ITTO PROJECT PD 386/05 Rev.1(F)
TECHNOLOGICAL DEVELOPMENT FOR THE PRODUCTION OF PLANTING MATERIALS TO SUPPORT SUSTAINABLE PLANTATION OF BALI INDIGENOUS SPECIES THROUGH COMMUNITY PARTICIPATION

Seed Collection and Handling

Putat

Planchonia valida (Blume) Blume

BALI PROVINCIAL FORESTRY SERVICE
AND
REGIONAL TREE SEED CENTER FOR BALI AND NUSA TENGGARA
AND
INTERNATIONAL TROPICAL TIMBER ORGANIZATION (ITTO)

Seed Collection and Handling

Putat
Planchonia valida (Blume) Blume

Eko B.Hardiyanto

BALI PROVINCIAL FORESTRY SERVICE AND
REGIONAL TREE SEED CENTER FOR BALI AND NUSA TENGGARA AND
INTERNATIONAL TROPICAL TIMBER ORGANIZATION (ITTO)
2008

Hardiyanto, E.B. 2008. Seed Collection and Handling-
Putat (*Planchonia valida* (Blume) Blume)

Published by:
Directorate General of Land Rehabilitation and Social Forestry
Ministry of Forestry
Gedung Manggala Wanabhakti
Jl.Gatot Subroto, Senayan, Jakarta

Bali Provincial Forestry Service
Jl. Raya Puputan No.23 Niti Mandala, Renon, Denpasar
Telephone : 62 361 237039
Fax : 62 361 227819
Email : itto_pd386@yahoo.com

Regional Tree Seed Center for Bali and Nusa Tenggara
Jl. By Pass Ngurah Rai, Tuban
Telephone : 62 361 751815
Fax : 62 361 750195
Email : bpth@denpasar.wasantara.net.id

CONTENTS

FIGURES

PREFACE

Bali Province has large degraded forest and land. Around 55.313 ha of land are classified as degraded and critical. In the mean time the demand on wood in Bali, particularly wood for handicraft industry has been increasing and the local wood production is not able to meet the wood demand. Wood-based local handicraft industry is an integral part of the tourism industry of Bali, taking up around 35% of wood consumption and providing a lot of job opportunities. Concern about the sustainability of the industry due to the deterioration of the resources has been growing.

The Provincial Government of Bali has addressed the above problems by embarking on the rehabilitation program of degraded forest and land by planting trees of indigenous species. The objectives are to empower local economy and improve environmental conditions, and to meet the ever-increasing demand of wood for local handicraft industry. Six indigenous species have been identified and selected in the planting program, and included in the International Tropical Timber Organization (ITTO) Project No: 386/05 Rev.1 (F) titled "Technological Development for the Production of Planting Materials to Support Sustainable Plantation of Bali Indigenous Species through Community Participation".

The availability of good quality of seeds and planting stocks as well as proper planting techniques have been identified as some of the many factors crucial for the success of planting program. This guideline is intended to provide information on seed collection and handling of *Planchonia valida* (Blume) Blume. The preparation of the guideline is part of the above ITTO Project and therefore the guideline is written heavily based upon the research findings generated from the same project and other experiences relevant to the subject.

The author hopes that the guideline will be useful for and benefit organizations or farmers involved in tree planting.

In this opportunity I would like to acknowledge the following individuals for their invaluable contribution to the preparation of the guideline:

- Ir. Made Sulendra, the Head of Bali Provincial Forestry Service;
- Ir. Kamboya M. For, the Head of Bali and Nusa Tenggara Forest Seed Center;
- Ir. Magdalena Hehakaya M.Si, the Project Manager of the International Tropical Timber Organization (ITTO) Project No: PD 386/05 Rev. 1 (F);
- Ir. Djoko Iriantono, M.Sc, Ir. Suratman, M.Si, Ir. Laksmi Pratiwi, Putu Darwika, Drs. I Wayan Kawit and other technical staff not mentioned here at the Bali and Nusa Tenggara Forest Seed Center.

