The implementation of a forest nursery accreditation policy is a major step towards improving the success of Philippine forestry. However, among the major requisites for the successful implementation of the policy are the substantial knowledge and skills of nursery operators to produce high quality seedlings and a full appreciation of tree farmers and forestry project implementers of the multiple benefits of using high quality planting stock. For this purpose, a best management practice guide for production of high quality seedlings was developed as part of the implementation of ACIAR Project ASEM/2006/091. Information and technologies from various sources were extracted, screened and collated to come up with a robust manual for smallholder-based high quality seedling production. This paper discusses the process of developing the BMP manual, presents the summary of its content and provides suggestions for further development of the material.

INTRODUCTION

The quality of planting stock is a major determinant of the success of tree farming and reforestation endeavours. According to Harrison et al. (2008), successful forest conservation and regeneration efforts require the use of reproductive materials that meet the appropriate genetic, morphological and physiological quality standards. The survival of trees, growth performance, length of rotation period and volume and quality of timber that can be harvested from a plantation are greatly influenced by the quality of seedlings used. Gregorio et al. (2009) described a high quality planting stock as that grown from germplasm material collected from superior mother trees which has undergone appropriate nursery silvicultural treatments so as to exhibit a sturdy stem, root system free from deformities, balanced root and shoot biomass, and is highly adapted to adverse growth conditions particularly full sunlight with limited soil moisture and nutrients.

The use of low quality seedlings is common in reforestation projects and tree plantations in the Philippines. A number of studies including those of Nixon et al. (2000) and Sy (2001) argued that the use of low quality planting stock is the prime reason for the limited success of reforestation efforts in the country. The forest nursery sector is characterized as having low operational effectiveness and not producing high quality forest reproductive materials (Tolentino et al. 2002; Edralin et al. 2010; Gregorio et al. 2010). This is caused by several interrelated factors, including social, economic, technical and policy factors. To improve the production and use of high quality seedlings in Philippine forestry, the ACIAR Seedling Enhancement Project (locally known as the Q-Seedling Project) was implemented in Leyte Island and Northern Mindanao. One of the major interventions of this project was the participatory formulation of the forest nursery accreditation policy and pilot testing of the system at the local level through LGUs and local DENR offices. This initiative has paved way for the implementation of a national policy on forest nursery accreditation embodied in the DAO 2010-11 ‘Revised Regulations Governing Forest Tree Seed and Seedling Production, Collection and Disposition’.
The implementation of the forest nursery accreditation policy requires seedling producers to adopt the best management practice for high quality seedling production. For this purpose, a manual of best management practice (BMP) for high quality seedling production in smallholder nurseries was developed as part of the implementation of the ACIAR Q-Seedling Project. Smallholder seedling production is the focus considering that smallholder nurseries comprise most of the nursery industry in the Philippines. This paper focuses on the development of the best management practice guide for smallholder high quality seedling production. The first section discusses the process of collating the BMP technologies and screening the technologies to fit with the characteristics of smallholder seedling producers. The succeeding sections involve the description of the main topics of the manual, the review process prior to production of the manual and the dissemination of the manual to stakeholders in pilot project sites. Suggestions to further improve the guide are also presented.

IDENTIFICATION AND COLLATION OF BMP TECHNOLOGIES

The technologies presented in the BMP guide have been drawn from various sources including printed materials (e.g. books, journals, nursery manuals and research reports), internet-based information, results of research activities of the previous ACIAR-funded projects (PN 92/08 and 96/110) at VSU, observations from seedling production practices in key Southeast Asian countries and knowledge of experts.

Desktop Research of BMP for High Quality Seedling Production

A substantial literature review was undertaken to identify technologies presented in the BMP guide. A plethora of printed materials on nursery seedling production including books, journal papers, manuals and nursery project reports from various countries were identified. Considerable information on nursery seedling production practices from the worldwide web were also reviewed. The kind of technologies presented in these sources range from very simple, requiring a low-cost nursery set-up to a more sophisticated process that requires major financial and technical inputs. Also, the technologies vary from highly effective in producing high quality seedlings to being considered as inappropriate silvicultural practices.

