

# INTEGRATED SUSTAINABLE AGRICULTURE SYSTEM FOR SMALL-SCALE FARMERS

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## INTRODUCTION

The Federated States of Micronesia is made up of 607 small islands spread over a million square miles of the Western Pacific Ocean. However, the total land area is only about 271 square miles. The islands of Micronesia are striving towards self-sufficiency while mindful of high malnutrition and an enormous trade imbalance attributable to importing foods. Very little food crops are cultivated at the local level and most of the foods available at local markets are imported. Due to high shipping cost, these are very expensive and unaffordable for average local people. And even after paying high-prices, people are not able to get fresh produce because of long transportation time. Although current agriculture programs are mostly on subsistence level, food crops and swine production are considered primary and important industries in Micronesia. Almost every household on the island has swine production operations with capacities that range from a few animals to about twenty-five animals and backyard gardening. These operations may be small, but they are numerous. Local people mostly rely on banana, breadfruit and taro as main source of food for themselves and also for livestock; however, their needs are usually much greater than the available food supplies. Taro and pigs are part of many traditional and cultural practices. Value of taro and pigs is closely related with demands during funerals, annual feasts and daily community functions and activities. The present paper discusses the research and extension work done to meet this ever-increasing demand for food and feed through increasing agricultural production by generating the ability to successfully raise livestock, and grow food and feed crops for sustenance by training local farmers in appropriate and skillful use of sustainable and integrated agriculture systems.

## SUMMARY

This project demonstrated feasibility of integrated sustainable agriculture and livestock production systems for small-scale farmers in the island conditions. The project optimized overall agricultural and livestock production by using locally available resources through an integrated technology, which employed multipurpose crops, animals, and recycling of residues and byproducts as nutrients for animals and crops. The project not only provided opportunities for income generation and profitable self-employment to the participating farmers but also provided an example to other farmers and rural communities to get same benefits on successful duplication of the project. The project team attracted, encouraged and trained farmers through field days and hands-on training workshops, and distributed sustainable farming, swine production and composting guides. A video of project activities was telecasted on local channel and distributed to non-subscribers of cable.

## OBJECTIVES

1. Develop, implement and demonstrate cropping systems for multipurpose crops to maximize production in sustainable manner;
2. Develop, implement and demonstrate swine production system based on locally available resources for small-scale farmers;
3. Develop, implement and demonstrate simple techniques to optimize the use of different;
4. Implement and demonstrate recycling of animal wastes and crop residues through composting;
5. Educate and train farmers and rural communities in on-farm implementation of sustainable agriculture systems through demonstrations, training workshops, and field days;
6. Develop, publish, and distribute sustainable farming and swine production guides, easy-to-understand handouts, and informative brochures in English and local language; and
7. **Record, develop and telecast project's success stories in English and local language.**

## OUTCOMES AND IMPACTS

The project increased knowledge, created awareness and developed skills of 78 participants of training workshop and 124 participants of field days about integrated sustainable agriculture and livestock production. The project also attracted and encouraged more than 2,000 people through indirect contact such as video telecast, cultivation guides and video distribution. The project made participants capable to organize training, teach other farmers and provide assistance, and apply gained knowledge and skills in the field. Ultimately, the project developed positive attitudes, zeal for learning techniques and farming aspects and changed the behavior of the participants.

Project coordinator, producers and participants maintained a high level of interest for development, implementation and demonstration of multiple integrated activities for cropping systems and swine production in a sustainable manner. Demonstration plots developed at the pilot and producer sites were used for demonstration of planned outreach activities to encourage establishment of integrated sustainable agriculture and livestock production systems. At the project sites, vigorously growing crops, harvest of excellent sweet potatoes, bananas, eggplants, taro and papaya, and swine production along with sustainable and fast composting techniques attracted much attention of local communities. **Harvested eggplants from the project's pilot site** were showcased during State Agriculture Fair 2010 and 2011, and were awarded with the first and second prize for vegetable/eggplant category.

The successful implementation of the skills and technology gained by the farmers through this project will not only lead to long-term availability of fresh food crops and swine at affordable prices in Micronesia but also serve as a model for the region. This will also serve as a means to ensure food security and income generation. This project will help small farmers comply with existing and anticipated regulations to protect the environment from contamination by manure.



1. Tissue culture multiplication; 2. Nodular structures; 3. Green shoot buds; 4. Multiple shoots; 5-6. Well-rooted plantlets; 7. Planting material of banana; 8. Planting material of taro; 9. Sweet potato and taro planting at producer's site; 10-11. Application of compost by side-dressing at producer's site; 12. Field view of sweet potato cultivation at pilot site; 13-14. Field view of banana cultivation at producer's site; 15. Close-up view of taro row; 16. Field view of taro cultivation at pilot site; 17. Close-up view of sweet potato row; 18. Field view of sweet potato cultivation at pilot site; 19-20. Feeding swine on modified diet based on local resources at pilot site; 21-22. Harvested sweet potatoes from pilot site; 23-24. Close-up of banana bunch at producer's site; 25. Field view of eggplant cultivation at pilot site; 26. Harvested eggplants from pilot site (Winner Produce of the State Agriculture Fair 2010 and 2011); 27. Close-up view of eggplant plants at pilot site; 28. Planting material of papaya; 29. Shredded green material for composting; 30. Shredded brown material for composting; 31. Coconut husk used at base for better aeration; 32. Finished compost and fresh and healthy soil used between the layers as an activator; 33. Hot composting technique: Shredded green and brown materials arranged in layers; 34. Close up view of green and brown layers in compost pile; 35. Heating phase: One week old compost pile; 36. Maturation phase: Finished compost ready to use.

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