

Agroforestry Opportunities for East Timor: Forage banks and forage gardens

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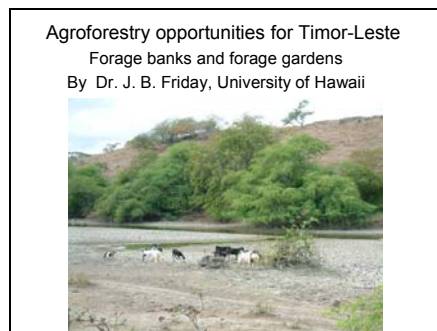
website <http://www.ctahr.hawaii.edu/forestry/data/timor.html>

*Timor-Leste Agricultural Rehabilitation, Economic Growth,
and Sustainable Natural Resources Management Project*

Timor-Leste Ministry of Agriculture, Forestry and Fisheries
University of Hawaii at Manoa
U.S. Agency for International Development

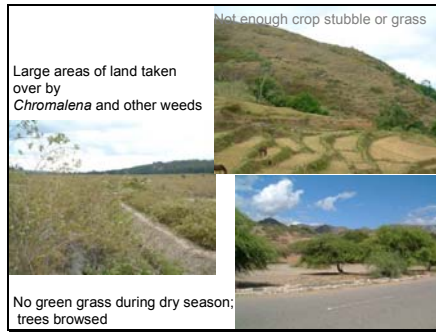


Slide 1



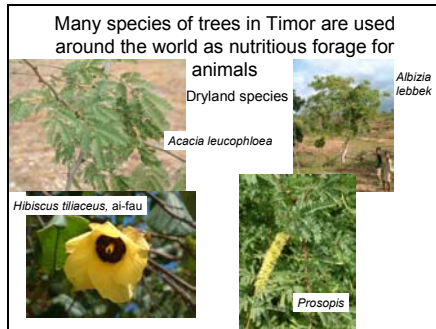
Most farmers in Timor-Leste, like farmers in developing countries everywhere, cannot afford to spend much time and money growing timber trees which will be harvested decades into the future. Resource-poor farmers need immediate sources of income. One way farmers can realize income from planting trees is by raising forage banks and forage gardens to feed their livestock. The photograph in the picture shows a typical roadside scene in Manatuto, Timor-Leste, with goats in the foreground and heavily browsed legume trees (*Acacia* and *Prosopis* spp.) in the background.

Slide 2



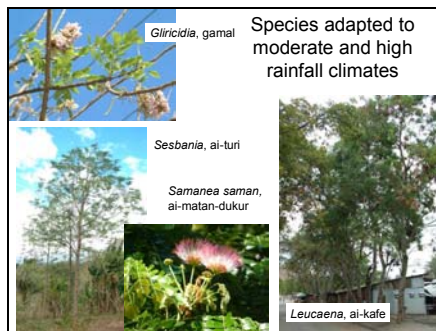
Farmers in Timor-Leste need additional sources of forage, especially in the dry season. Many areas are already overgrazed, such as the field above the rice terraces in the photograph at top, taken in Venilale. Large areas of former grazing land have been taken over by noxious weeds, such as the *Chromolaena odorata* in the photograph on the left, taken in Seical. Trees in coastal areas, such as these *Prosopis* trees in Manatuto, are grazed as high as the livestock can reach.

Slide 3



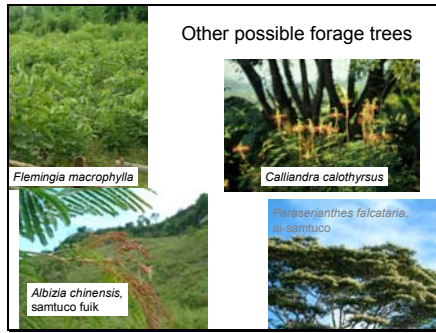
Many species of trees in Timor are used around the world as nutritious forage for animals. Dryland species suitable for forage include ai-puti (*Acacia leucophloea*), *Albizia lebbek*, ai-fau (*Hibiscus tiliaceus*), and ai-mama (*Prosopis* spp).

Slide 4



Agroforestry trees with potential for forage in areas with moderate rainfall include gamal (*Gliricidia sepium*), ai-turi (*Sesbania grandiflora*), ai-matan-dukur (*Samanea saman*), and ai-kafe (*Leucaena leucocephala*). Ai-kafe is widely used for cattle forage in Australia, West Timor, and throughout the tropics.