Inasmuch as forest nursery accreditation is geared towards the promotion of the operational effectiveness of the forest nursery sector in the Philippines, in which the smallholder nursery group is the major component, the nursery BMP guide is focussed on smallholder-based high quality seedling production. Individual technologies and pieces of information have been drawn from various sources and collated to produce the entire package of nursery silvicultural practices presented in the BMP manual. Table 1 presents a few examples of the printed materials that were used in developing the manual.

Table 1. Some of the references used in developing the BMP for smallholder high quality seedling production.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Title and information</th>
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<tbody>
<tr>
<td>Reference</td>
<td>Title and information</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>FORRU (Forest Restoration Research Unit) (2005). How to Plant a Forest: The Principles and Practice of Restoring Tropical Forests, Biology Department, Science Faculty, Chiang Mai University, Thailand.</td>
<td>Smallholder-based seedling production practices; species framework approach of reforestation.</td>
</tr>
<tr>
<td>Carter, J 1987, From Seed to Trial Establishment: a Handbook Giving Practical Guidelines in Nursery Practice and the Establishment of Simple Species and/or Provenance Trials, DFR User Series No. 2, Australian Tree Seed Centre, CSIRO Division of Forest Research.,</td>
<td>A comprehensive guide for nursery seedling production for research purposes particularly when seedlings are designed to be used for field trials. Includes information on pre-sowing treatments for some tree species, preparation of germination and potting media, potting and seedling care and maintenance.</td>
</tr>
<tr>
<td>Mulawarman, Roshetko, JM, Sasongko, SM and Irianto, D 2003, Tree seed Management, Seed Sources, Seed Collection and Seed Handling: a Field Manual for Field Workers and Farmers, International Centre for Research in Agroforestry (ICRAF) and Winrock International, Bogor, Indonesia.</td>
<td>Discusses the importance of collecting germplasm from selected sources and provides details of seed collection, processing and storage methods. Also discusses the various sources of germplasm and compares them according to the purpose of establishment, maintenance requirement and quality of seeds from each source.</td>
</tr>
<tr>
<td>DENR (Department of Environment and Natural Resources) 2004, How to Propagate Superior Quality Clones, Techno Transfer No. 23. Davao, the Philippines.</td>
<td>Presents the design of an intermediate scale clonal production facility and details of the clonal propagation (using cuttings) of some tree species.</td>
</tr>
</tbody>
</table>
Table 1. (cont.)

<table>
<thead>
<tr>
<th>Reference</th>
<th>Title and information</th>
</tr>
</thead>
</table>

Field Tours to Indonesia, Thailand and Vietnam

Field tours were made to key Southeast Asia countries, specifically Indonesia, Thailand and Vietnam, to identify features of the tree seedling production and distribution pathway that could be applied to improve the operational effectiveness of the forest nursery sector in the Philippines. These tours were undertaken as part of a broader ACIAR Seedling Enhancement Project. Several aspects were investigated during the field tours including the organisation of the forest nursery sector, the germplasm diffusion pathway and the policy environment in which the forest nursery sector is operating. In this paper, the technologies in seedling production that have been used in developing the BMP guide are given emphasis rather than making a comprehensive presentation of the observations of the field tours. The details of the observations from the field tours are reported in Mercado et al. (2010) and Harrison et al. (2010).

Nursery Silvicultural Practices in Indonesia

The seedling nursery industry in Indonesia is jointly operated by both the government and private sectors. Private seedling producers are mostly smallholders – both individuals or people organisations. The seedling production of the private sector is very similar to the seedling production practices of smallholder nursery operators in the Philippines. For example, seedlings are not sun-hardened, not placed on elevated beds allowing roots to penetrate to the ground, with the absence of grading and poor nursery maintenance as reflected by nurseries infested with weeds. However, a number of initiatives to improve the quality of forestry planting stock have been implemented in Indonesia. For example, certification of seeds, seed sources and seedlings has been practiced by the Forestry Department. Tree seed centres have been established to serve a number of functions including providing technical advice to nursery operators and tree farmers, carrying out research on seedling quality improvement, certifying genetically superior seed sources and implementing extension activities to improve tree growers’ awareness of the benefit of using high quality seedlings.