Eko Bhakti Hardiyanto
Tree Breeder and Silviculturist

Planchonia valida (Blume) Blume
Seed Collection and Handling

Taxonomy and Nomenclature
Family : Lecythidaceae
Vernacular/common name: darah (Karo), putat (Sunda), putat, putat kebo, putat penggung, putat resek (Java), butat (Madura), putat, kutat (Bali).

Natural Distribution and Habitat
The natural occurrence of *P. valida* includes Malaysia, Sumatra, Kalimantan, Java, Sulawesi and Lesser Sunda Islands (Bali, Lombok, Sumba, Sumbawa, Komodo and Timor).
The species is widely found humid areas, along river banks or on alluvial plain and ridges at altitudes ranging between 0 to 1,000 m, with a mean annual rainfall ranging from 1,100 mm to 3,800 mm and 2-5 months of dry period. It grows on a wide range of soil: alluvial, latosol, and volcanic soil, with soil reaction ranging from acid to basic.

Uses
The wood is hard and heavy, usually used for house construction, flooring, wall panel and tool holders. The wood is also for fuelwood. *P. valida* has been recommended as a substitute for teak in very humid areas (but not in waterlogged and swampy areas). Leaf and young shoot are edible, used for vegetable by steaming.

Planchonia valida tree

Botanical Features
P. valida is a big-size tree up to 50 m in height and 150 cm in diameter. The bole is straight like pillar and the branch can spread up to 20 m long. The species sheds its leaves in the dry season. When the stem wood is sawn axially, its bark surface is slightly cracked. The bark color varies from brownish grey to dark brown. Inner part of the wood ranges from pink to reddish orange. The leaf is arranged spirally, clustered at the twig terminal.

Phenology
The flowers are clustered, big in size with large carpels, have 4 sepals and 4 petals, many pollen grains, bloom at night. Pollination is by bat. Flowering period is in February-March and fruiting period in April-May.

Flower of *Planchonia valida*

Fruits of *Planchonia valida*

Fruit and Seed

The fruit is oblong with hard carpels on the fruit head, fibrous, comprises of 1-4 locules. The fruit contains up to 10 seeds. The seed is round, toothed margin, epigeous type of germination, long hypocotyl.

Fruits and seeds of *Planchonia valida*

Seed Collection

P. valida usually sheds its leaves in December-February, the color of mature leaves becomes reddish. New leaves and flowers appear in February – March and the fruit ripens in April-May. Matured fruits have brownish green skin. Lately in Bali the flowering season has changed; the trees start flowering in August and the fruit is ripe in November-December. Fruits are collected by climbing the standing tree and picking the fruit directly or using a pole mounted with hook. Collected fruits are put in cotton or gunny bags.

Fruits are ready to be extracted

Seed Handling

Seeds are extracted from the fruit and rinsed with clean tap water several times. The clean seeds are ready for sowing.

