

Evaluation and Implementation of Nitrogen-Fixing Species in Hedgerow Intercropping in the Marianas

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Title: Evaluation and Implementation of Nitrogen-Fixing Species in Hedgerow Intercropping in the Marianas

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Situation:

Intercropping with hedgerows, one of the recommended farming systems in the Pacific, can enhance productivity of limited farmlands by providing:

- Nutrient cycling from deeper soil layers
- Green manuring and mulching benefits
- Weed suppression and barriers from pests and diseases
- Erosion control
- Biologically fixed nitrogen in farming systems
- Animal feeds and lumber

After the USDA Natural Resources Conservation Service introduced selected species of hedgerow plants to the Marianas, several farmers expressed an interest in planting hedgerows on their farms. However, lack of site-specific information on hedgerow management and species adaptability to local soils hindered adoption.



These nitrogen-fixing trees, being grown inside a fenced area, are to be used as goat feed.

Objectives:

- Develop protocols for seed propagation of leguminous plants as hedgerows and develop a guidebook
- Examine biomass production of the plants grown in different soils on Guam
- Examine seed production in different soils
- Examine the plants' susceptibility to arthropod, nematode and disease problems
- Produce videos, fact sheets and technical reports on plant production and present results at workshops and conferences



Data are collected on height and girth.



The canopy of *Gliricidia sepium*, one of eight trees, is being assessed.

Actions:

Seeds of eight nitrogen-fixing leguminous plants were obtained locally or from a seed company in Hawaii, and three-month-old seedlings were planted in a randomized complete block design with three replications at three experiment stations on Guam:

- Barrigada Farm, central Guam, soil type Pulantat clay, 6.0 to 7.5 pH
- Yigo Farm, northern Guam, soil type Guam Cobbly clay loam, 6.4 to 7.5 pH
- Ija Farm, southern Guam, soil type Akina silty clay, 4.5 to 6.2 pH

Biomass, flowering, seed production and occurrence of arthropods, disease and nematodes were examined for each of these species:

- Sesbania sesban* cv. Nubica
- Leucaena leucocephala* cv. K636
- Gliricidia sepium*
- Desmodium rensonii*
- Cajanus cajan*
- Acacia angustissima*
- Flemingia macrophylla*
- Calliandra calothyrsus*



Biomass from nitrogen-fixing trees is weighed.

Results:

Propagation

A brochure describing the propagation methods for each species was produced.

Biomass Production

L. leucocephala cv.K636 produced the greatest biomass in the trial, with 26.1 tons per hectare at Barrigada, followed by *S. sesban* cv. Nubica at 19.9 tons per hectare, also at Barrigada. Except for *F. macrophylla* and *C. calothyrsus*, all of the nitrogen-fixing trees produced greater than 11 tons of biomass per hectare at Barrigada.

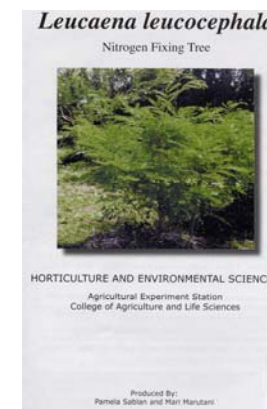
Biomass production not only varied by location and soil type, it also varied by season, with a general decline in vegetative growth from November to February.

Seed Production

D. rensonii and *F. macrophylla* produced numerous seeds regardless of season. *L. leucocephala* and *S. sesban* produced more seeds in the alkaline soils of Barrigada and Yigo than in the acid soils of Ija.

Plant Pests

The main troublesome insect pests were mealybugs, Chinese rose beetle and longhorn beetle. No serious foliage, stem or floral diseases were observed.



This pamphlet is one of eight produced in the project.

Potential Benefits:

The project provided information on selecting nitrogen-fixing trees suitable to different soil types on Guam. The results were disseminated via a technical publication, eight pamphlets and a 15-minute video to local high schools and offices of the Guam Cooperative Extension and USDA-NRCS in Guam and the Commonwealth of the Northern Mariana Islands.