Vegetative propagation of forest tree seedlings through tissue culture has been practiced in government and some private nurseries in Indonesia. The SEAMEO-BIOTROP, Korean International Aid Cooperation Agency (KOICA) and the community-managed facility of Pundok Pesantra (a Muslim religious group) are examples of government and private groups, respectively, that have been producing tissue cultured seedlings. Tissue culture has been promoted as part of the program of the Forestry Department to support the production and use of high quality seedlings in the country. Figure 1a shows the tissue culture facilities
producing *Tectona grandis* at SEAMEO-BIOTROP and Figure 1b demonstrates the tissue culture of Pundok Pesantra.

![Figure 1a](image1a.png) ![Figure 1b](image1b.png)

**Figure 1.** The tissue culture facilities of SEAMEO-BIOTROP producing seedlings of *Tectona grandis* (a) and a laboratory worker of Pundok Pesantra carrying out a tissue culture process (b)

**Nursery Silvicultural Practices in Thailand**

Visits were made to the communal nursery of the Forest Restoration Research Unit (FORRU) of Chiang Mai University at Ban Mae Sa Mai and the nursery of the Royal Forestry Department (RFD) near Chiang Mai. FORRU has been working to reforest areas previously used for agriculture in Doi Sutep-Pui National Park near Chiang Mai, with funding support from the WWF country program and corporate partner King Power Duty Free. FORRU operates a nursery producing seedlings of a wide range of native tree species for framework plantings in the park, and has developed seedling production and forest restoration techniques from research and experimentation over 15 years. Nursery experiments include the propagation of *Ficus* trees. Figs were used for the framework species planting trial of FORRU. An important observation of the set-up was the kind of potting media used for germinating the seeds. The potted seedlings in the nursery were not placed on elevated benches but manual root pruning was carried out regularly.

The RFD nursery in Chiang Mai produces about 1 M seedlings a year, of which more than 50% are teak. The nursery practices tissue culture and seedling propagation using cuttings. The tissue cultured propagules are mainly used as sources of cuttings for the production of more seedlings (Figure 2a). The tissue cultured propagules are potted and placed in the misting chamber and recovery shed (Figure 2b) before being transferred to the transplant shed. The transplant shed has a double layer of shade cloth to reduce solar radiation by 50% (Figure 2c).

![Figure 2a](image2a.png) ![Figure 2b](image2b.png) ![Figure 2c](image2c.png)

**Figure 2.** Seedlings used as sources of cuttings for mass seedling production (a), the recovery shed (b) where newly potted tissue cultured propagules and cuttings are placed before transferring to the transplant shed (c)
Germination chambers were observed in one section of the nursery. These were made of concrete, covered with plastic sheeting and contained a germination medium of sand and soil mix at the ratio of 4:1 (Figure 3a). These are used for germinating seeds of red gum (*E. camaldulensis*), narra (*Pterocarpus indicus*), jack fruit (*Artocarpus heterophylla*), and some other tree species. It was also noted that hardened seedlings were placed on elevated beds to facilitate aerial root pruning (Figure 3b).

![Figure 3. The concrete outdoor germination beds (a) and elevated hardened seedlings (b) in the RFD nursery](image)

**Nursery Silvicultural Practices Observed in Vietnam**

Four forestry agencies and sites were visited in Vietnam, namely the Forestry University of Vietnam (VFU), the Forest Science Institute of Vietnam (FSIV), the Forest Research Centre at Phu Ninh, Phu Tho Province, and the Department of Forestry within the Ministry of Agriculture and Rural Development in Hanoi. Vietnam is implementing major programs for forest industry expansion, including the Five Million Hectare (5MH) Project, to establish 5 M ha of plantations. To ensure the use of high quality seedlings for the program, Vietnam has implemented a certification scheme for nurseries, germplasm and seedlings. The highly detailed seedling production policy is reported in the MARD (2006) document ‘Decision on Approval of the Forest Reproductive Materials Development Strategy for 2006-20’.