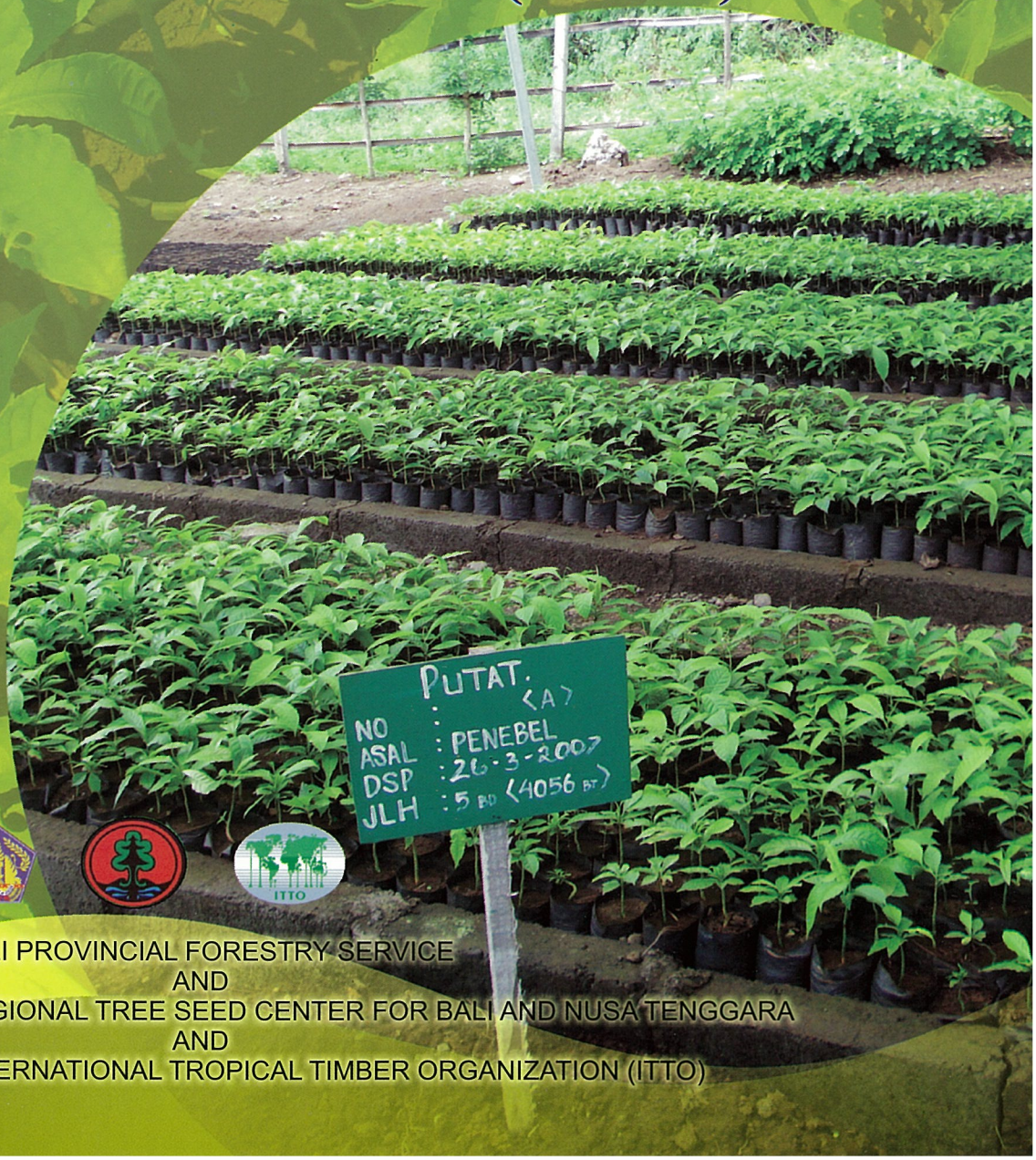
Secretariat:
BALI PROVINCIAL FORESTRY SERVICE
Jl. Raya Puputan No. 23 Renon Denpasar - Bali
Telp.: 62 361 237 039
Fax.: 62 361 227 819
email: itto_pd386@yahoo.com

ITTO PROJECT PD 386/05 Rev.1(F)
TECHNOLOGICAL DEVELOPMENT FOR THE PRODUCTION OF PLANTING MATERIALS TO SUPPORT SUSTAINABLE PLANTATION OF BALI INDIGENOUS SPECIES THROUGH COMMUNITY PARTICIPATION

Nursery and Planting

Putat

Planchonia valida (Blume) Blume



BALI PROVINCIAL FORESTRY SERVICE
AND
REGIONAL TREE SEED CENTER FOR BALI AND NUSA TENGGARA
AND
INTERNATIONAL TROPICAL TIMBER ORGANIZATION (ITTO)

