Leucaena: sustainable crop and livestock production systems in Nusa Tenggara Timur Province, Indonesia

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Introduction In the late 1800s/early 1900s, population increases, slash and burn cropping, wildfires, livestock, and weeds led to extensive losses of natural vegetation and land degradation in the semi-arid islands of Nusa Tenggara Timur province, E Indonesia. In the 1930s-60s, villagers, government institutions and NGOs recognized the need to reduce degradation and increase production. They developed and promoted more sustainable fallow systems, based on the use of leucaena (*Leucaena leucocephala*), introduced several centuries earlier from central America.

Major reasons for success (Piggin, 2003).
1. A recognized need for better systems In the 1930s, low farm productivity and poverty caused by serious land degradation led to the realization that serious efforts were needed to develop sustainable farming systems.
2. Failure of alternatives Attempts in the 1960s and 70s to control erosion and land degradation with physical structures and traditional terraces were unsuccessful because of labour requirements, costs and ineffectiveness.
3. Adaptation of leucaena to the local environment Leucaena is deep-rooted, drought-resistant, well adapted to semi-arid climates and low nutrient alkaline/neutral soils, relatively easy to establish and very persistent.
4. Compatibility of leucaena with local farming systems Leucaena is a robust plant that can persist and regenerate in traditional swidden cropping systems that involve regular and severe cutting and burning.
5. Capacity of leucaena to supply local needs Leucaena is a multi-purpose plant that contributes to a multitude of village needs, including fence timber, firewood, building timber, forage, mulch and seeds for ornaments and food.
6. Commitment of local leaders and groups Local village heads, NGOs, church groups, and government departments were committed to develop and demonstrate more sustainable leucaena systems to local villagers.
7. Creation of a favorable policy environment Regulations were instituted to tether/confine livestock in cropping areas, cropping credit for farmers planting leucaena, development of erosion prevention programs, obligatory planting of leucaena, and encouragement of cattle husbandry by livestock distribution schemes.
8. Effectiveness of leucaena Leucaena has been effective in reducing erosion, increasing infiltration and stream flows, suppressing crop weeds, improving soil N, and providing shade for mangoes, cocoa, pepper and cloves.
9. Contribution of leucaena to development of more commercial farming systems Leucaena has helped village farmers move from subsistence to commercial farming through the development of cattle and goat fattening and orchards of bananas, papaya, mangoes, coconuts, cloves, pepper, and cocoa.

Conclusions Contrasting systems have emerged and endured in the Amarasi and Sikka areas. They are excellent examples of the adoption and use of shrub legumes in village farming systems. The Amarasi system was developed in the 1930s and is based around the use of leucaena as a forest fallow rotation for corn and a forage for tethered cattle and goats. The Sikka system was developed in the 1960s and involves contour rows of leucaena to prevent erosion and create indirect terraces where corn, peanuts, and mungbeans are grown and mulched with leucaena clippings from the hedgerows. Weight gains of 1.3-1.7 kg/head per day have been recorded for tethered cattle fed with leucaena whilst maize yields can be doubled by including 2-3 years of leucaena in crop–fallow rotations. These systems each now cover about 50Kha, or 70% and 30% of the Amarasi and Sikka areas, respectively. They contribute substantially to farm production, wood supply, and stabilization of the resource base. Villager families farm about 2ha, suggesting that some 25K farm families may be growing leucaena in both Amarasi and Sikka.

References

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