Slide 5



Other possible forage trees which already exist in Timor-Leste include *Calliandra calothyrsus*, ai-samtuco (*Paraserianthes falcataria*), and samtucu fuik (*Albizia chinensis*). *Flemingia macrophylla* is a popular forage shrub in the Philippines and Indonesia.

Slide 6

Why trees for forage?

- Trees stay green during at least part of dry season
- Legume tree leaves high in protein and highly palatable to livestock
- Branches may be used for firewood after leaves are used as forage
- Nitrogen-fixing trees improve soil fertility
- Trees grow rapidly and can compete with weeds
- Branches from trees can be harvested repeatedly
- Trees are easy to grow
- Reforesting areas with forage trees may help decrease grazing pressure and improve watershed health



There are many reason to use trees to produce forage for farm livestock: Trees stay green during at least part of dry season
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 Branches from trees can be harvested repeatedly
 Trees are easy to grow
 Reforesting areas with forage trees may help decrease grazing pressure and improve watershed health
 The photograph shows a hedgerow of ai-kafe (*Leucaena*) repeatedly cut for forage on an experimental farm in Hawaii.

Slide 7

Forage gardens: supply both grass and legume tree forage for confined animals

- Improved animal nutrition
- Confined animals gain more weight, stay healthy, don't destroy crops



Forage garden of napier grass, flemingia, and cassava in Bandung, Java

Forage gardens supply both grass and legume tree forage for confined animals. Having a good supply of accessible forage can lead to improved animal nutrition. Confined animals gain more weight than free-ranging animals, contract fewer disease, and don't destroy crops. The photographs show a mixed species forage garden with napier grass, *Flemingia*, and ai-farina (cassava) and confined goats in Bandung, Java, Indonesia.

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Forage banks: trees which can be cut to supply forage during the dry season

- Animals may be free-ranging some of the time
- Legume trees are protein reserves
- Grass banks are energy reserves



Trial of different *Leucaena* (ai-kafe) selections for forage in Hawaii

Forage banks are trees which can be cut to supply forage during the dry season. Animals may be free-ranging some of the time. Legume trees are naturally high in protein and these may be thought of as protein reserves. Grass banks may be thought of as energy reserves. The photograph shows a trial of different ai-kafe (*Leucaena*) selections for forage in Hawaii.

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Demonstration feed garden and confined goat house at the International Institute of Rural Reconstruction in the Philippines



Feed garden includes *Gliricidia* (gamal) and napier grass

These photos show a demonstration feed garden and confined goat house at the International Institute for Rural Reconstruction in the Philippines. The feed garden includes gamal (*Gliricidia sepium*) and napier grass.

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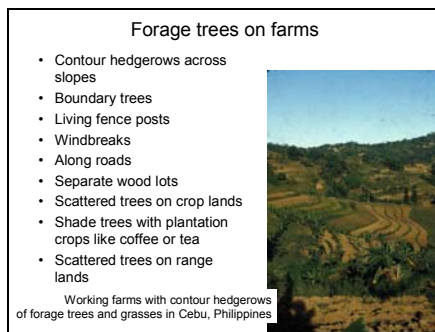
Hedgerows of legume trees may also be planted along the contours of cultivated fields to prevent erosion. The upper photo shows a boy harvesting napier grass from a contour hedgerow in Cebu, the Philippines. In this community, all the available land is used for crops, so farmers must grow their own fodder for their livestock. A little bit of grass is cut each day and fed to the goats.

Slide 11



After the animals are fed cuttings from the hedgerows of grass and legume trees, the animal manure is carried back to the fields to be used as fertilizer. Note how well the corn is growing below the goat house! The photograph on the left shows goats eagerly eating *Calliandra calothyrsus*.

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Forage trees on farms can be used in many ways:

- Contour hedgerows across slopes
- Boundary trees
- Living fence posts
- Windbreaks
- Along roads
- Separate wood lots
- Scattered trees on crop lands
- Shade trees with plantation crops like coffee or tea
- Scattered trees on range lands

The photograph shows a landscape of actual working farms with contour hedgerows of forage trees and grasses in Cebu, Philippines.

