SALT

- There are several traditional ways of controlling soil erosion, such as reforestation, terracing, multiple cropping, contouring and cover cropping.

- The Asian Rural Life Development Program has developed an erosion control technique that is both easier and less expensive to implement than the traditional methods. This technology is known as SALT Sloping Land Agricultural Technology.

- SALT is a package technology on soil conservation and food production, integrating different soil conservation measures in just one setting .

- Basically, SALT is a method of growing field and permanent crops in 3-meter to 5-meter wide bands between contoured rows of nitrogen fixing trees are thickly planted in double rows to make hedgerows.

- When a hedge is 1.5 to 2 meters tall, it is cut down to about 40 centimeters and cuttings (tops) are placed in alleyways to serve as organic fertilizers.

SALT: An agroforestry scheme

- SALT is a diversified farming system which can be considered agroforestry since rows of permanent shrubs like coffee, cacao, citrus and other fruit trees are dispersed throughout the farm plot.

- The strips not occupied by permanent crops, however, are planted alternately to cereals (corn, upland rice, sorghum, etc.) or other crops (sweet potato, melon, pineapple, castor bean, etc.) and legumes (soybean, mung bean, peanut, etc.).

- SALT also includes planting of trees for timber and firewood on surrounding boundaries. Examples of trees species for "boundary forestry in SALT are sesbanias, cashew nuts, etc.

History of SALT

- In 1971, the Asian Rural Life Development Program conducted by Mindanao Baptist Rural Life Center (MBLRC)started to employ contour terraces in the Philippines.

- From testing different intercropping schemes and observing ipil-ipil based farming systems in Hawaii and at the Center, the SALT was finally verified and completed in 1978.

Objective of SALT

- Conversion of hilly land to green and stable land.
- To increase productivity of slopy land.
- To enrich the soil and reduce soil erosion and replace the eroded hillside with terraced green landscape.
- To conserve soil moisture.
- To reduce pest and diseases and reduce the need for expensive inputs such as chemical fertilizers.

Advantages of SALT

- It is a simple, applicable, low-cost, and timely method of farming upland.
- It is a technology developed for farmers with few tools, little capital, and little learning in agriculture.
- Contour lines are run by using an A-frame transit that any farmer can learn to make and use.
- A farmer can grow varieties of crops he is familiar with and old farming patterns can be utilized in the SALT system.

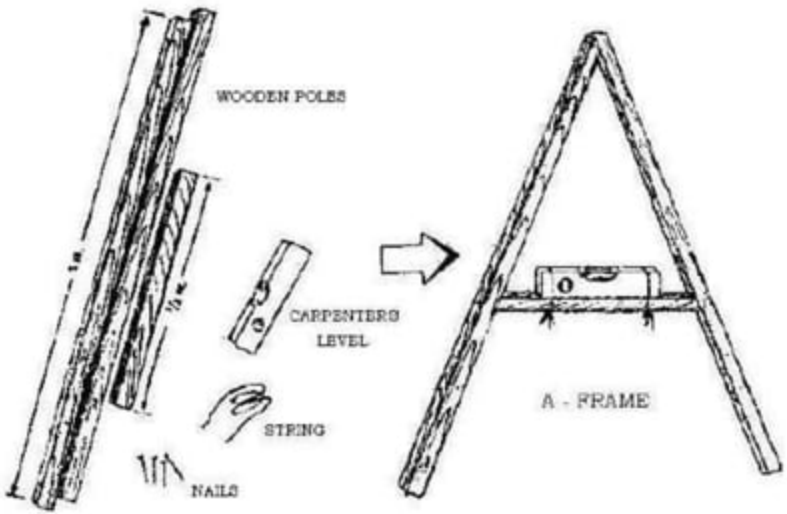
Observations made about SALT

- SALT is for small family farm raising both animals, food crops and permanent crops.
- The farmers' income is increased by 3 folds only after 5 years.
- This technology is now accepted throughout many hilly countries across the globe.
- MBLRC was awarded 'Roman Magassase Award'.
- SALT has been modified over years and different types of SALT has been evolved.