Nursery and Planting

Putat

Planchonia valida (Blume) Blume

Eko B. Hardiyanto

BALI PROVINCIAL FORESTRY SERVICE AND
REGIONAL TREE SEED CENTER FOR BALI AND NUSA TENGGARA AND
INTERNATIONAL TROPICAL TIMBER ORGANIZATION (ITTO)
2008

Hardiyanto, E.B. 2008. Nursery and Planting-
Putat (*Planchonia valida* (Blume) Blume)

Published by:
Directorate General of Land Rehabilitation and Social Forestry
Ministry of Forestry
Gedung Manggala Wanabhakti
Jl.Gatot Subroto, Senayan, Jakarta

Bali Provincial Forestry Service
Jl. Raya Puputan No.23 Niti Mandala, Renon, Denpasar
Telephone : 62 361 237039
Fax : 62 361 227819
Email : itto_pd386@yahoo.com

Regional Tree Seed Center for Bali and Nusa Tenggara
Jl. By Pass Ngurah Rai, Tuban
Telephone : 62 361 751815
Fax : 62 361 750195
Email : bpth@denpasar.wasantara.net.id

CONTENTS

FIGURES

PREFACE

Bali Province has large degraded forest and land. Around 55.313 ha of land are classified as degraded and critical. In the mean time the demand on wood in Bali, particularly wood for handicraft industry has been increasing and the local wood production is not able to meet the wood demand. Wood-based local handicraft industry is an integral part of the tourism industry of Bali, taking up around 35% of wood consumption and providing a lot of job opportunities. Concern about the sustainability of the industry due to the deterioration of the resources has been growing.

The Provincial Government of Bali has addressed the above problems by embarking on the rehabilitation program of degraded forest and land by planting trees of indigenous species. The objectives are to empower local economy and improve environmental conditions, and to meet the ever-increasing demand of wood for local handicraft industry. Six indigenous species have been identified and selected in the planting program, and included in the International Tropical Timber Organization (ITTO) Project No: 386/05 Rev.1 (F) titled "Technological Development for the Production of Planting Materials to Support Sustainable Plantation of Bali Indigenous Species through Community Participation".

The availability of good quality of seeds and planting stocks as well as proper planting techniques have been identified as some of the many factors crucial for the success of tree planting program. This guideline is intended to provide information on nursery and planting *Planchonia valida* (Blume) Blume. The preparation of the guideline is part of the above ITTO Project and therefore the guideline is written heavily based upon the research findings generated from the same project and other experiences relevant to the subject.

The author hopes that the guideline will be useful for and benefit organizations or farmers involved in tree planting.

In this opportunity I would like to acknowledge the following individuals for their invaluable contribution to the preparation of the guideline:

- Ir. Made Sulendra, the Head of Bali Provincial Forestry Service;
- Ir. Kamboya M. For, the Head of Bali and Nusa Tenggara Forest Seed Center;
- Ir. Magdalena Hehakaya M.Si, the Project Manager of the International Tropical Timber Organization (ITTO) Project No: PD 386/05 Rev. 1 (F);
- Ir. Djoko Iriantono, M.Sc, Ir. Suratman, M.Si, Ir. Laksmi Pratiwi, Putu Darwika, Drs. I Wayan Kawit and other technical staff not mentioned here at the Bali and Nusa Tenggara Forest Seed Center.

