

## CASE STUDY

### Japanese Nature Farming Research

*Ivan Kawamoto, Mokichi Okada Association*

Location: UH Waimanalo Experiment Station, O'ahu

#### Farm Description

The Mokichi Okada Association has been conducting field trials on Japanese Nature Farming for the tropics at the University of Hawaii Experiment Station since 1992. In 1998 they began a small scale one acre field trial designed to be a miniature version of a 5 acre farming system. They are in the process of studying a rotation system on 8 farm plots. They use farm machinery to mimic farming techniques for a 5 acre farm unit.

The MOA field plots are located at 200 ft. elevation, with 30-40 inches of rainfall/yr. The dominant soil is Waialua clay, 2-6% slope. Soils are moderately well drained occurring on alluvial fans. Runoff is slow and the erosion hazard is slight. Soil workability is slightly difficult.

Japanese Nature Farming seeks to use the "soil as fertilizer" rather than relying on additions of chemical fertilizers or animal manures and composts. They manipulate the soil food web with the addition of cover

crops to meet the fertilizer inputs required for crop production.

Management decisions are made by scientists in Japan who evaluate the data recorded in Waimanalo (fresh and dry weights).

#### MOA vegetable trials (8 plots)

1. Cowpea-green pepper-egg-plant-cowpea
2. Sorghum-soybean-sorghum-daikon
3. Bush bean-lettuce-crotalaria-choisum
4. Ryegrass-sorghum/mucuna intercrop-sunflower-ryegrass
5. Carrot/beet-guinea grass-bush bean-lettuce-onion
6. Crotalaria-corn/soybean intercrop-crotalaria-chinese cabbage
7. Dasheen/sweet potato – guinea grass – sweet potato/dasheen – pigeon pea
8. cowpea-guinea grass-pigeon pea

Other crops grown: Ginger, Taro



#### Overview of Sustainable Techniques Used

*Plant Diversity (via cover crops, windbreaks, vegetable crops)*

*Manipulating soil microbial processes*

*Green manures*

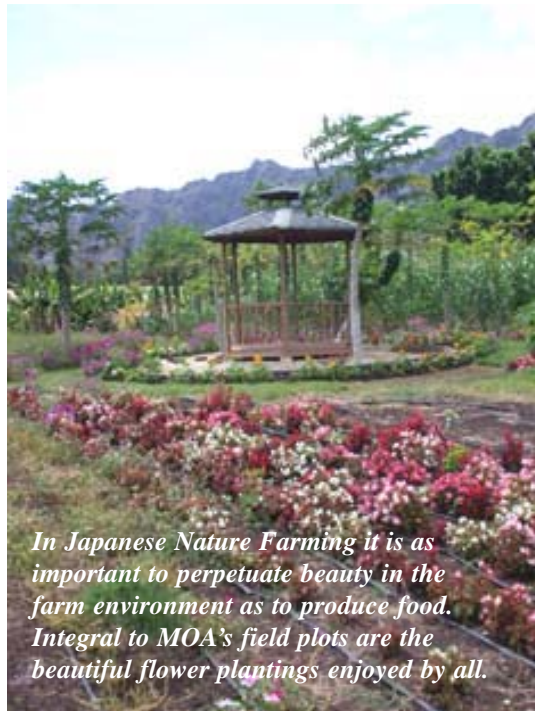
*Pest resistant cultivars*

*Transplanting*

*Sanitation*

*Crop rotation*

*Organic practices – based on Japanese Nature Farming philosophies*



*In Japanese Nature Farming it is as important to perpetuate beauty in the farm environment as to produce food. Integral to MOA's field plots are the beautiful flower plantings enjoyed by all.*

**Labor:** 2 full time employees. About 30 volunteers come out monthly to enjoy the farm and to help with hand labor. (very labor and equipment intensive).

**Machinery:** subsoiler, flayer mower, chisel plow

**Seed:** As available from UH, MOA, etc. They conduct variety trials to decide what cultivars to use.

**Planting:** They use transplants for cabbage, broccoli, wombok.

#### Cropping Sequence

4 crops/plot, rotate approximately every 3 months (except taro and ginger)

3 crops/year

**Intercropping:** For disease control MOA is experimenting with green onion interplanted with curcubits and chives interplanted with nightshades.

**Mycorrhizas:** They plan to conduct some trials with inoculating vegetables (onion) with mycorrhizas in the future.

## Soil Quality Impacts

Japanese Nature Farming stresses the need for aeration in the soil. Plots are subject to frequent use of machinery to obtain aeration via subsoilers and chisel plows. They also use flayer mowers for cutting their cover crops. A hard pan layer has been observed under the plots.

They are observing a decline in soil carbon over time and are concerned about its impacts.

They have observed that their soil tends to compact easily. They need to be extremely careful with the moisture content of the soil before using their machinery. Observers commented that perhaps it's due to overtilling and damage to soil aggregates.

Earthworms are present, but very deep in the soil (possibly due to overtilling).

Spade tillers (from Italy) might result in less damage to soil structure. Ripping and disking (rather than rototilling) may minimize damage to soil structure. No till trials might be another option.

## Green Manures

MOA's green manure experiments are unique. Currently they are planting green manures on each plot 50% of the time, and growing food crops 50% of the time (which obviously is not considered to be economically feasible). They are observing that the soils are becoming too enriched (based on feedback from Japanese researchers) and will be modifying their cropping system to grow edibles 75% of the time and green manure 25% of the time.

They are most impressed with crotolaria (high N, lots of OM, helps control nematodes), sorghum-sudangrass, mucuna and pigeon pea (high N).

They grow sunflower to mine phosphorous from the soil and make it available to future crops.

*MOA green manure trial with mucuna and sorghum.*



*MOA ginger and green onion intercropping trials to control fusarium.*

## Insect Pest Control

No IPM program is being implemented. Insect pest pressures include: leafhoppers (on beets), aphids (on daikon) and Chinese rose beetles.

Since the plots are located on an experiment station, they suspect that when insect pests are treated with chemical controls adjacent to their plots that many insect pests migrate to their trials for refuge.

Suggestions for insect control included:

- Promoting predatory wasps (already present)
- Using lights at night
- Using geese, free range chickens
- Growing insectary plants along borders

## Plant Disease Control

Against powdery mildew – neem oil (trilogy), kaligreen (Potassium bicarbonate)

## Weed Management

Initially they had a lot of weed seed banked in the soil. As they have worked the plots, their weed problems have decreased significantly as the seed bank declined. Now weeding problems are minimal with their frequent cropping sequence.

Nutsedge can become a problem in walkways for crops with a one year rotation (taro). Weeding is done before weeds go to seed, by hand with a hoe.

## Certification Program

MOA has a certification program for selling produce in Japan with different levels of certification and labeling available.

FMI on MOA and Japanese Nature Farming  
<http://www.moa-inter.or.jp/index.html>