The Ten Steps of Sloping Agricultural Land Technology

Step One : Make An A-Frame

- Students have already dealt in the practicals.

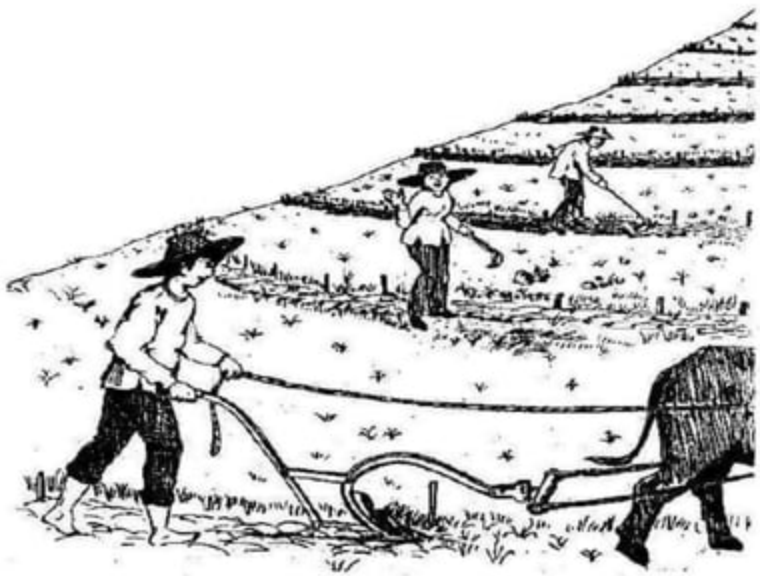


Step Two: Locate Contour Lines

- Try to locate as many contour lines as possible.
- The contour lines should be spaced from 4-6 m in steep slopes and 7-10 m in gradual slopes.

Step Three: Prepare the Contour Lines

- After the contour lines are found, they are prepared by plowing and harrowing until ready for planting.
- The width of the area to be prepared should be one meter.



Step Four: Plant Seeds of Nitrogen Fixing hedge rows or shrubs

- On each prepared contour line make 2 furrows 50 cm apart.

- Plant at least 2-3 seeds per hill at a distance of 1 cm between hills. Cover the seeds firmly with soil. (Ipil-ipil seeds should be soaked overnight in water before planting.)

- The ability of nitrogen fixing plants to grow on poor soils and in areas with long dry seasons makes them good plants for restoring forest cover to watersheds, slopes and other lands that have been denuded of trees.

- Through natural leaf drop they enrich and fertilize the soil. In addition, they compete vigorously with coarse grasses, a common feature of many degraded areas that have been deforested or depleted by excessive agriculture.

- Ipil-ipil (*Leucaena leucocephala*) is the best example of nitrogen fixing trees for hedgerow on the SALT farm. Other examples of nitrogen fixing trees are *Flemingia congesta*, *Acacia villosa*, *Gliricidia sepium*, *Leucaena diversifolia* (the so-called acid-tolerant ipil-ipil).