Eko Bhakti Hardiyanto
Tree Breeder and Silviculturist

Planchonia valida (Blume) Blume
Nursery and Planting

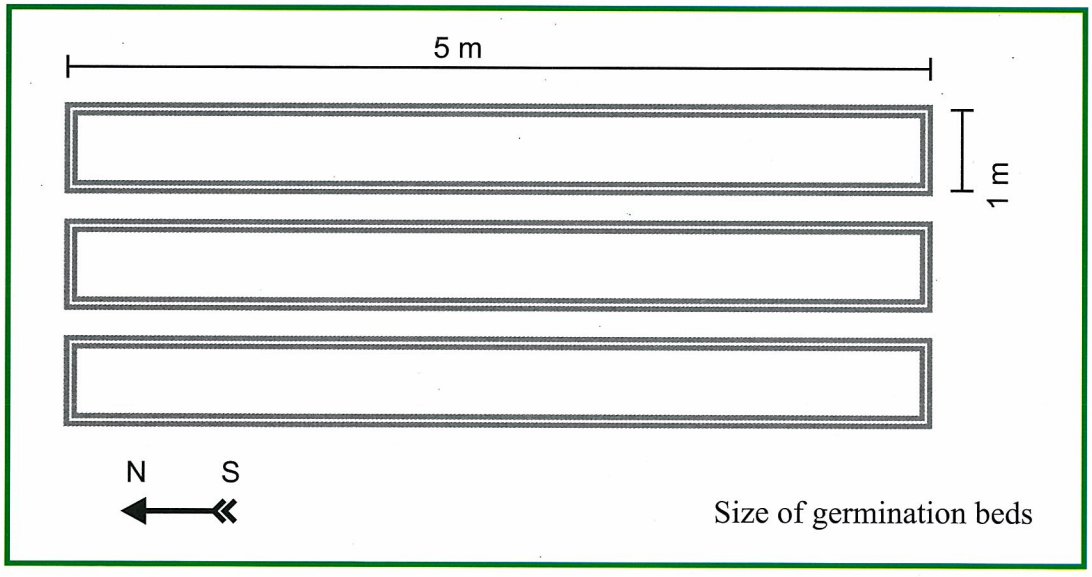
Site Selection of Nursery

The nursery site should be selected based on the followings:

a. Near the planting area to improve survival due to less damage during transport between the nursery and field.
b. Good accessibility to and within nursery.
c. Good topography (flat or gently slope) to make easy work. Low areas should be avoided as these will collect water at the low point and inhibit proper growth.
d. An ample, reliable and consistent water sources must be located nearby.
e. Workable soil.
f. Sufficient size to accommodate the number of seedlings needed to be raised.
g. Relatively easy to find workers.

Germination Bed

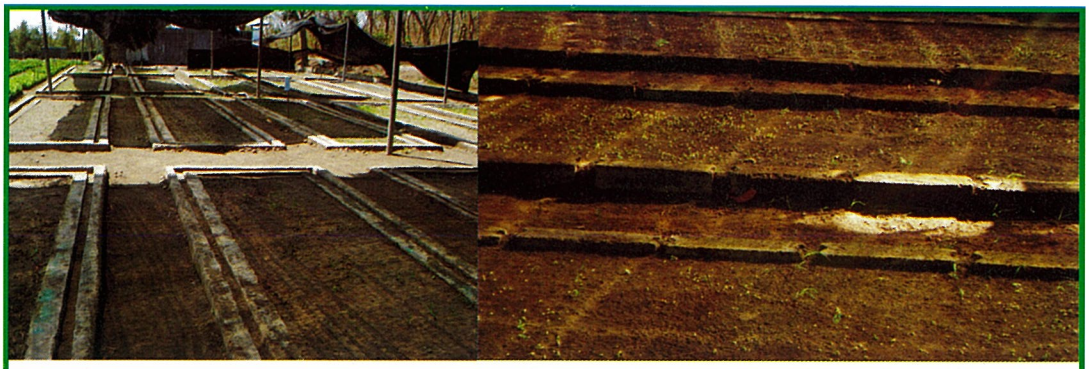
Germination bed with the size of 1 x 5 m may be prepared using brick, piece of wood or bamboo at the edge of the bed. Sowing media consist of fine sand. The media are put in the seed bed to a depth of about 15 cm. The surface of the media is leveled off to make easy for pricking and to prevent the root of seedling from damage during pricking. To reduce sun light the seed bed is put under shade using nylon net or coconut leaf (light intensity of 50 %).



