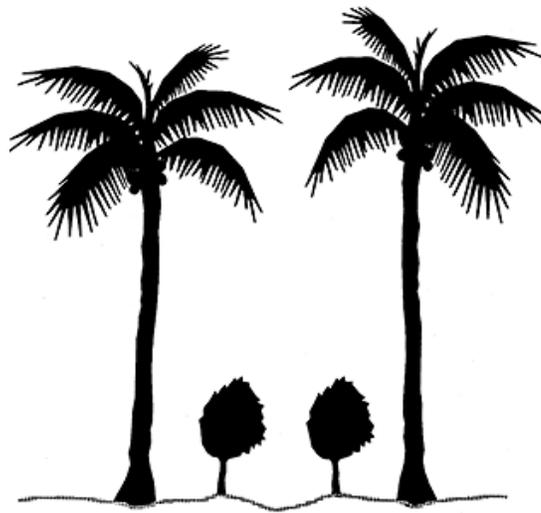


Project ALA – 97/68



A GUIDE TO INTERCROPPING COCONUTS



Prepared for the
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INTERCROPPING COCONUTS

RATIONALE

Mono-cropping coconuts provides very low incomes for upland farmers even with an optimum planting density. However, there is a large area of land beneath the canopy of coconut plantations available for the farmer to use (Fig. 1). Weeds growing beneath the palms compete for moisture and nutrients and decrease yields. Diversifying the farming system by intercropping cash crops, such as cacao, coffee, banana, pineapple etc. and changing to multi-storied cropping systems, can generate much higher returns.

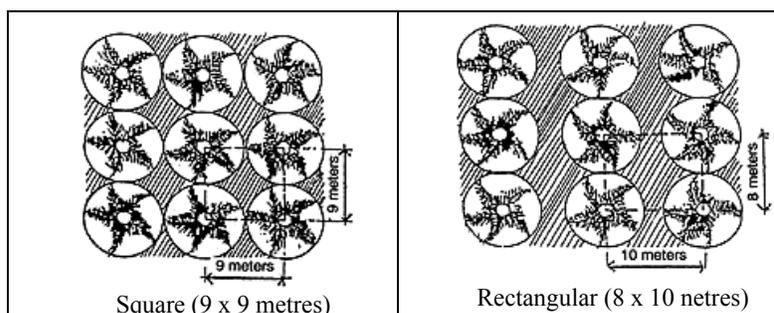


Fig. 1 Schematic planting layouts showing spaces available for intercropping*

PRINCIPLES

Intercropping takes advantage of the nature of the coconut tree's canopy of fronds, and its rooting system (see Fig. 2):

- On average, 56% of solar radiation reaches the ground, although this varies with the age of the coconut stand, its planting density, and its alignment. As Figure 1 indicates, a rectangular system, aligned in a n E-W direction, allows more sunlight to reach the alleys between the rows of trees.
- Over 80% of the active roots occur in the 25–60 cm soil layer in a 2 m radius around the palm, leaving 70-75% of the soil available for use by other crops.

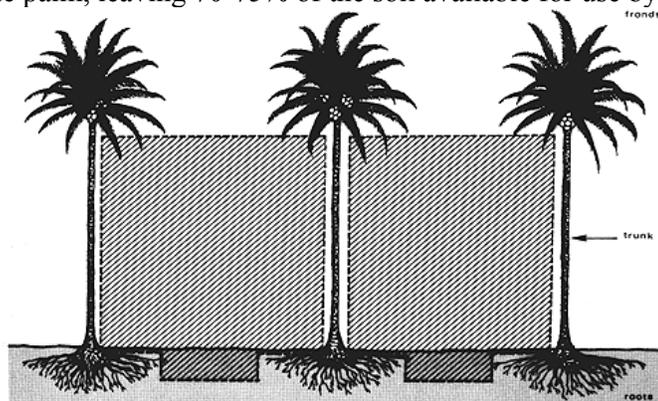


Fig. 2 Indication of the area available for intercropping under a coconut stand*

Intercropping with perennial, short-term, or cover crops rarely affects the yield or growth of the coconut crop adversely. Practices such as weeding and fertilising the intercrops may also increase coconut yields. Fallen coconuts are easier to recover in a clean understory. With widely spaced coconuts, i.e. above 7.6 m, intercropping is possible irrespective of the age of the palms. However, closely spaced palms, aged 8-25 years, are generally not suitable for inter- and mixed cropping. Mature plantations over 25 years old allow sufficient light to enter the understory making conditions suitable for underplanting.

* From: Reynolds, S.G. 1988. *Pastures and cattle under coconuts*. FAO Plant Production and Protection Paper 91. Rome: FAO

PRACTICES

1) Spacing

The extension worker and farmer will have to work with the spacing and alignment in established coconut plantations. When laying out a new plantation or fruit orchard ensure to align the alleys E-W. Triangular spacing may help facilitate this.