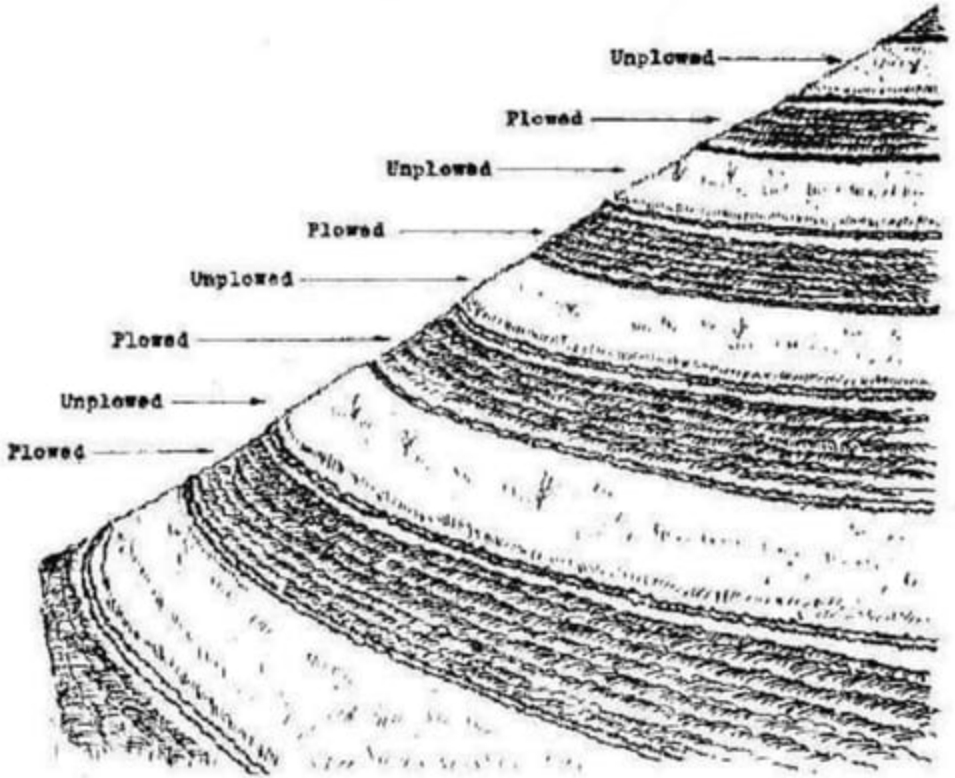
Step Five: Cultivate Alternate Strips

- The space of land between the thick rows of nitrogen fixing trees where the crops are planted is called a strip.

- If you wish to prepare the soil for planting before the nitrogen fixing trees are fully grown, do it alternately, on strips 2, 4, 6, 8 and so on.

- Alternate cultivation will prevent soil erosion because the unplowed strips will hold the soil in place.

- When the nitrogen fixing trees are fully grown, you can proceed with cultivation on every strip.


Unplowed
Plowed
Unplowed
Plowed
Unplowed
Plowed
Unplowed
Plowed

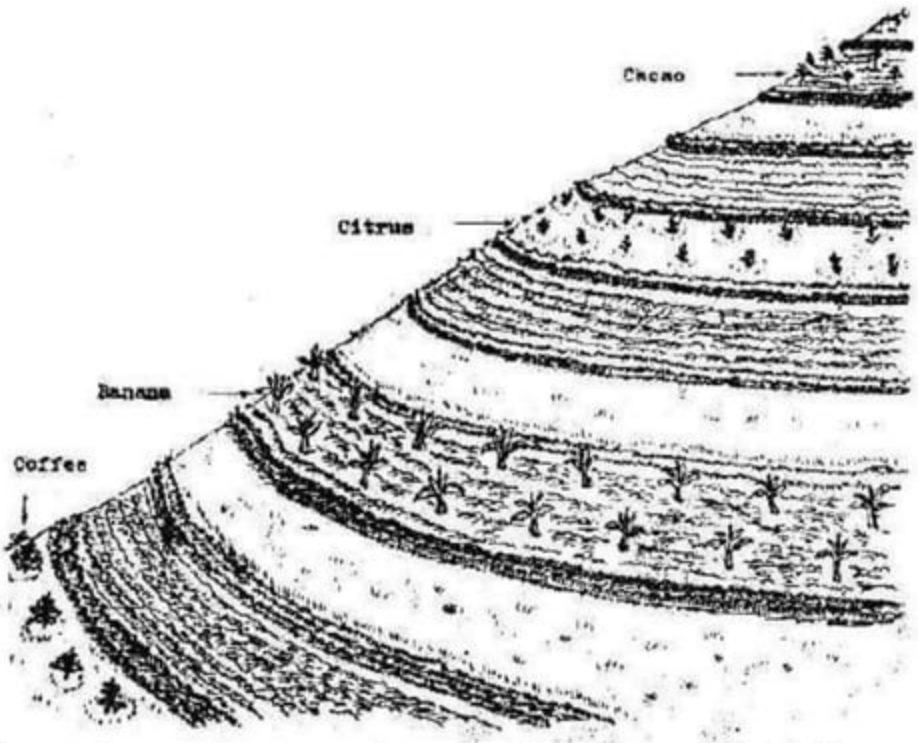
Step Six: Plant Permanent Crops

- Permanent crops may be planted at the same time the seeds of nitrogen fixing trees are sown.