Size of germination beds

Seed Sowing

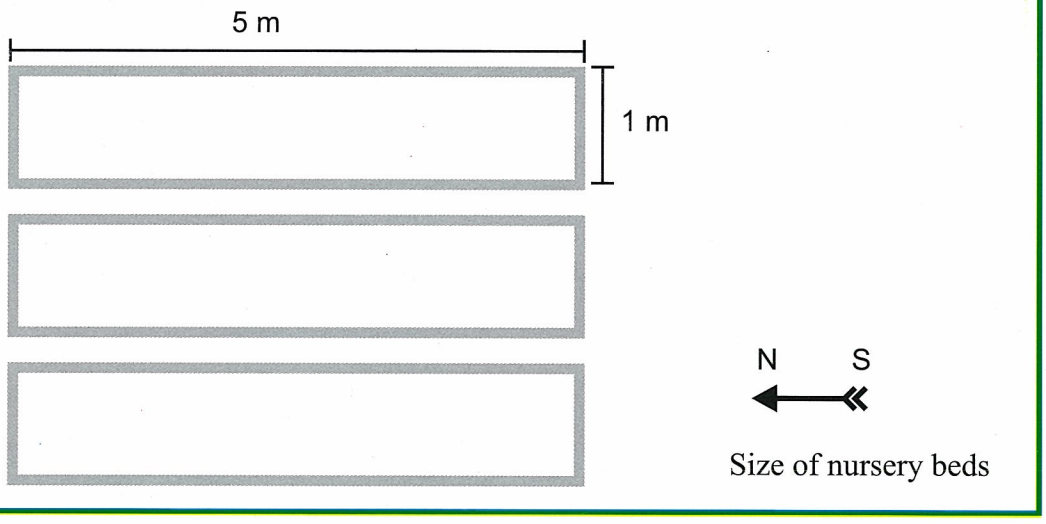
The seed of *P. valida* should be sown immediately after seed collection to maintain high germination capacity due to its recalcitrant nature. The seed is sown in the germinating media one by one with its hilum at the bottom side, and then covered with fine sand, ash or soil, 1 cm thick. Germination normally starts at the second week after sowing.



Germination beds | Start to germinate in the germination bed

Nursery Bed

Nursery bed is made of concrete, brick or bamboo (arranged in north-south direction) with a size of 1 x 5 m. The polybag previously filled with media is then put in the nursery bed. To reduce sun light the nursery is put under shade using nylon net or coconut leaf (light intensity of 50 %).



Size of nursery beds

Nursery beds

Potting media

Potting media consisting of a mixture of top soil and compost/ manure with a ratio of 8:2. The media should be mixed thoroughly before being filled into polybag. The potting medium is filled manually by hand into the polybag with adequate density so that the filled polybag can be raised firmly. The polybags that already filled with media are placed in the nursery bed.

Filling the potting media into polybag

Planting the seedling into polybag

Pricking Out

Pricking out should be done when the seedling grows vertically. Pricking should be done in the morning or late afternoon. The seedlings are pulled gently to prevent from damage and their roots are then slightly soaked into water in a plastic box. A vertical hole is made in the potting media to which the seedling will be planted using a bamboo stick. The root is then placed carefully into the hole so that it is not twisted. The seedlings are placed under partial shade (50 % light intensity) made of nylon net.

Maintenance

Seedling maintenance includes weed control, pest and disease control and watering. Watering is regularly done, 1-2 times a day. Dead seedling should be replaced immediately. To obtain high quality at 15 days old the seedling are fertilized with leaf fertilizer. In addition the seedlings are fertilized NPK (15:15:15) at a rate of 10 g/l of water/m^2 of nursery bed given every week up to age of 5 months.

Weed control

Watering in nursery beds

Afterwards, seedling needs hardening off to make the stem lignified. During hardening off phase the frequency of watering is reduced, and fertilizer is no longer applied. Seedlings with woody stem will be more robust to be transported and planted in the field. At 2 month of age the shade is progressively open as *P. valida* seedlings grow better under full sun light. Seedlings are ready to be planted in the field at about 6 months old, having a height of 35-40 cm and root collar diameter of more than 4 mm.