In Vietnam, seedlings are produced by three categories of nurseries, namely state enterprises, private enterprises and household nurseries. There is a large number of household nurseries; most are small and the quality of seedlings produced is generally low (seeds taken from unselected mother trees, seedlings placed on the ground with no spacers and the polybags covered with soil on the outside, and seedlings that are lanky because they are not sun-hardened). However, one commonly practiced technique even in smallholder seedling production is the use of a recovery chamber when cuttings are propagated. Figure 4 shows a simple recovery chamber used to grow cuttings of mangium.

![Figure 4. Low-cost recovery chamber for propagating cuttings](image)
Tissue culture and seedling propagation using cuttings is largely practiced in large-scale commercial nurseries including the VFU and research institutions FRC and FSIV. Figure 5a is an example of a eucalypt cutting that was newly potted. Cuttings are taken from the hedge garden (Figure 5b) established using germplasm from genetically superior mother trees. VFU has carried out a selection of mother trees of eucalypts and acacias using seed imported from Australia.

![Figure 5a](image1.png) ![Figure 5b](image2.png)

**Figure 5.** A eucalypt cutting (5a) used for producing a new forest reproductive material taken from the hedge garden (5b)

### DISTILLATION OF SILVICULTURAL PRACTICES FOR THE BMP MANUAL

The extensive review of literature on nursery seedling production systems, field tours to key Southeast Asian countries and the opinion of expert have provided a broad range of information on nursery seedling production. Not all practices are regarded as ‘best’, in fact, most of them are considered ‘poor’ technologies, which do not actually promote the production of high quality seedlings. The best management practices were drawn out from the pool of information. Considering that the BMP guide is designed to largely cater for the smallholder seedling producers in the Philippines, only the practices that are feasible for adoption by smallholders were included in the BMP manual. The distillation of technologies was mostly based on the socio-economic characteristics and technical capabilities of smallholder seedling producers as revealed from the results of surveys on the nursery sector including those of Tolentino et al. (2002) and Gregorio et al. (2006). Best practices requiring high financial input and a high level of nursery management skills – e.g. establishing expensive nursery infrastructure involving a sophisticated irrigation system, nursery climate control and tissue culture – were not included.

### SUMMARY OF SEEDLING PRODUCTION PRACTICES INCLUDED IN THE BMP GUIDE

The front cover page of the BMP manual for smallholder-based nursery seedling production is presented in Figure 6. The guide is composed of eight sections as listed in Table 2. It is a highly illustrated manual to clearly convey the information and ensure a high level of understanding of the content even for an audience with low educational background.
The cover page of BMP guide for the production of high quality seedlings in a smallholder-based operation

Table 2. The table of contents of the BMP manual and corresponding page numbers

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>What is seedling quality</td>
<td>3</td>
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<tr>
<td>Establishing a small-scale forest nursery</td>
<td>5</td>
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<tr>
<td>Sources of germplasm</td>
<td>10</td>
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<tr>
<td>Germplasm collection, processing and storage</td>
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<tr>
<td>Seed dormancy and pre-sowing treatments</td>
<td>19</td>
</tr>
<tr>
<td>Seed sowing and germination media</td>
<td>23</td>
</tr>
<tr>
<td>Potting media, bagging and potting</td>
<td>28</td>
</tr>
<tr>
<td>Seedling maintenance activities</td>
<td>35</td>
</tr>
<tr>
<td>References</td>
<td>43</td>
</tr>
</tbody>
</table>

The Introduction

The introduction presents the theme of the BMP guide. It highlights the importance high quality seedlings and the need to improve the supply of high quality seedlings in the Philippine forestry. A brief background of the seedling physical and genetic quality is presented. The content of the guide and sources of information are mentioned, and the purpose of developing the guide is highlighted.

What is Seedling Quality?