- Only the spots for planting are cleared and dug; later, only ring weeding is employed until the nitrogen fixing trees are large enough to hold the soil so full cultivation can begin.

- Coffee, banana, citrus, cacao, and others of the same height are good examples of permanent crops.

- Tall crops are planted at the bottom of the hill while the short ones are planted at the top.

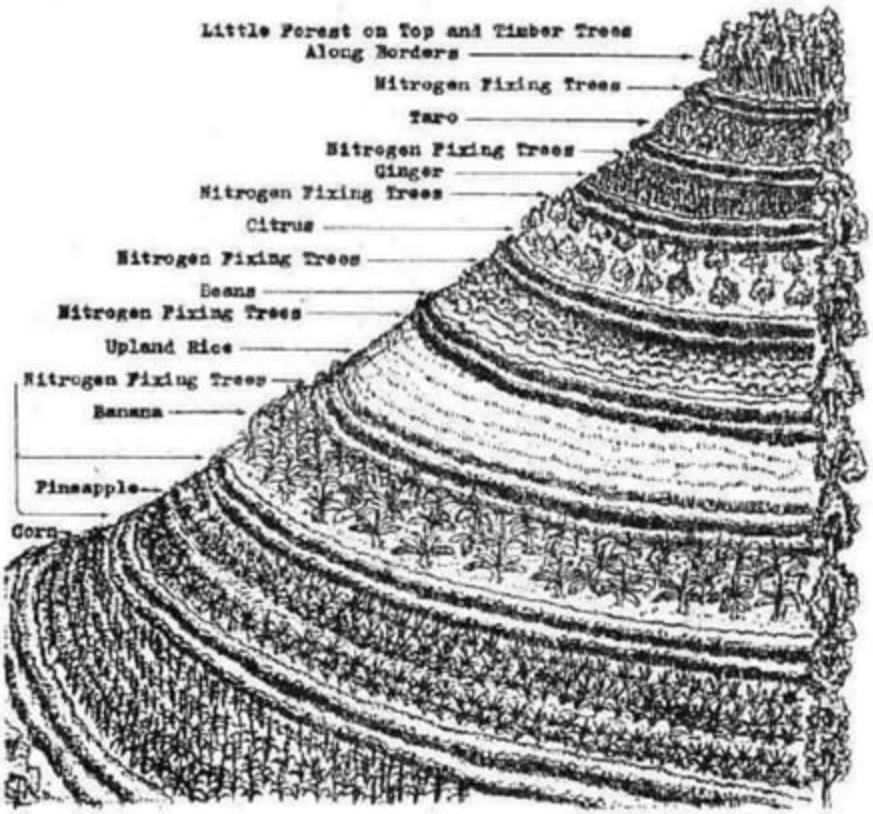

Cacao
Citrus
Banana
Coffee

Step Seven: Plant Short - Term Crops

- Plant short and medium - term income producing crops between strips of permanent crops as a source of food and regular income while waiting for the permanent crops to bear fruit.

- Suggested short and medium – term crops are pineapple, ginger, castor bean, peanut, mung bean, melon, sorghum, corn, upland rice, etc.

- To avoid shading, short plants are planted away from tall plants.


Little Forest on Top and Timber Trees
Along Borders
Nitrogen Fixing Trees
Taro
Nitrogen Fixing Trees
Ginger
Nitrogen Fixing Trees
Citrus
Nitrogen Fixing Trees
Beans
Nitrogen Fixing Trees
Upland Rice
Nitrogen Fixing Trees
Banana
Pineapple
Corn

