Introduction 1

Tropical tree seed handling continuously develops. Scientific research and less advanced, yet persistent practical progress bring about new knowledge and experience on tropical species. Development of new information technology, together with the more traditional writing of textbooks and technical material, bring the new information to a broader user group. Access to better technology and material has characterised many tropical countries over the past 10–15 years. Although many tropical countries are still lagging far behind in economic development, the former habit of making an uncritical parallel between tropical countries and developing/poor countries is not always valid. Progressive and resource-rich tropical countries have shown that it is possible to make well-functioning forest seed supply systems also under tropical climates. Seed research has species by species and topic by topic shown the way towards a more efficient seed handling procedure for individual species, for example in relation to storage behaviour and dormancy (Sacande et al. 2004). Technical facilities are becoming increasingly widely available, and quality is improving. Climbing equipment, storage containers, processing machines and refrigerators are examples of some equipment which can be found in most markets or specialised shops in larger towns throughout the world. Computerised seed documentation systems have revolutionised all documentation and data distribution systems. The technical facilities are thus to a large extent available to provide an efficient seed supply system.

Cheap and simple methods are still a reality in many countries and for particular user groups, and information on how to provide good quality by simple methods still has a place in the extension service. However, on central seed supply level, better equipment, better documentation systems and better distribution systems are often more subject to economic priorities rather than being beyond access, even in the so-called tropical developing countries.

The general advantage of using good quality seed has been well documented (Foster et al. 1995). Where there is a direct economic link between planting material and tree tenure, there should thus be a good incentive to use the best seed available. The incentive would normally justify a good investment in seed technology and improvement. When we can observe that the seed sector is often resource-poor and underdeveloped, and that quality of seed is far from optimal, the main reason should be sought in the lack of a link between planting material and tree harvest. Some frequently encountered constraints are:

1. The relative poverty of seed users. A large and increasing part of tree planting is done on farms and by smallholders (Simons 1997). Many smallholders are unable or hesitant to pay the extra cost for tree seed, which has been claimed, but not necessarily proved, to be of better quality.
2. Lack of a proper distribution system. For lesser-used species there may not be a source and supply at all. For more commonly planted species with improved seed supply, the bottleneck is to get seed distributed to remote areas and particularly to small end users in small quantities. In practice, most seed suppliers distribute seed within a radius of less than 50 km (Nathan 2001).
3. Poor-quality documentation. Seed quality contains a number of components and their relative importance is not always clear. Lack of research trials for most species makes documentation of genetic quality, for example for growth habit, unreliable. Documentation on origin, seed source and mother trees does contain indirect genetic information, but often a blurred concept of the 'best available', which is rather nontransparent for seed users. Since really good, documented quality is obviously expensive, the poor definition of quality obviously invites deceit. Documentation of physiological quality frequently suffers from lack of standards and outdated analyses.
4. Time span from planting to tree harvest. This is the general and ubiquitous problem of forest establishment. In terms of quality seed supply it has implications ranging from corruption and deception to insufficient means of investments in improvement means. Lack of confidence and trust in alleged improved material can almost always be referred back to the lengthy time span required from the purchase of seed or planting material until the trees have reached a reasonable size to be able to judge their growth potential. If there is no real legal procedure to get compensation if cheated, customers cannot be expected to pay for an alleged improved quality. And if customers are unwilling to pay, suppliers are unwilling to provide a better quality; this is the ubiquitous vicious cycle of tree seed supply.

The political-economic trend during the last 10–15 years in most tropical developing countries has been to reduce the public sector and strengthen market mechanisms. This has affected the forest seed sector, since this sector has traditionally been part of the public sector. Market economy necessarily implies generation of profit within a reasonable time span. Short-rotation industrial species in relatively large closed units suit market mechanisms. Long-rotation species, reforestation or supply for resource-poor people and environmental elements of forestry, such as biodiversity or watershed management, do not fit well into a purely private environment. Without an economic incentive or strong public control, the importance of species diversity and genetic quality tends to be neglected. The consequences of neglecting quality control tend to increase, as the quality of random supply gets poorer – the latter due to a general degrading of natural seed sources. The need for regulations and implementation of control systems has thus become increasingly important.

