

A. COMMON PROBLEMS ASSOCIATED WITH CLEARING OF PROTECTION FOREST



Clearing of protection forest poses threats to watershed functions:

- Less litter and soil organic matter leads to reduced infiltration and water holding capacity.
- Increased runoff water amount and velocity can cause floods and increased erosion.
- High risk of declining water quality of streams and rivers.



On steep slopes the newly opened forest land is prone to erosion and a rapidly declining productivity.



After establishing coffee, farmers normally weed intensively (once every month) especially if the coffee price is high. This practice exposes soil surface to raindrops and increases the erosion risk.

AGROFORESTRY/SOIL CONSERVATION TECHNOLOGY OPTIONS FOR COFFEE BASED FARMING IN SUMBERJAYA

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B. KNOWN OPTIONS FOR CONSERVATION



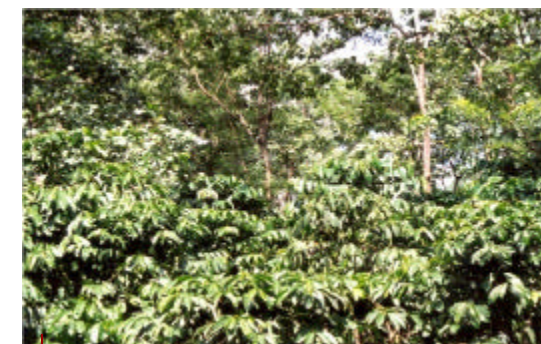
- 1. Infiltration pit (rorak, lobang angin)**
Infiltration pits increase infiltration and hence reduce runoff and erosion. Farmers perceive this as a means to prevent plant litter and fertilizer from being washed away and thus improve coffee growth.



- 3. Grass strips (reduced weeding)**
Reduced weeding requires less labor by skipping the weeding on 30-cm wide strips along contour lines between coffee rows. If properly created and after the strips stabilize, the natural grass strips can serve as sediment filter during erosion process. A current practice, however, is to scrape the entire soil surface and pile up the plant residues and some soil along coffee rows.

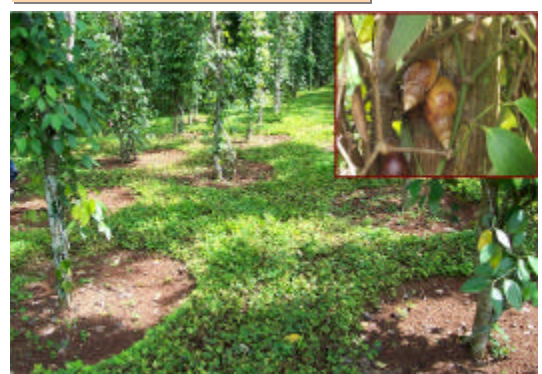


- 2. Ridging (gulud)**
Ridges increase infiltration, reduce erosion and lateral nutrient transport. Farmers dump plant residues and coffee litter in the furrows which stimulates soil biota.



- 4. The multistrata as a superior system because:**
 - The system consists of several tree crops (stink bean, locus bean, avocado, candle nut, etc.), which give good protection to soil. In its mature form it looks like a secondary forest.
 - The diversified yield serves as a buffer to farmers' income when coffee prices are low.

C. OPTIONS REQUIRING FURTHER VERIFICATION

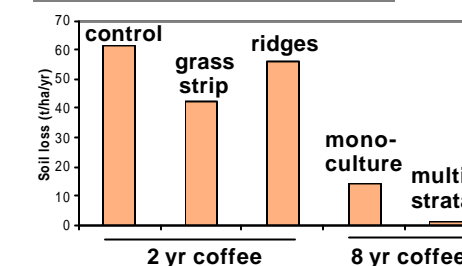


Cover crop and ring weeding system.

This system is practiced in pepper plantations in North Lampung district. A low, creeping legume, *Arachis pinto*, is used as cover crop and functions as a filter against erosion. The symbiosis of this legume with *Rhizobium*, can fix nitrogen from the air and this nitrogen can later on be used by pepper or coffee plants.

Ring weeding around the pepper or coffee plants should be done intensively, otherwise, for the pepper case, the legume facilitates the spreading of snail to pepper. The snails eat the leaves of the pepper and reduce productivity.

D. PREDICTED EFFECTS OF TECHNOLOGY OPTIONS



Effect of a few treatments on soil loss in coffee plots of 2 and 8 years old having monoculture or multistrata system and slope of 60% as predicted with the Griffith University Erosion System Template (GUEST).

Graph interpretation:

- Treatments such as grass strip or relief modification techniques like ridging can reduce soil loss compared to that of control.
- With time, the canopy cover as well as plant litter increases and these reduce the amount of soil loss, even under the monoculture system.
- In old multistrata system, the canopy cover and plant litter contribution on soil surface is the highest and these bring down soil loss to the tolerable level.

E. ICRAF RESEARCH TO REFINE OPTIONS, VERIFY EROSION PREDICTION AND SUPPORT ADOPTION (YEAR 2001-2003)

- Soil loss evaluation under several conservation/agroforestry treatments at plot scale and at micro-catchment scale.
- Farmers' managed research for technology adaptation
- Contribution of the multistrata systems on litter layer formation.
- (Above-ground) tree interaction under multistrata coffee systems.



Runoff plot with gutter and 'Chino' meter for measuring soil loss and runoff

F. FARMER'S CHOICE

Researchers and extension agents facilitate farmers to blend research based options with their socio-economic and environmental conditions. Farmers decisions are influenced by:

- Slope. The multistrata system would suit most slopes, but the mechanical interventions are more difficult to implement on slopes steeper than 40%.
- Labor availability. Construction of infiltration pits and ridges requires much labor.
- Cash availability. Purchase of good quality seedlings requires cash investment.
- Farmers' experience. Farmers are very likely to adopt the options they are familiar with.