Transportation

Seedling transportation should be carried out carefully as the young seedlings are delicate and prone to damage. To have high survival and optimal growth the following procedures should be taken:

a. Ideally seedling should be planted in the same day as it is transported from the nursery;
b. During transport extra care to the seedling should be taken, avoiding damage and direct exposure to sunlight;
c. If delay of planting is likely special treatment is required as follows:
   - store the seedling in a cool place and out of the direct sun at all times;
   - never let the root dry out, sprinkle them with water when necessary.

Planting Site

P. valida can be grown at low land up to 1,000 m altitude, with a mean annual rainfall ranging between 1,100 to 3,800 mm and 2-5 months of dry period. It can be planted on various soil types such as latosol and alluvial.

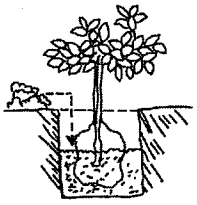
Planting

Normally seedlings are ready to be outplanted when they age 6 months old, 35-40 cm in height, more than 4 mm in root collar diameter and have 8 leaves. *P. valida* may be planted in forest and farm lands or wood yard. The initial spacing varies depending on the planting objectives: 3 x 3 m, 3 x 4 m, 3 x 5 or 4 x 5 m. In an agroforestry system trees may be spaced accordingly based upon the available space, or trees may be planted in the form of fence planting. In this regard trees can be spaced 4-5 m apart.

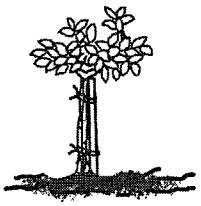
a. Site preparation
   Site should be prepared accordingly to achieve a reasonable success in terms of survival and growth. Site preparation includes the followings:
   - Clearing weed and other unwanted vegetation;
   - Improving physical soil properties;
   - Marking out the planting spots with sticks and preparing the planting holes (40 x 40 x 40 cm). It is recommended to fill the planting hole with decomposed manure or organic compost at a rate of 3 kg per hole;
   - Transporting seedling to the planting spots.

Planting procedures

Prepare planting hole (40x40x40 cm)



Tear the polybag and plant carefully



Provide a stick for support

b. Planting

The following planting procedures should be undertaken:

- Tear the polybag carefully, make sure that the soil media are not broken. When there are cracks in the polybag, press the polybag with hand slowly so as to remake the soil media firm. Avoid root twisted when planting since this will reduce tree growth or cause tree death in later years.
- Place seedling root down to the bottom of the planting hole carefully and hold the stem, push the soil into the planting hole until it is well filled up to the root collar.
- Pack the soils tightly around the tree roots with sole of the boots so that no air pockets are left near the tree roots. The air pocket may be filled with water which can cause seedling death due to lack of air for root.
- Carry out planting at the early rainy season if possible when the soil has enough moisture.
- Prepare additional seedling (about 10 % of the total seedling planted) for blanking. Replace the death trees with new seedlings immediately soon after planting.

Maintenance

Trees are fertilized using Urea (30-50 g/tree), applied one months after planting. The fertilizer is placed at furrow or holes at a depth of 10 cm, about 15 cm from the tree. Second fertilizer application is done at 4-6 months old with Urea at a rate of 100 g/tree.

Weed control is carried out by clearing weed around the trees. It is done until the trees are capable of competing and suppressing the weed.

Trees may have multiple stems, or forked branches starting at very low part of the stem. Multiple stems should be reduced to only single stem to improve stem form and quality. This operation is called singling. Singling is done by removing poor stems and leaving only one best stem. Singling should be done at early growth phase of trees when trees start showing multiple stems.

To increase wood quality, pruning needs also be carried out. Big branches not easily self-pruned should be pruned, otherwise the log quality will be poor.

Secretariat:
BALI PROVINCIAL FORESTRY SERVICE
Jl. Raya Puputan No. 23 Renon Denpasar - Bali
Telp.: 62 361 237 039
Fax.: 62 361 227 819
email: itto_pd386@yahoo.com