bamboo, Rhododendron, Hedychium, Dioscorea, wild Musa and other economic and medicinal plants of the region are also grown here.

The Experimental Gardens at Shillong and Barapani are in the process of introduction and acclimatisation of a large number of such species and paying considerable attention towards maintenance of germ plasm collections, growing and multiplication of rare/endangered/threatened horticultural wealth in order to save them from extinction, offering a training ground to university and college students, forestry, agriculture, horticultural enthusiasts and is rendering technical guidance to the concerned state(s) administration.

REFERENCES

BORTHAKUR, D. N. Agricultural Resources of North Eastern Region. Paper presented at the Seminar on Resource Potentials of N. E. Region : April 29 - May 1, 1981, Shillong. 1981.

CHOPRA, R. N. *ET AL.* Glossary of Indian Medicinal Plants. C.S.I.R., New Delhi. 1956.

HARIDASAN, K. AND R. R. RAO. Forest Flora of Meghalaya, Vol. II. Bishen Singh Mahendra Pal Singh, Dehra Dun. 1987.

JOSEPH, J. AND S. K. MURTI. Plant Resources of North Eastern India. Paper presented at the seminar on Resource Potentials of N. E. Region : April 29 May 1, 1981, Shillong. 1981.