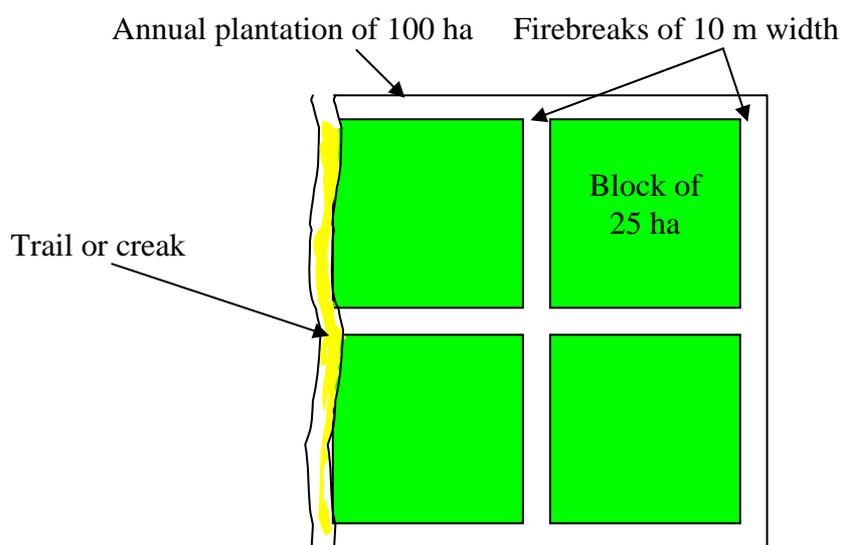


Appendix 5: Tending the Plantation

1. Protection Against Fire

The establishment of firebreaks is necessary. It should be included in planning from the early stages. In establishment of firebreaks, the plantation should be divided into blocks. Different planting sites can have different block sizes. The block should not be too small because it would need more area. However, it should not be too big because it cannot prevent the fire effectively. The optimum size of a block recommended by the Forestry Administration is 25 ha. These blocks are separated from each other by firebreaks. Firebreaks can be trails, clear strips of land, creaks, and green vegetation strips.



1.1 Firebreak Width

It is hard to say how wide a firebreak should be. Recommendations range from 6m to more than 30m. Even very wide firebreaks may be crossed by fires, but are difficult to maintain. It is important to use existing and natural firebreaks where possible, and to make “green” firebreaks (see below) multi-purpose and productive. Firebreaks running across the slope (on the contour) should be wider than firebreaks running up and down the slope (vertically), because fire can easily jump uphill.

1.2 Firebreak Types

Natural firebreaks include streams, rivers, rocky outcrops, and gullies. Existing man-made firebreaks include roads, trails and rice paddies.

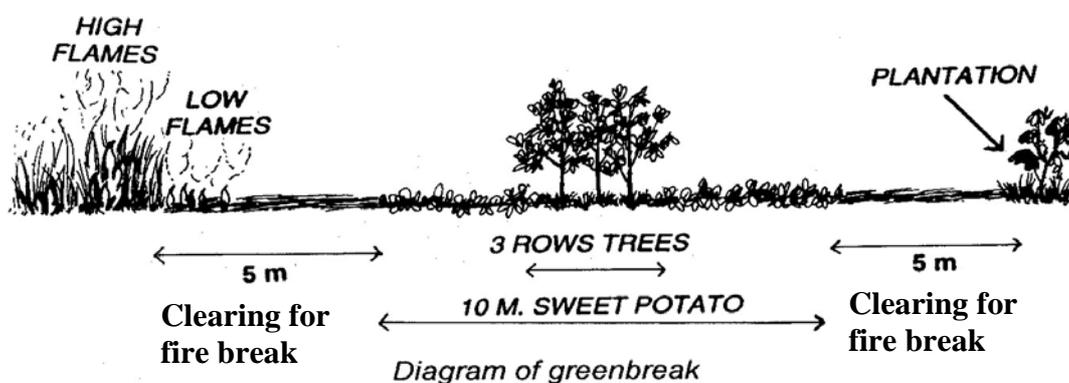
Use existing natural or man-made firebreaks and widen them where necessary. Existing greenbreaks include forest and agricultural areas, especially moist gallery forests.

Remove dead plant material and flammable plants along the edge of existing forests and shrublands, to make them more effective firebreaks.

Live firebreaks or greenbreaks: Plant trees at a close spacing (such as 1m x 1m) to achieve rapid crown closure and early suppression of the *Imperata*. Tree species that have been used

as live firebreak plantations include *Leucaena leucocephala* (kathomthet), *Schima wallichii*(Phaong), *Syzygium cumini*(Pring), and *Vitex pubescens* (Popoul).

Flames in the greenbreak
get smaller or go out



Source: Kathleen et al, 1999.

Multipurpose firebreaks. Incorporate food or wood production in firebreaks where possible.