Step Eight: Trim Nitrogen Fixing Hedge rows

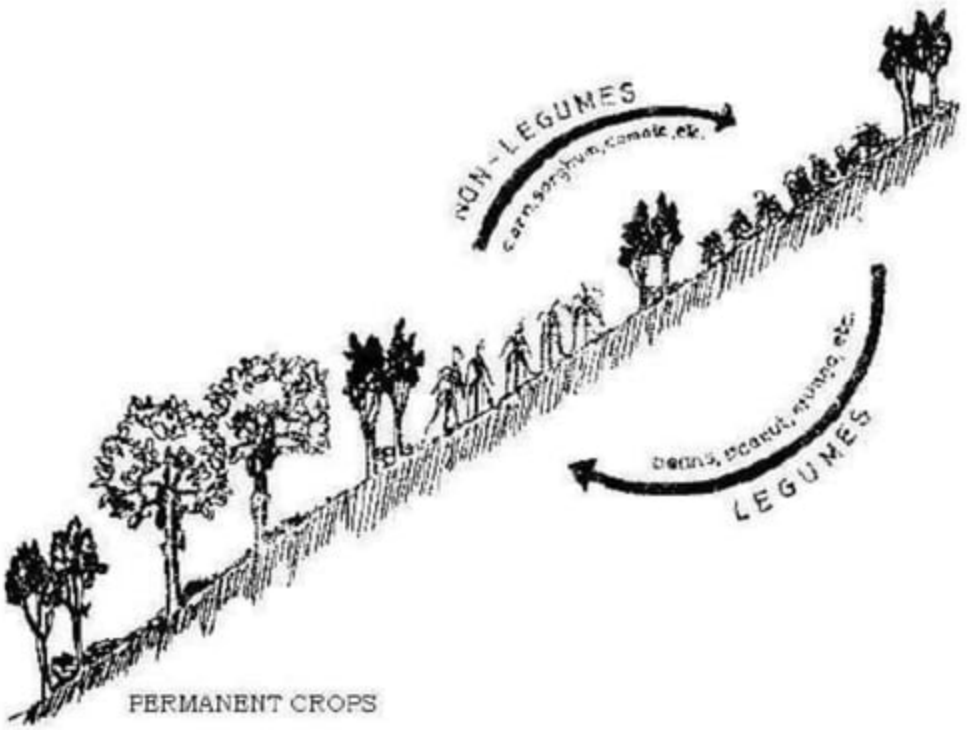
- About once a month the continuously growing N-fixing trees are cut down at a height of one to one and a half meters from the ground.
- Cut leaves and twigs are always piled at the base of the crops. They serve as an excellent organic fertilizer for both the permanent and short – term crops.
- In this way only a minimal amount of commercial fertilizer (about ¼ of the total fertilizer requirements) is necessary.

Step Nine: Practice Crop Rotation

- A good way of rotating is to plant grains (corn, upland rice, sorghum, etc.), tubers (cassava, gabi, etc.) and other crops (pineapple, castor bean, etc.) on strips where legumes (mung bean, peanut, etc.) were planted previously and vice versa.

- This practice will help maintain the fertility and good condition of your soil.

- Other management practices in crop growing like weeding and pest and insect control should be done regularly.