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Another shrub which is used for forage for goats is the sunflower, *Tithonia*. This plant often grows on waste lands. The photograph shows a farmer feeding goats cut sunflower leaves in Java. This slide is from the World Agroforestry Centre Southeast Asia (formerly ICRAF), Bogor, Indonesia, from the slide show ICRAF Southeast Asia Lecture Note No. 4: Indigenous Fallow Management, by Malcolm Cairns, Kurniatun Hairiah and Paul Burgers, available at: <http://www.worldagroforestry.org/seas/Products/Training/Materials/SlideSeries/IFM.htm>

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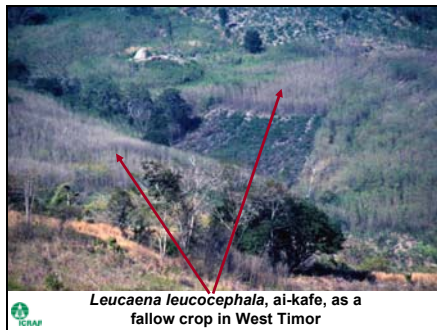


Forage trees are an important part of a cyclical agroforestry system in West Timor. An fallow crop of *Leucaena leucocephala*, ai-kafe, is planted after crops are harvested and fields are fallow. The trees fix nitrogen for crops, and yield a high quality forage. Cattle are confined and fed on a cut-and-carry system. This system has been in place since the 1930s.

This photograph is from the World Agroforestry Centre Southeast Asia

(formerly ICRAF), Bogor, Indonesia, from the slide show ICRAF Southeast Asia Lecture Note No. 4: Indigenous Fallow Management, by Malcolm Cairns, Kurniatun Hairiah and Paul Burgers, available at: <http://www.worldagroforestry.org/sea/Products/Training/Materials/SlideSeries/IFM.htm>

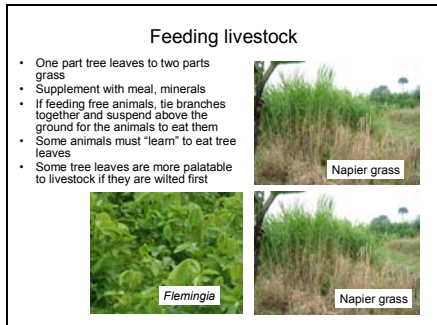
Slide 15



The landscape is transformed to a patchwork of different-aged ai-kafe (*Leucaena*) stands interspersed with cropped fields.

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Slide 16



Basic guidelines for feeding livestock include:
 Feed one part tree leaves to two parts grass
 Supplement with meal, minerals as needed
 If feeding free animals, tie branches together and suspend above the ground for the animals to eat them
 Some animals must “learn” to eat tree leaves
 Some tree leaves are more palatable to livestock if they are wilted first

Slide 17

Maintaining forage trees

- Let grow 12 to 18 months before cutting
- Cut trees at 1 meter height
- Cut green shoots up to once per month; less often in the dry season
- Cut shoots before leaves start to fall during the dry season
- Don't let animals browse the trees continuously: they'll kill them
- Use leftover branches for firewood




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Let the trees grow 12 to 18 months before cutting
Cut trees at 1 meter height
Cut green shoots up to once per month; less often in the dry season
Cut shoots before leaves start to fall during the dry season
Don't let animals browse the trees continuously: they'll kill them
Use leftover branches for firewood

Slide 18

Possible Difficulties

- Will farmers cut and carry forage to livestock?
- Will farmers be able to protect seedlings so that livestock don't destroy them?
- Will farmers confine livestock?
- Do farmers know how to plant trees?
- Can farmers get seeds or cuttings to plant trees?
- Can farmers get pots and potting mix?



Despite all the apparent advantages, raising forage trees is not yet popular in Timor-Leste. Many questions remain to be answered, among them:
Will farmers cut and carry forage to livestock, or will it be considered to much work?
Will farmers be able to protect seedlings so that livestock don't destroy them?
Will farmers confine livestock?
Do farmers know how to plant trees?
Can farmers get seeds or cuttings to plant trees?
Can farmers get pots and potting mix to raise seedlings?

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The farmers have the answers

Development of forage banks or any other agricultural system needs to come from the farmers.
We professionals can facilitate but they are the ones who decide.



In the end, the farmers have the answers and make the right decisions for their own farms and livelihoods. Development of forage banks or any other agricultural system needs to come from the farmers. Agency staff, NGO staff, consultants, and other professionals can facilitate but the farmers are the ones who decide.