# Plant Introductions in the Maldives

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Agriculture in the Maldives is based mainly on plant species introduced periodically from time immemorial. Information is provided on the manner in which agriculture is practiced in the Maldives, including people's attitude towards plant products.. Several UN agencies made efforts towards the development of agriculture, horticulture and forestry by deputing consultants from time to time to advise the government on the suitability of different species for specific islands. While Mr Butany conducted field trials in several islands/atolls, using several species of field crops and vegetables, several other experts enlisted elite cultivars of tobacco, spices, tree species, fruits species and vegetables, for growing in specific islands based on their visits to different islands/atolls. Dr Arora visited several islands/ atolls to study the diversity of different cultivated species and Mehra collected and evaluated several species of cultivated plants grown in different islands/Atolls.

Based on the reports of the consultants, the presentation discusses the achievements and opportunities for agricultural development in the Maldives especially related to the suitability of several introduced species, for household farming, community farming, crop-island development, development of un-inhibited islands, integrated agri-horticulture- forestry development, ornamental horticulture, fodder production, export crops and hydroponics.

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# Indian Plant Genetic Resource Management System

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Plants provide raw materials for food, feed, fibre, shelter and medicines and several other uses. Termed as plant genetic resources (PGR) these are recognized as tangible resources of as much importance as soil, water, oil and minerals. The PGR are characterized by unequal distribution on earth; with some geographical regions endowed with greater diversity and called as centres of diversity. Growth in agriculture throughout the world has been achieved through two important processes – selection for better traits and introduction of plants from different geographical regions. Introduction of plants like rubber, coffee, tea, oil palm has played an important role in the economies of many countries. In India, rubber, coffee, cashew, sunflower, soybean, and maize are some of the examples of introduced plants which have become major crops.

Since the industrial revolution when scientific plant breeding has markedly improved agricultural production, the role of systematic collection, evaluation, conservation and exchange of PGR has gained rapid strides. Management of PGR is an important issue, especially for a country like India, which is predominantly an agrarian society and also richly endowed with PGR. Realizing the importance of PGR, the Indian Council for Agriculture Research established the National Bureau of Plant Genetic Resources (NBPGR) in 1976. The Bureau is the nodal institute working on survey, collection, exchange, quarantine, characterization, evaluation, conservation and documentation of PGR. It has played a pivotal role in crop improvement and development and diversification of agriculture in India through germplasm introduction from various foreign sources and germplasm collection from within the country and abroad, and germplasm supply to plant breeders and other users. International collaboration and infrastructural facilities were strengthened manifold during the 1980s. While a cold-storage module (with a seed storage capacity of 30,000) was established in 1983, the state-of-the-art technology National Genebank (NGB) was established in 1996 with a storage capacity of one million

seed accessions. Well-equipped cryopreservation and *in vitro* conservation facilities were developed to cater to the conservation of recalcitrant seed species and vegetatively propagated materials in 1986. The NGB maintain a germplasm holding of 0.29 million accessions of field and horticultural crops. Germplasm accessions numbering about 0.1 million have been evaluated and 79 catalogues published. Realizing the need for molecular characterization of the indigenous genetic diversity, a National Research Centre on DNA Fingerprinting was established at NBPGR in 1996. Also, to document the performance of promising germplasm and promote their exchange and use, the ICAR started the registration of potentially valuable plant germplasm at NBPGR in 1996. The NGB, ranks fourth in terms of base collection of germplasm in the world.

For better evaluation and enhanced utilization of PGR, the activities of NBPGR have been recently expanded in a network mode. This involves coordination with the Project Director/Project Coordinators, All-India Coordinated Crop Improvement Projects, who serve as the National Active Germplasm Sites. In addition, collaboration is carried out with the Consultative Group and National Genebanks of other countries.

The modalities for access to PGR have changed rapidly in the last decade with the advent of the Convention on Biological Diversity (1993), the World Trade Organization (1995) and the International Treaty on Plant Genetic Resources for Food and Agriculture (2004). These treaties have also led to strengthening of intellectual property regimes in areas of agriculture and biotechnology which have directly and indirectly impacted PGR management in India. Important aspects related to these issues would be discussed in the presentation.

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# Plant Introduction in India during Pre- and Post-CBD Periods–An Analysis

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The Introduction of exotic germplasm has enriched the Indian agriculture since times immemorial, resulting in establishment of a large number of crops and in development of high yielding varieties. In fact most countries are dependent on crops that have originated elsewhere and are considered to be interdependent with respect to genetic resources required for their crop improvement programmes.

In last two decades with the enforcement of CBD and provisions of the TRIPs under WTO, there is a general apprehension that free exchange of germplasm would be adversely affected because of issues related to sovereign rights of countries and IPR. Therefore, an analysis has been carried out on introduction of germplasm from other national genebanks and Consultative Group (CG) centres. The CG centres have assembled a large amount of germplasm in their mandate crops through international cooperation and freely distribute the genetic resources of these crops to the world community. The analysis includes the number of accessions received during the last 5 years of pre-CBD era (1988-1992) and another 5 year (1997-2001) of post-CBD era. The period during 1993 to 1996 was not included to avoid the effect of transit phase.

A total of 46,650 accessions were received from national genebanks in different crop groups during pre-CBD (52.1 percent) and 42,911 (47.9 percent) from CG centres. Whereas, post-CBD 39,625 (47.3 percent) accessions were received from national genebanks and 44,057 (52.7 percent ) accessions from CG centres. The data also indicates that national gene banks are major providers of cereals, oilseeds, forages, vegetables and fruits, while for grain legumes supply was almost equally distributed between national genebanks and CG centres. In cereals, the germplasm received in the form of international nurseries/trials which are received from CG centres was not included in this data. In cereals, national genebanks contributed 33.46 percent during pre-CBD, which got slightly increased (34.75 percent) during post-CBD.

Further, analysis regarding the type of genetic material received in cereals indicated that of the total