NON - LEGUMES
LEGUMES
PERMANENT CROPS

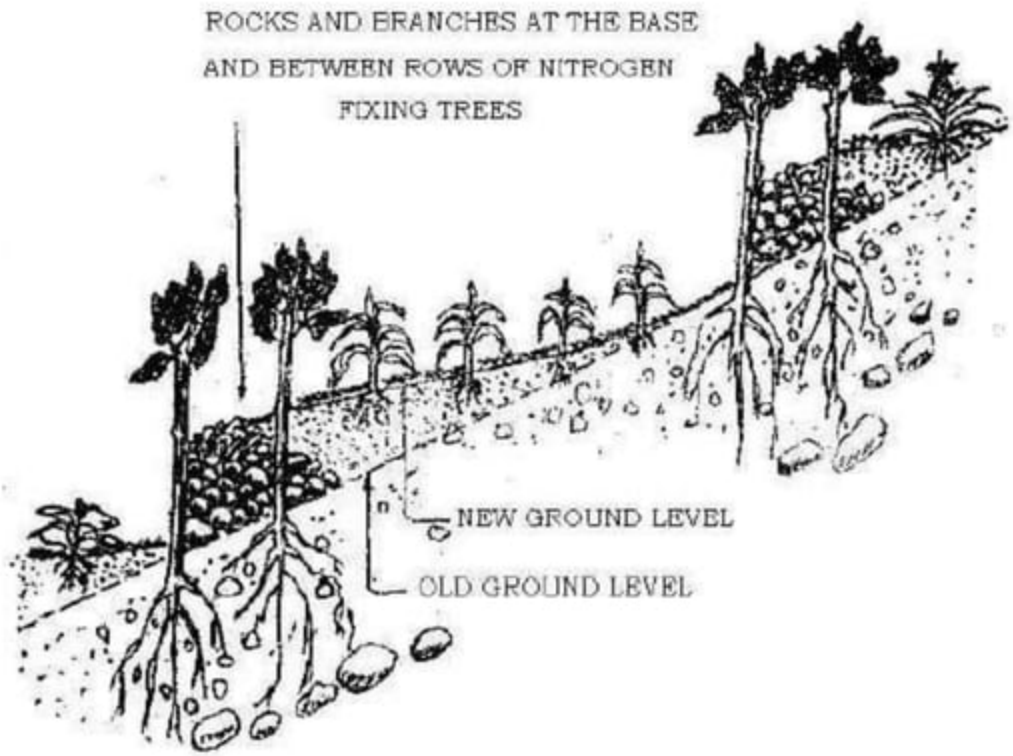
Step Ten: Build Green Terraces

- Apart from providing adequate food and sufficient income, another more important benefit of using SALT is the control of soil erosion.

- This is done by the double thick rows of nitrogen fixing trees and the natural terraces being formed along the contour lines of the hill.

- As you go on farming the sloping land, keep gathering and piling up straw, stalks, twigs, branches, leaves, rocks, and stones at the base of the rows of nitrogen fixing trees.

- By doing this regularly as the years go by, you can build strong, permanent, naturally green and beautiful terraces which will reliably anchor your precious soil in its right place.


ROCKS AND BRANCHES AT THE BASE
AND BETWEEN ROWS OF NITROGEN
FIXING TREES
NEW GROUND LEVEL
OLD GROUND LEVEL

SALT economics

- Location: Kinuskusan, Bansalan, Davao del Sur
- Area: 1 hectare
- Slope: 25%
- Climate: Type D (with about 100-125 inches rainfall per year)
- Soil: Miral Clay Loam
- pH: 5.5; low N: low P: Medium K
- Total length of Ipil-ipil hedgerows = 1,804 linear meters
- Ipil-ipil yield of 1 linear meter = 1 kilo green leaves
- Ipil-ipil yield per harvest per hectare = 1,804 kilos of green leaves

One year harvest of ipil-ipil =
a. 258.5 kilos of N or about 11 bags of Urea
b. 120.2 kilos of P about 12 bags of 0-20-0 (Solophos)
c. 90.1 kilos of K or about 3 bags of 0-0-60 (Muriate of Potash)

Corn yield per hectare:
a. Without fertilizer = 1.5 tons
b. With ipil-ipil only = 3.3 tons
c. With commercial fertilizer = 4.3 tons (100-50-0)

Per P=1.00 investment SALT will give you a net return about:
a. P= 0.05 or 5% during the first year
b. P= 1.04 or 104% during the second year
c. P= 1.31 or 131% during the third year
d. P= 2.07 or 207% during the fourth year
e. P= 4.15 or 415% during the fifth year

Characteristics of various SALT models

Production sys	SALT1	SALT 2	SALT 3	SALT 4
Also called		Small Agro-livestock Land Technology	Sustainable Agroforest Land Technology	
Base crop	Staple food crops	Fodder crops	Trees	Fruit crops
Major product	Food grains	Meat, milk, manure	Fodder, fuel, timber	Fruits
Planting area				
a. Staple food crop	75%	20%	20%	40%
b. Cash crop	25%	20%	20%	60%
c. Forage, fodder	-	40%	-	-
d. Forestry	-	20%	60%	-

Source: Pratap and Watson (1994), ICIMOD