

# INTERCROPPING *COLOCASIA* TARO WITH BLACK PEPPER (*PIPER NIGRUM*) ON POHNPEI

S. SILBANUS AND B. RAYNOR<sup>1</sup>

Pohnpei Research Assistant, Sustainable Agriculture Research and Education  
P. O. Box 216, Pohnpei, FSM 96941

## Abstract

Black pepper (*Piper nigrum*) is an important cash crop on Pohnpei. Due to its perennial nature and slow growth, black pepper should lend itself to intercropping with annual crops, especially in the first few years of establishment, both in terms of ecology and cash income. There has been some concern that intercropping may increase disease in young pepper plantings. This paper reports on a six-month, on-farm trial of intercropping of black pepper with *Colocasia* taro.

## Introduction

Black pepper (*Piper nigrum*) is one of the most important cash crops on Pohnpei Island. However, by virtue of its perennial nature, the initial establishment of pepper gardens presents many problems to farmers. Newly planted gardens are subject to erosion, and weed growth is heavy and takes much labor to control. High temperatures in new farms also leads to high mortality of young pepper vines. Also, since pepper takes nearly three years before it bears fruit, financial return to farmers is delayed, to the point that many farmers abandon their farms in early stages. Intercropping newly established pepper farms with *Colocasia* taro (*Colocasia esculenta* (L.) Schott) could have many positive effects. The shade of the taro plants could reduce weed growth and cool the soil, and the relatively fast maturity (8-9 months) could provide the pepper farmer with food and cash income in the first couple years before the pepper vines bear fruit. Although intercropping of new pepper farms has been considered as a possible strategy, and many farmers practice it, there is some concern that taro intercropping can lead to increased disease in young pepper plantations (Gnanaratnam, personal communication), especially foliar and root fungus diseases. This research experiment was carried out to observe the effect of intercropping *Colocasia* taro on black pepper on Pohnpei Island.

## Methods

In January, 1992, with the cooperation of the Black Pepper Section staff of the Pohnpei State Division of Agriculture, four possible black pepper farmer/cooperators were identified in Madolenihmw Municipality. The study was limited to Madolenihmw because of lack of transportation for the research assistants. These farmers were selected based on their farms being one to two years old and on their willingness to adopt intercropping. After visiting the farms and meeting with the farmers, Hiroki Tihpen's one-acre pepper farm in Wapar, Madolenihmw was selected as the research site. Unfortunately, interplanting of taro on the farm was delayed by a five-month drought. In May, when the rains started again, four plots of 25 pepper posts each were randomly selected and delineated on the Tihpen farm. Two plots were planted with taro in single rows running between the rows of pepper posts, with 1-m spacing between plants. The other two plots were left as a non-intercropped control. The taro cultivar planted was "Sawa Toantoal," the most common and popular cultivar on Pohnpei (Raynor 1989). The farmer was allowed to maintain all plots based on his regular practices, and all inputs (labor and amount) were recorded during the study. Two research assistants visited the farm every two weeks. During the visits, survival, height, and diameter of pepper plants and height and number of leaves on taro plants were recorded. Weed pressure was also recorded during the visit by percent cover and height of various species. Data collection were carried out for seven visits from May 21 to August 28, 1992.

## Results

In order to determine the effects of taro intercropping on black pepper growth, the average pepper vine height in the taro intercropped plots versus the non-intercropped plots was multiplied by the average pepper vine diameter for each data period to give an average vine volume. The results are presented in Fig. 1.

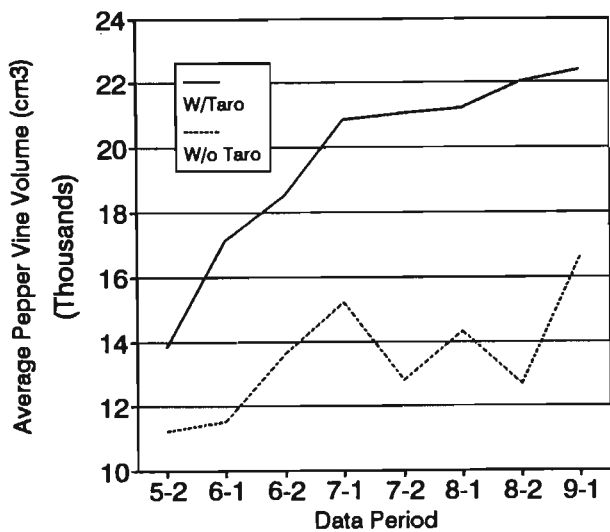


Fig. 1. Black pepper (*Piper nigrum*) growth on Tihpen farm.

To determine the effects of weed pressure, the height and percent cover of the most common weed in the Tihpen pepper farm, the grass *Paspalum conjugatum*, was multiplied together for each data period. The results are presented in Fig. 2.