Seedling quality is often overlooked in tree growing because of several reasons including the farmers’ lack of information on the characteristics of a high quality seedling (Gregorio et al. 2005). This section discusses the concept of seedling quality. The factors that determine seedling quality are discussed. The importance of using high quality seedlings in tree growing is highlighted and the benefits of using high quality seedlings over low quality planting materials are enumerated. Details of the characteristics of a high quality seedling are also presented. Illustrations with labels are included to visualize the difference between
high and low quality seedlings. Figure 7 is an example of illustrations that are presented in this section.

![Image of a root system with a good taproot and fine root hairs](image1.png) ![Image of a deformed root system (J-root) with a curled taproot](image2.png)

**Figure 7. Illustrations of a root system to compare the characteristics of high and low quality seedlings**

Establishing a Small-scale Nursery

The production of high quality seedlings requires the application of appropriate silvicultural practices in the nursery. Accordingly, the nursery design virtually affects the quality of planting stock. This section discusses the design of a model nursery for smallholder high quality seedling production. The factors to consider in selecting an appropriate nursery site are enumerated and discussed. An example of a layout of nursery design is illustrated. Figures of the basic low-cost structures necessary for high quality seedling production are presented. These structures include the germination shed, potting shed, transplant shed and hardening beds (Figures 8a to 8d). The design, construction and function of each structure are discussed. Examples of basic nursery tools are also illustrated.

![Figure 8. The basic structures in smallholder nursery showing the germination shed (a), potting shed (b), transplant shed (c) and the hardening area with elevated bench (d) to promote aerial root pruning](image3.png)

**Sources of Germplasm**

The source of germplasm largely determines the germplasm genetic quality and ultimately the genetic quality of resulting seedling. Nursery surveys in the Philippines including those reported by Tolentino et al. (2002), Gregorio (2006), Gregorio et al. (2010) and Edralin et al. (2010) have been conducted to identify suitable species and varieties suitable for the local conditions. The results of these surveys helped in selecting the appropriate species and varieties for the nursery production.
Developing the BMP Guide For High Quality Seedling Production In Smallholder Nurseries

(2010) revealed that germplasm used in seedling production is almost always taken from unselected sources. With the implementation of the forest nursery accreditation policy, seedling producers are required to use germplasm from superior mother trees. This section of the BMP manual provides information about the various sources of germplasm for tree seedling production. The sources are categorised according to the purpose of establishment, seed origin, quality of mother trees, level of management required and the quality of seeds they produce. Table 3 presents the characteristics of various germplasm sources as described by Mulawarman et al. (2003).

**Table 3. The characteristics of seed sources for forest tree seedling production**

<table>
<thead>
<tr>
<th>Character</th>
<th>Seed orchard</th>
<th>Seed production area</th>
<th>Seed stand</th>
<th>Seed tree</th>
<th>Unselected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planting purpose Seed origin</td>
<td>Seed production identified</td>
<td>Not for seed production identified and unidentified</td>
<td>Not for seed production Unidentified</td>
<td>Not for seed production Unidentified</td>
<td>Not for seed production Unidentified</td>
</tr>
<tr>
<td>Quality of mother trees</td>
<td>Selected and tested trees</td>
<td>Selected stands, thinned, untested</td>
<td>Selected stands, unthinned (or thinned) untested</td>
<td>selected trees from unselected stands</td>
<td>Unselected trees from unselected stands</td>
</tr>
<tr>
<td>Seed quality Level of management</td>
<td>Very good intensive</td>
<td>Good intensive</td>
<td>Fairly good intermediate</td>
<td>Intermediate some</td>
<td>Poor none</td>
</tr>
</tbody>
</table>

**Germlasam Collection, Processing and Storage**

The genetic quality of germplasm is a function of germplasm source. However, its physical quality is influenced by the method of germplasm collection, processing and storage. The seed viability, germinative energy and even initial growth of germinants are largely affected by the way in which seeds are processed and stored. It is a common experience of nursery operators in the Philippines to waste a considerable volume of seed due to poor methods of seed processing and storing (Gregorio 2006). This section details the appropriate germplasm collection procedure for various conditions including tree height, fruit characteristics and seed size. The pros and cons of each method are elaborated. Also, the process of seed processing and handling are briefly discussed and reinforced with illustrations. Some of the illustrations to supplement the discussions are presented in Figures 9a to 9c.