Clean firebreaks are areas where vegetation has been completely removed by slashing or cultivation. This approach is not recommended for a permanent firebreak because it requires much labour, and is unproductive.

Slash or cultivate *Imperata* again before the regrowth begins to dry or turn brown (before it becomes flammable).

2. Weeding*

Weed control in the plantation involves two operations: suppression of weeds, which means to cut down the weeds from the planted saplings; and weed elimination which requires removals of weeds along with their roots. Weeding should be done within a radius of 1 m around the seedling. Target those weeds that smother or damage seedlings. Other growth should be considered harmless and be retained for microclimatic reasons. Weeds may be controlled by the following methods:

2.1 Mechanical Method (weeding by hand or using simple tools)

Where labour is inexpensive and easily available; weeds can be removed by hand. Weeds can also be cut off or slashed with a knife, sickle, or long machete, at ground level. Many farmers prefer to dig weeds out of the soil using a hoe. This method can be carried out by cutting of weeds in strips.

2.2 Biological Method

The use of suitable cover crops, maintenance of proper stand density, use of suitable degree of grazing and use of insect pests which may feed on weeds should be tried in their eradication.

(*):This element was extracted and modified from Forestry / Fuelwood Research and Development Project.1994.

2.3 Frequency of Weeding

Weeds should be removed before they flower and shed their seed. The first 6 to 8 months after the seedlings have been planted are important. During the first year of planting, weeding should be done every 6 months. This weeding regime should continue until the tree canopies start to close together. Once that happens, their shade will inhibit the growth of most weeds.

3. Soil Working

Soil working improves infiltration rate, removes compaction, improves soil aeration, reduces water loss from the soil, improves soil structure, checks the growth of weeds and improves the general hygiene of the area. Soil working is useful during the initial years of plantations. It is generally recommended around plants to a radius of about 50 cm. Soil working can be done manually or mechanically.

4. Mulching

Mulching is becoming more widely used to control weeds. The main idea of mulching is to prevent sunlight from reaching the weeds so that they will not grow. Many types of material can be used as mulch, including green manure, straw, sawdust, woodchip or bark. Plastic sheeting or stones can also be used as light and moisture barriers.

The beneficial effect of mulches are: (i) conservation of moisture by decreasing run off and evaporation, and increasing the infiltration rate, (ii) prevention of soil erosion, (iii) providing thermal insulation, (iv) maintenance of soil structure by reducing the effect of rain drops, (v) increasing microbial population, (vi) improvement of physio-chemical property of surface soil and (vii) decreasing weed growth. Thus soil mulches keep the surface layer of soil cooler, moist and more permeable to water.

5. Fertilizing and Manuring

Fertilizing is not a standard practice in large scale-plantations. For forestry purposes the combination of 12:12:12 (this formula indicates nitrogen : phosphorus : potassium respectively) is recommended. Urea can be given during watering or just before rainfall. In each case about 10 -20 g of urea should be spread around the plant and covered with soil (Siyag, 1998).

The fertilizer is to be applied individually, not broadcast, in a ring shape at least 30 cm from the stem. Application of fertilizer too close to the stem can damage the seedlings, or even kill them. At least two applications are necessary, during the wet season.

Manure is always preferable to fertilizer. A well-composted, decomposed mix of cowdung and litter or farm waste, can be used effectively. Manure should be applied once a year.

Application of chemical fertilizers and manure will no longer be necessary once the seedling reaches three years of age.

6. Thinning*

Thinning consists of felling individual trees. This method is often used in an immature stand to improve the growth of remaining trees. Thinning is necessary only when the trees are grown to produce sawn timber, veneer, or large poles. It is not required if the trees are being grown to produce the highest possible volume of small-diameter branches such as for pulpwood.

Thinning usually involves selecting and removing the poorest trees. The remaining trees will grow faster because competition for light, moisture, and soil nutrients will be less.

Thinning helps to (i) improve the health of the crop by removing dead, dying and diseased trees; (ii) salvage anticipated losses of the merchantable volume; assure the best physical conditions of growth; obtain the desired crop; improve stand composition, regeneration and protection; and improve wood quality. Some methods of thinning are recommended below:

Row/strip thinning: When labour is scarce or when using mechanized logging operations, the first thinning generally consists of felling every third row, leaving the other two rows completely untouched.

Selection thinning: This consists of removing diseased or pest-infested individual trees, as well as dead or dying trees. It also involves removing genetically inferior trees and plants so they will not compete with superior trees.

Mechanical: This can be done with a bulldozer or a tractor pulling a disc harrow in alternate strips. This method is applied in uniform block plantations of trees.

Stick thinning: This method is sometimes used in natural stands. It consists of walking through the stand carrying a stick of desired length. Wherever the stick touches two trees simultaneously, the inferior tree is removed. The spacing that results averages about 1.5 times the length of the stick. To thin a stand to approximately 3m spacing, use a stick 2m long.

(*):This element was extracted and modified from Forestry / Fuelwood Research and Development Project.1994.