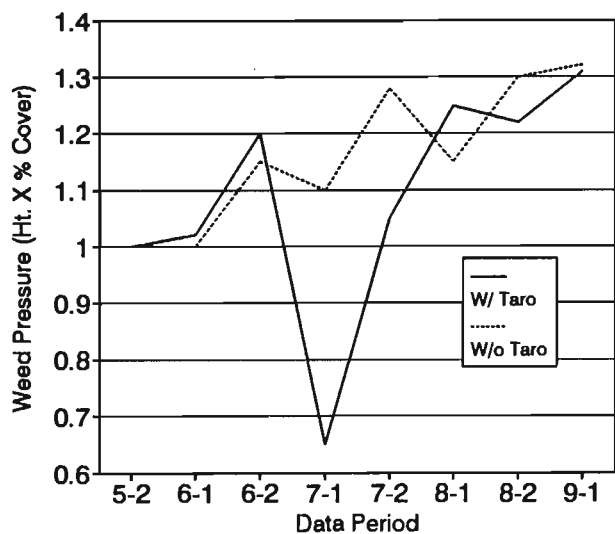


Fig. 2. Weed pressure on Tihpen farm (weed volume of *Paspalum conjugatum*).

#### Discussion

Black pepper growth appears to be slightly favorably influenced by the intercropping of *Colocasia* taro (Fig. 1).

The decline in the non-intercropped pepper plot vine volume in July was caused by the dieback of one vine to *Phytophthora* foot rot. The foot rot also led to a decline in diameter on some plants due to loss of leaves. Foot rot, a common disease in pepper farms on Pohnpei that eventually leads to vine death, was noticeably more evident in the non-intercropped plots. It usually occurs in periods of wetter weather and is more common in flat and poorly drained areas of the pepper fields. Since our experiment was limited to a small sample size and data was taken for only three months, the lower incidence of foot rot in the taro intercropped plots probably cannot be attributed to the taro itself, but the results are encouraging for future studies.

Regarding the incidence of *Paspalum conjugatum* in the pepper plots, there seems to be little difference between the taro intercropped and non-intercropped plots (Fig. 2) in terms of weed pressure. The length of data collection was actually too short to notice any beneficial shading effects of the taro plants, because when data collection was suspended in late August, the taro plants had not yet formed a closed canopy. If the experiment had been carried out longer, there might have been some beneficial effects on weed pressure. The temporary decline of *Paspalum* in data period 7-1 is attributable to the clean weeding of one of the taro intercropped plots by the farmer's family. While this is not directly caused by the taro itself, it does suggest that farmers might be more motivated to weed their pepper farms if there is also taro or another crop in between the pepper posts. This extra weeding proves beneficial to both the intercrop and the pepper vines.

#### Conclusions

The initial conclusion based on this experiment, although too short and too limited to offer conclusive proof, is that *Colocasia* taro intercropping appears to be beneficial to black pepper growth in new farms in terms of both decreased incidence of *Phytophthora* foot rot and decreased weed pressure. Further field trials are needed to verify this conclusion.

#### Acknowledgements

The researchers would like to thank the staff of the Pohnpei Division of Agriculture and local pepper grower Hiroki Tihpen for their generous cooperation without which we could not have carried out this project. We would also like to thank the USDA LISA Project for financial assistance.

### References Cited

- Gnanaratnam, J. 1992.** Pepper Technical Consultant, Pohnpei State Division of Agriculture.
- Raynor, B. 1990.** Taro (*Colocasia esculenta* (L.) Schott) Agriculture on Pohnpei Island: Pest and Disease Occurrence and Control. Paper presented at the ADAP Crop Protection Conference held in Guam on May 28-30, 1990. 10 pp.

---

<sup>1</sup> LISA PI - Pohnpei/Field Representative, The Nature Conservancy, P. O. Box 216, Pohnpei, FSM 96941.

**The Editor**

L. Ferentinos is the Project Coordinator of the Taro Production Systems Project at the University of Hawai'i at Manoa.

Jane C. Muench, an independent editor with J.C.M. Office Services, provided technical support.

Publication was supported in part by a grant from the USDA/CSRA Sustainable Agriculture Research and Education Program (formerly called L.I.S.A.). Additional support was provided by American Samoa Community College, College of Micronesia, Northern Marianas College, University of Guam, Yap Institute of Natural Science, and the University of Hawai'i under the Agricultural Development in the American Pacific (ADAP) Project.

All reported opinions, conclusions, and recommendations are those of the authors (contractors) and not those of the funding agency or the United States government.

The Library of Congress has catalogued this serial publication as follows:

Research extension series / Hawaii Institute of Tropical Agriculture and Human Resources.—001.—(Honolulu, Hawaii):

The Institute, [1980—  
v. : ill. ; 22 cm.

Irregular.

Title from cover.

Separately catalogued and classified in LC before and including no. 044.

ISSN 0271-9916 = Research extension series - Hawaii Institute of Tropical Agriculture and Human Resources.

1. Agriculture—Hawaii—Collected works. 2. Agriculture—Research—Hawaii—Collected works. I. Hawaii Institute of Tropical Agriculture and Human Resources.

II. Title: Research extension series - Hawaii Institute of Tropical Agriculture and Human Resources.

S52.6R47

630'.5—dc19

85-646281

AACR 2 MARC-S

Library of Congress

[8506]