The last 10–15 years has seen a rapid development in the techniques of vegetative propagation. Although mass vegetative propagation requires a fairly high investment in propagation facilities, once it is there it has proved highly competitive with seed propagation for a number of species. Many improved varieties of trees are propagated almost exclusively by cuttings or tissue culture. Vegetative propagation does imply some risk factors compared with seed propagation in terms of genetic diversity. However, provided appropriate control can be maintained, vegetative propagated plants are a good alternative to seed, in particular for species with seed problems and where a uniform performance of a high-bred species is desired. However, although increasingly applied, vegetative propagation has not and will not replace seed propagation as the principal method of plant propagation. The genetic variation contained in seedling plants compared with vegetative propagules is a strong argument to maintain seed propagation in environmental plantings. Seed propagation will almost always be used by small and less equipped nurseries.

Further improvement of seed technology and extension of skills and experiences of seed handling is thus still relevant. It is also necessary to avoid constraints in seed technology becoming a hindrance for diversity of plantations. Far too many planting programmes stick to the ‘easy ones’ when selecting species (Fig. 1.1). Developing good seed procurement and handling techniques is a method for making potential plantation species ‘available’ for planting. Experiences have shown that overcoming seed problems can sometimes boost the use of otherwise ‘impossible’ species.

The need for diversity in planting programmes is becoming more urgent as tree resources in most tropical countries are under pressure. Conservation of gene resources, both species and variation within species, is not done alone in protected areas. Conservation by use implies that conservation becomes integrated in the reforestation programme. Seed handling is one among several approaches to promote diversity.

Rehabilitation of vast areas of deforested land is one of the major challenges of environment rehabilitation and management now and for the many years in

Fig. 1.1. Hard native wood is popular for traditional furniture manufacturing. Natural resources are heavily exploited but the species are rarely planted because they are difficult to establish from seed and are slow-growing

the future. For far too long we have observed the destruction without creating efficient countermeasures. Hillsides turned into unproductive grassland and bushland, siltation of rivers and streams, destroyed coral reefs and thousands of endangered plants and animals not only on a local scale but also on a global scale is what deforestation in sensitive areas has brought. Repairing the damage is what faces our and future generations. Seed handling is one link in the chain to help restore the environment. Though seemingly small, the link is crucial. Seed is the genetic connection between the parent generation and the offspring, and the vehicle that brings progress or recession in terms of genetic quality (Fig. 1.2). The difference between good and poor is very large. For example a poorly managed and degraded shrub may yield less than 1 m^3 of fuelwood per hectare per year – about the consumption of a household. A well-managed forest in the same place may yield 20 m^3 – or from utilising 1 ha just for fuel, the family may, with better genetic material and management, utilise only 500 m^2 (Fig. 1.3).

The supply of quality forest seed has always been subject to a well-known demand–supply problem: customers who demand quality seed but allegedly cannot get it; and suppliers who produce quality seed but claim that there are no customers. Unfortunately both parties could be right. In practice it has appeared quite difficult to make good seed supply operational on a national level containing a broad range of species and containing the best documented genetic quality. Mostly it is a price problem. Genetically improved material is expensive; and any

Fig. 1.2. The seed is the apparatus of regeneration and the vehicle of genes. The physiological quality is influenced by maturity, age and deterioration, and it is manifested by the ability to germinate. The genetic quality is influenced by the parents and crossing, and it is manifested by the growth habit

Fig. 1.3. Fuelwood is one of the most important extracts from forests. Millions of rural people rely on fuelwood as their only or principal source of household energy. As the sources are being depleted, the pressure on the remaining forests is increasing and often results in poor productivity

http://www.springer.com/978-3-540-49028-9

Tropical Forest Seed
Schmidt, L.H.
2007, XVIII, 409 p., Hardcover
ISBN: 978-3-540-49028-9