# Executive Summary

In India, forestry is the second largest land use after agriculture with a forest and tree cover of 23.4% of the geographical area. Some of the principal commercial timber species are teak, sal, *Dipterocarpus spp*., and conifers. The main species under social and agroforestry include eucalypts, acacias, and poplar, *Melia, Dalbergia and Leucaena*. The increase in human and cattle population in the country has put immense pressure on forests. The National Forest Commission, 2006 recommends that in order to meet the growing needs of the nation stress should be laid on establishing high yielding plantations and agroforestry based on improved planting stock. Tree improvement has the potential to increase productivity immensely through use of genetically improved and certified forest reproductive material.

***Seed Certification in agriculture***

Agricultural seed certification is an assurance of genetic quality and vaietal identity. The OECD is an inter-governmental organization, which provides multilateral forum to develop and reform economic and social policies. The OECD Agricultural codes facilitate international trade and harmonization of certification standards. 55 countries participate in its agricultural seed certification schemes.

In India, seed certification in agriculture and horticulture is regulated in accordance with the Seed Act, 1966. The Act is currently under revision and the Seed Bill, 2004 has been introduced in Parliament. It is proposed to make seed certification mandatory and now forestry seed is also covered under the Bill. The Ministry of Environment and Forests has advised the Ministry of Agriculture and Cooperation to delete "forestry" from the purview of the Bill as the former proposes to draft a separate legislation on forest reproductive material (FRM).

***FRM Certification in Forestry***

Research has shown that if forests are to be of increased value including the aspects of stability, adaptation, resistance, productivity and diversity, it is necessary to use reproductive material, which is genetically superior and phenotypically suited to the plantation site and must be of high genetic quality.

The object of the certification of tree seed and plants (FRM) is to maintain and make available to the practicing forester as well as agro-forester sources of seed, plants and other propagation materials of superior provenances and cultivars so grown and distributed as to insure the genetic identity and high quality of seed and plants. Seed cost is a very small proportion of plantation establishment cost and plantation projects can afford to purchase the best seed rather than the cheapest. The evidence seems overwhelming that whenever, there is a substantial afforestation programme, tree improvement (both provenance research and individual selection) in tropics will more than pay for itself. Looked at another way, no one can afford the substantial losses, which result from non-implementing a realistic tree improvement programme.

The elements of a comprehensive seed certification scheme for forest seed and plants are:

(a) Inspection of the seed source by a qualified professional forester.

(b) Assessment of cone/fruit crop by a qualified professional forester before seed collection begins.

(c) Collection of cones/fruits by a registered seed collector.

(d) Testing of an adequate sample at an official seed-testing laboratory.

(e) Sowing of seed in a registered nursery where labels and records satisfy minimum requirements.

The minimum requirements for certification are:

(i) Previous history of the seed source

(ii) Isolation from foreign pollen

(iii) Field inspection of seed trees, seed and plants

(iv) Adherence to specified standards for germination and purity

(v) Labels and certification

(vi) Reference numbers for identifying origin of seed

***International Certification Schemes on Forest Reproductive Material***

Internationally, the two important FRM certification schemes are the EU Directive on FRM involving 46 species and the genus *Populus*, applicable in 27 countries; and the OECD scheme, which has been adopted by 22 countries. The U.S. is a member of the latter scheme although its Association of Official Seed Certification Agencies now has the standards to certify all native plants and trees. In Australia there is no official seed certification agency. However, FRM certification is done by the Southern Tree Breeders Association, which includes the official bodies also.

Fundamental to both the EU and OECD certification schemes is the demarcation of regions of provenance, maintenance of national register of approved basic material and establishment of Designated Authority. The EU has identified six types of basic material and requires that member states enact a law on FRM. The six types of basic material are:-

(a) Seed Source: Trees within an area from which seed is collected;

(b) Stand: A delineated population of trees possessing sufficient uniformity in composition;

(c) Seed Orchard: A plantation of selected clones or families which is isolated or managed so as to avoid or reduce pollination from

outside sources, and managed to produce frequent, abundant and easily harvested crops of seed;

(d) Parents of Family: Trees used to obtain progeny by controlled or open pollination of one identified parent used as a female, with the pollen of one specific parent (full-sib) or pollen from a number of identified or unidentified parents (half- sib);

(e) Clone: Group of individuals (ramets) derived originally from a single individual (ortet) by vegetative propagation, for example by cuttings, micro propagation, grafts, layers or divisions;

(f) Clonal Mixture: A mixture of identified clones in defined proportions.