![Illustration](a)  ![Illustration](b)  ![Illustration](c)

**Figure 9. Illustrations of seed collection techniques for short mother trees with fine seeds (a) and for tall trees with large seeds (b), and extraction of seed of narra (**Pterocarpus indicus**) from its leathery pulp(c)**

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Seed Dormancy and Pre-Sowing Treatments

Surveys on the forest nursery sector in the Philippines revealed that seed dormancy and pre-sowing treatments are among the least understood aspects in the production of forest reproductive materials. There is limited knowledge of seed characteristics, types of seed dormancy specific for a particular species and methods of breaking the seed dormancy to facilitate seed germination.

The concept of seed dormancy and why this needs to be overcome prior to seed sowing is discussed in this section. The types of seed dormancy are defined and the common methods of breaking seed dormancy (pre-sowing treatments) are discussed. Illustrations on how to perform the pre-sowing treatments are presented to allow readers to visualize the process. Pre-sowing treatments for commonly planted timber species are enumerated. Figures 10a to 10c show some to the pre-sowing treatments presented in the manual.

![Image](a) ![Image](b) ![Image](c)

**Figure 10.** Examples of seed pre-sowing treatments: fire treatment by burning with a thin layer of fuel (a), hot water treatment (b) and scarification (c)

Seed Sowing and Germination Media

This section discusses the seed sowing techniques based on seed size, and the recommended germination medium and process of preparing the germination mix. The recommended germination medium is a mixture of soil and sand. This mixture was selected as the best medium based on the nursery trials of various kinds of germination mediums commonly used by nursery operators (ACIAR 1998). Sterilization of the germination mix (Figure 11a) is emphasized because this is not commonly practiced by nursery operators but has benefits in controlling pathogens and preventing growth of weeds. Also, sieving of the germination mix (Figure 11b) is highlighted, considering that this is often neglected while it is an important factor in seed germination. The size of the sieve mesh in relation to seed size is indicated. The sub-irrigation method of watering (Figure 11c) is emphasized, especially for fine seed.

![Image](a) ![Image](b) ![Image](c)

**Figure 11.** Illustrations on how to sterilize the germination medium (a), how to sieve the medium after sterilization (b), and the sub-irrigation watering which is appropriate especially for germinating fine seeds including eucalypts
Developing the BMP Guide For High Quality Seedling Production In Smallholder Nurseries

Potting Media, Bagging and Potting

The kind of potting media for high quality seedling production and the appropriate method of bagging and potting are discussed in this section. The BMP guide recommends the mixture of soil, mudpress and rice hulls (3:1:1) as the best potting media because it contains a substantial amount of nutrients for plant growth, provides free drainage and aeration but also has considerable water-holding capacity to support the moisture requirement of seedlings (ACIAR 2009). The appropriate method of filling seedling containers (polybags) is demonstrated. The details of correct pricking and potting out of young seedlings are discussed. Illustrations of inappropriate transplanting technique are also presented to help the reader visualize the process. Figures 12a to 12d illustrate results of nursery potting practices with a, b and c regarded as results of wrong practices while d is the result of correct potting.

![Illustrations of results of seedling form based on how potting was undertaken](image)

Figure 12. Illustrations of results of seedling form based on how potting was undertaken

Seedling Maintenance Activities

Care of seedlings from potting up to hardening off is presented in this section. The shade requirement of seedlings after potting and the need to expose the seedlings to full sunlight (sun-hardening) before outplanting are discussed. The necessity of having optimal seedling spacing and the importance of grading the seedlings (arranging according to height) while these are on the hardening bed is explained. Also, the importance of placing seedlings on elevated beds, both for improving seedling physical quality and to reduce seedling maintenance cost due to reduced labour requirement is highlighted. Further, the need to reduce the frequency of watering and fertilizer application to promote high seedling physical quality is discussed. Illustrations of seedling maintenance practices – particularly grading and placing seedlings on elevated hardening beds – are presented in Figure 13a and 13b, respectively.