Points to remember are:

- Rectangular spacing gives greater potential for intercropping with light demanding trees (see Fig. 1).
- Planting coconuts in avenues or hedges, with the wider rows oriented E-W (e.g. 10×5 m, 12×5 m, 15×5 m), gives sufficient sunlight for the intercrops. A spacing of 12×5 m gives 160 palms/ha.

2) Alignment

- Determine the direction of East and West by using a compass. If no compass is available, an approximate direction can be gained from the position of the rising and setting sun, or the direction of one's shadow.
- If the alleys between rows of coconuts are aligned E-W, plant light-demanding species in the alleys, and shade-tolerant plants in the lines of the coconut trees.
- Plant the intercrops far enough away from the coconut trees so their roots do not overlap. A staggered layout may be needed to maintain optimum spacings (see Figure 3). The spacing of the palms determines the number of lines of intercrops.

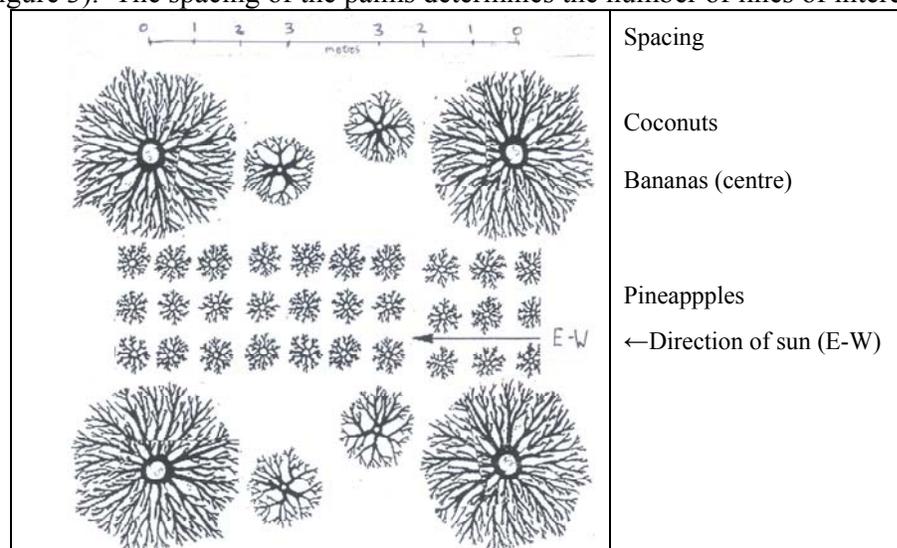


Fig. 3 Representation of horizontal root distribution of pineapple and banana with coconut[#]

3) Management practices

a) Zero Tillage

Zero tillage and heavy mulching should be practised when intercropping coconut plantations on steep slopes. On flatter areas, tillage operations such as ploughing and

[#] Adapted from: Nelliath, E.V., Bavappa, K.V., Nair, P.V.R. (1974). Multi-storied cropping, a new dimension in multiple cropping for coconut plantations. *World Crops* 26(6), 262–266.

hoeing should not be done within two metres of the base of the tree to avoid damaging the coconut root system lying close to the surface.

b) Mulching

Clean weeding and spraying with herbicide can result in yield increases from 10–47 nuts per palm per year, but should be restricted to slopes of 0-12%, to prevent erosion. On sloping land, reduce the coconut palms' demand for soil moisture by regularly cutting down the weeds and shrubs and applying them, along with fallen coconut leaves, as mulch around the trees. Mulch the pineapple and fruit tree intercrops to reduce competition for scarce soil moisture.



Photo 1. Coconut tree mulched 2-metres around base

4) Some advantages and disadvantages of intercropping coconuts.

Advantages:

- Increased and diversified farm income.
- Reduced dependence upon coconut products with unstable market prices.
- Improved growth and yields of coconut palms and ease in finding the fallen nuts due to management of intercrop through weed control, use of fertilizers, etc.
- Intercropped plants such as bananas and pineapples provide income in the short-term, as it takes young palms six or seven years to produce economic yields.
- Better use of good quality land located close to settlements.
- Canopy lowers air temperatures by 4–6°C lower and gives higher air relative humidity. These reduce evaporation from the soil and lower crop transpiration rates maintaining higher level of soil water availability for intercrops..

Disadvantages

- Competition between intercrops and coconut, for water or plant nutrients.
- Intercrops may incur losses to farmer if planted where light is insufficient.
- Intercrops may harbour diseases or attract pests harmful to coconuts.
- Fertilisers needed for intercropping may not be affordable.
- Tillage for intercrops may damage shallow-rooted palms reducing copra yields.
- The growth habit of some intercrops may cause difficulty in harvesting coconuts.
- Intercropping demands a higher level of skill from the farmer.