The EU has identified four categories of FRM: source identified, selected, qualified and tested. On the other hand, the OECD has, for the time being (2007), identified two categories of FRM: source identified, and selected.

***FRM Certification in India***

Accurate estimates for the demand of forest seed, plants and improved clones are not available. Some information has been received but it is incomplete. However, based on the work done in ICFRE, it may be of the order of 10,000 tonnes annually.

We recommend that for forest seed and plant (FRM) certification we may adopt the scheme developed under the Indo-Danish Project with suitable modifications. The scheme should be continually reviewed to bring it up to date and abreast with technological developments.

The modifications suggested are: -

(a) The Designated Authority should be a Committee of the Government of India headed by Director General of Forests, MoEF and not the Conservator of Forests, Research of the State concerned.

(b) The National FRM Development Committee should coordinate the programme on tree improvement and production of genetically improved FRM based on sound breeding strategies.

(c) Seed zones should be revisited and delineated by the Regional/State FRM certification committees and approved by the Designated Authority. The new States formed since then, should also be incorporated. Meanwhile, sources of FRM should be indicated and identified as follows:

(i) Compartment number, block, range and forest division from where the seed is collected indicating latitude, longitude and altitude in case of collections from forests.

(ii) Khasra number, revenue village, tehsil/taluka and district/State if FRM is collected/produced outside forests.

(d) National/State FRM Development Committees are expected to pay particular attention to production of quality FRM by forest departments, ICFRE institutions, and agricultural universities and by the private sector.

(e) Norms for inspection, sealing, labelling and issue of certificates may be reviewed.

(f) Both the development of genetically improved seed / FRM for meeting total requirements and certification of seed and planting stock must get statutory backing soonest possible with the enactment of a separate law related to Forest Seed / FRM. Meanwhile, implementation of the plans for production and certification of seed/ FRM must be taken up forthwith as per details given under Phase I in Chapter 6 of this report.

The scheme recognizes four categories of reproductive material: source identified; selected; untested seed orchards; and tested reproductive material. For all the above categories of FRM, seed origin has to be specified as a first condition. The Scheme on Certification of FRM after long deliberations and consultations with the State Forest Departments decided that instead of provenances as in the case of The OECD and EU schemes, the country's forests will be identified into seed zones to specify seed sources as the site factors vary even within small areas like compartments. The formation of seed zones took into account the administrative set up of the country and the forest types.

The key requirements of the scheme for control of FRM are:

(a) For selected, untested and tested FRM a qualified person on behalf of the Designated Authority must inspect the stand or seed orchard.

(b) Collection (including extraction, cleaning, packaging and storage) under supervision of officials duly authorized by the Designated Authority. Likewise clonal planting stock or vegetatively propagated FRM to be certified must be produced from approved basic material as per guidelines that may be issued by the Designated Authority and duly certified by the concerned Regional/ State FRM Certification Committee.

(c) Sowing of seed, planting of seedlings and vegetative propagation must be in a nursery under direct supervision of duly authorized official.

(d) Satisfactory records mush be kept of collection, processing, grading and storage of FRM and must be available for inspection.

(e) All categories of FRM must be kept separate at all stages according to prescribed criteria.

(f) Each consignment of plants and parts of plants shall be in accordance with the Rules of the Scheme.

***Interaction with Stakeholders***

We visited eleven States to interact with forest officials/ scientists to ascertain their views and to study the status of seed certification there. The States visited are Andhra Pradesh, Haryana, Maharashtra, Orissa, Punjab, Tamil Nadu, Uttarakhand, U.P., M.P., Gujarat, and the Bikaner region of Rajasthan. We also received inputs from the private sector and useful advice from a large number of resource persons from India and abroad. Their views are summarized below:-

(a) All the stakeholders stand for improvement of forest stands so as to maximize their productivity. Some SFDs and FDCs have a substantial number of seed stands, seed production areas, seedling seed orchards, clonal seed orchards, and candidate plus trees. Progeny trials have been completed in case of short rotation species and for many others are under progress. We need to build on this reservoir of strength and quickly develop SPAs and seed orchards to meet the future FRM requirements.

Most participants wanted greater stress to be laid on enhancing production of quality FRM before initiating steps for certification and legislation. They felt that certification should come first and legislation later.

(b) The need for producing genetically improved FRM outside forests and by the private sector was also recognized.

(c) All the stakeholders felt the necessity for institutional and regulatory framework to support Forest Seed Certification on an all India basis including use of forest seed for departmental use by forest departments/corporations.