![Illustrations of grading (a) and hardening seedlings (b) by placing on elevated bench to promote aerial root pruning](image)

Figure 13. Illustrations of grading (a) and hardening seedlings (b) by placing on elevated bench to promote aerial root pruning
REFERENCES

This section provides the alphabetical list of books, manuals, reports and other sources of information that were used in developing the BMP guide.

REVIEWING THE CONTENT OF THE BMP GUIDE

The content of the BMP manual was reviewed prior to production and distribution to stakeholders. The review was essential to ensure that information presented is correct and appropriate for smallholder-based high quality seedling production. The review was undertaken by five individuals who were experts in the field of forestry particularly on nursery seedling production. Changes were made to the BMP guide after the review to incorporate the comments and suggestions of the reviewers. Only after the completion of the review was production of the manual undertaken.

PRODUCTION, DISTRIBUTION AND USE OF THE BMP GUIDE

Multiple copies of the BMP guide were printed and distributed to the LGUs and DENR offices that were directly involved in the implementation of the ACIAR Q-Seedling Project. The copies were distributed to relevant LGU staff and DENR personnel and to nursery seedling producers in pilot municipalities. The project has also disseminated copies of the manual to several participants during training events on high quality seedling production undertaken as part of the implementation of the Q-seedling project and at conferences attended by tree farmers and seedling producers. The project has carried out 13 training sessions on nursery BMP in 2009 to 2010 attended by approximately 300 key stakeholder representatives in several municipalities in Leyte and Mindanao. An electronic version of the guide has also been published by The University of Queensland and the Rainforestation Network to provide access for a wide audience to the manual. This version can be accessed at:

http://espace.library.uq.edu.au/eserv/UQ:200370/QSeedling22.pdf, and

Although assessment of the effectiveness of the BMP in improving the technical capability of seedling producers has not been carried out yet, some nurseries which are managed by training participants and have received copies of the manual, have been accredited for the production of high quality seedlings by LGUs and the DENR. This is a clear manifestation that the BMP guide and associated training sessions have been instrumental in improving the skills and knowledge of nursery seedling producers to produce high quality planting stock.

CONCLUDING COMMENTS

The implementation of a forest nursery accreditation scheme is a promising step towards improving the success of reforestation, tree farming and agroforestry initiatives in the Philippines. However, improving the technical capacity of forest nursery operators to produce high quality seedlings and promoting an appreciation of the importance of using high quality seedlings are two important requisites for the successful implementation of the policy. The guide on nursery best management practice for smallholder seedling production is a highly useful package to fulfil these requirements. The nursery industry in the Philippine is largely composed of smallholder seedling producers (private and community) and the BMP guide focuses on this large group of nursery operators. The technologies presented are simple and require only a low level of financial input, making them feasible for adoption by smallholder seedling producers.
A substantial rigour was observed in the development of the BMP manual. Accordingly, it could be considered virtually as one of the best among the nursery seeding production manuals, not only in the Philippines but also in other countries. However, although the content of the BMP was thoroughly reviewed, there is a need to assess the content of the manual on a broader scale, for example obtaining feedback from a wide range of users. This is important to further improve the manual. As technologies keep on developing, there is also a need for a regular updating of the content of the guide. Further, there is a need to publish the manual in other dialects, for example in several Filipino language versions including Bisaya, Waray and Tagalog. This will promote a much wider utilization of the manual, greater understanding of the content and a higher chance of adoption of the technologies. At present, the manual is published only in an English version.

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Tolentino, EL, Carandang, WM and Roshetko, J 2002, Evaluation of Small-holder Tree Farmers Nursery: Quality Stock Production in Support of the Tree Domestication Program of the Philippines, College of Forestry and Natural Resources. UPLB, Los Baños and ICRAF.