(d) Research on establishing minimum standards for certification of reproductive material of forest species should be taken up on a priority basis. ICFRE should organize and coordinate this activity.

(e) Financial and technical assistance may be provided by the Central Government to the States for establishing seed processing units and seed testing laboratories.

(f) In natural regeneration areas genetically improved seed from a large number of superior mother trees or seed bearers should be encouraged so as to conserve and improve the gene potential of the natural forests.

(g) Genetically improved and certified forest reproductive material must be used for production forestry, social forestry and other plantation programmes in the public as well as the private sector.

Some of the States such as Andhra Pradesh, Tamil Nadu, Uttarakhand, U.P; Gujarat, Haryana, Kerala, Madhya Pradesh and Maharashtra have made considerable progress in the development of SPAs, SSOs and CSOs. A few states also have the infrastructure to collect, process, grade and test seed, as well as a system of in house certification. However, in general, the progress in this respect is uneven and a

majority of the States do not use (or have) enough source identified or certified material for their plantations.

***Institutional Arrangements and Law***

We recommend that a system of FRM certification as suggested above be put in place urgently. This may be done in three phases. In the first phase, which may be initiated immediately without waiting for the enactment of a law, we propose the setting up of a Designated Authority in the form of a committee to be headed by Director General of Forests. The authority would be assisted by a National FRM Development Committee. The ICFRE should play an important role in FRM development and certification in close cooperation and coordination with the proposed designated Authority and National / State FRM Development Committees.

The Central Government should set up a Designated Authority, a National FRM Development Committee and Regional FRM Certification Committees for FRM certification soonest possible without waiting for the supportive legislation to be enacted. The Regional Certification Committees may be located at the Regional institutes of ICFRE and would cover several States. Later, States may have their own State Certification Committees. Each State would also have an FRM Development Committee to develop the basic material and development of seed / FRM production facilities on large scale including clonal plant production nurseries, SPAs, SSOs and CSOs etc. State level FRM certification committees should also regulate the registration of FRM dealers and producers. They would also regulate registration of forest nurseries. The proposed system should be implemented with immediate effect and must not be delayed pending enactment of propose law on FRM.

We also recommend the establishment of a National Bureau for Forest Genetic Resources on the lines of NBPGR responsible for authentic seed samples of forest species, registration of seed production areas, clones and clonal gene banks, import/ export of forest seed. Clones of species like poplars, eucalyptus, acacias etc already developed by private sector or ICFRE/ State Forest Departments/ Corporations shall be registered with NBFGR based on published data related to testing of these clones. Basic germ plasm of clonal planting stock of such clones can be obtained by new registered nurseries either from NBFGR or specified approved institutions/ organizations.

Phase II is proposed for the case where the Seed Bill, 2004 now before Parliament is passed and includes in its purview forestry. In that scenario the Committees to be formed by the Central Government may be renamed as subcommittees of the Central Seed Committee. The State Seed Certification Agencies and the State Seed Committees should have adequate representation from the forestry sector. However, this arrangement can at best be termed transitory.

Phase III is proposed as the last and an enduring phase where we should have in place both a scheme of FRM certification and a law on FRM to support and regulate its implementation. There are a number of special considerations peculiar to forestry, which are district from agricultural seed and planting materials such as seed

source or provenance; reliance on species rather than varieties and hybrids; tree seed take a much longer time to mature, several months to over two years; trees being woody perennials (rather than annuals) where a generation of trees occupies land from several years to several decades etc. We, therefore, recommend a separate law for certification of FRM. The proposed law would support the certification scheme and have the following main elements.

(a) Constitution of Committees
  (i) Constitution of a National Committee on FRM to be called the Designated Authority.
  (ii) National FRM Development Committee
  (iii) State FRM Development Committee
  (iv) Regional FRM Certification Committees
  (v) State FRM Certification Committees

(b) Registration of Forest Nurseries, FRM Dealers etc.
  (i) Registration of FRM producing and processing units
  (ii) Registration of seed dealers
  (iii) Registration of forest nurseries
  (iv) Evaluation of performance of cultivars and clones e

(c) Regulation of sale of FRM

(d) FRM Testing
  (i) FRM analysts
  (ii) FRM inspection
  (iii) Authorized officers

(e) Export and Import of FRM

(f) Offences and Punishment

(g) Powers of Central Government and State Governments

(h) Setting up of National Bureau of Forest Genetic Resources

To begin with the law is proposed to be applied to only important plantation species, which would be notified by the Designated Authority. A list of species that may be notified has been included in the report. (Annexure V)