Report on the Second Visit to the Mwoakilloa Atoll, Pohnpei, Federated States of Micronesia

Documenting and Promoting Local Food Crops

October 30 – November 7, 2004

By Dr. Lois Englberger, Amy Levendusky, Kehn Albert, Dr. Eliaser Johnson, and Yumiko Paul

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In conjunction with Pohnpei Agriculture of Office of Economic Affairs and Pohnpei State Department of Health

Contents of Report

Background
A project was initiated in 2003 to document the local foods that are growing on Mwoakilloa, assess a selection of these for nutrient content, and to promote the nutrient-rich local foods. This was led by a team including Dr. Eliaser Johnson, Yumiko Paul, and Dr. Lois Englberger. In addition to the community meeting and collection of information on the foods, samples of local foods were collected for nutrient analysis. A detailed trip report was written, including tables listing the cultivars grown on the atoll and their primary identifying characteristics. Tables were prepared to present the analysis results, and sets of photographs were prepared to include in the report.

A second visit was made to Mwoakilloa in 2004, supported by the SPC Pacific German Regional Forestry Project. Dr. Englberger and Amy Levendusky departed 29 October. The joint visit was four days, with Dr. Englberger returning 1 November and Ms. Levendusky returning 8 November. Mr. Kehn Albert, Health Assistant for Mwoakilloa, ably facilitated the visit.

Aims
The aim of the visit included:

- Documentation of the names and characteristics of the food crops
- Photographing the food crop varieties
- Sharing the results of the food crops collected and analyzed
- Bringing banana planting material for distributing
- Collecting pandanus and giant swamp taro for the Pilot Farm collection

Five *Karat*, 2 *Mangat*, and 1 *Ihpali* suckers were treated chemically for disease control and taken and distributed in Mwoakilloa. Cuttings of these green leafy vegetables were taken and distributed: spinach, kang kong, and basel.

Thirty-one attended the group meeting (Appendix 1). Dr. Englberger and Amy Levendusky explained about how food crop varieties are now being collected and planted at the Pilot Farm in Pohlangas, Madolenihmw, and information on the characteristics of the food crops are being studied and documented. It was explained that this project is also aimed at conserving the varieties.

The meeting participants agreed that it would be a good thing to provide planting material of giant swamp taro for the Pilot Farm, despite the fact that there is sometimes a hesitance on giving planting material of this, due to the importance of this crop. One participant said, “I am kind of proud that we in Mwoakilloa are being asked to do this” (as it shows that Mwoakilloa has something special that Pohnpei does not have). It was agreed that the collection for Mwoakilloa plants would be planted in one place, and if possible a sign made saying that this is the Mwoakilloa Collection.

A sample of green papaya jam prepared by Anna Santos and a sample of Marshallese preserved pandanus was brought for tasting. There was interest in both and questions

were asked on how to make these. A written description was provided (Appendix 2). Most informants said that they had not previously tasted preserved pandanus, but several said that they had heard that people in Mwoakilloa used to make it. One lady said that she had tasted it. Informants gave *Sehnikun en Kipar* as the local name.

The idea of promoting pandanus was discussed. Mr. Albert pointed out that at their New Year's festivities the different varieties of giant swamp taro are displayed and there is a competition with prizes to the farmer presenting the best ones, but that there is no such competition for pandanus and that this might be something to do. It was agreed that this should be discussed with Dr. Eliaser Johnson and that possible follow-up is carried out. It was agreed that a calendar of different pandanus varieties would also be of interest.

Pandanus varieties collected and planted at the Pilot Farm (1 cutting each) included these:

Variety name (collected by Kehn Albert)

1. *En Pesi*	5. *Mehkilkil*
2. *Insohl*	6. *Nehnkedahk*
3. *Juaipwehpw*	7. *Mwajak*
4. *Luarmwe*	8. *Jorihm*

Giant swamp taro varieties collected and planted at the Pilot Farm (10 plants each) included these:

Variety name	Farmer providing the plantlets
1. *Nihn-Jaimon*	Nelson Albert
2. *Nihn-Abrahm*	Nelson Albert
3. *Nihn-Dannis*	Nelson Albert
4. *Nihn-Dijohn*	Nelson Albert
5. *Palingahling*	Apiner Jim
6. *Jehm*	Apiner Jim
7. *Nihn-Ringlen*	Lincoln Lebehn
8. *Nihn-Doahm*	Lincoln Lebehn
9. *Nihn-Robis*	Noreen John
10. *Nihn-Eneri*	Edward Dannis
11. *Wiklale*	Marciano Edmond
12. *Nihn-Limwei*	Marciano Edmond

For each set of 10 plants/variety a payment was provided of $2.

During the group meeting and in other interviews throughout the visit information on the names and characteristics of the food crops varieties were collected and collated (Appendix 3-9). Further information on local recipes was also collected (Appendix 10). Photographs were labeled and filed electronically (Appendix 11). Descriptions of samples taken were documented with the previous sample descriptions (Appendix 12). Information was shared on the analysis results (Appendix 13), in addition to the laminated Mwoakilloa Vitamin A cards that were distributed and displayed at the Health Dispensary and the Mwoakilloa School Library.

Appendix 1

Participants in the Mwoakilloa Community Meeting on Documentation and Promotion of Local Food Crops. Mwoakilloa Municipal Office, 30 October, 2004.

Names of Participants	Gender	Names of Participants	Gender
1. Kehn Albert	Male	17. Apiner Jim	Male
2. Lincoln Lebehn	Male	18. Romeo Joel	Male
3. Kalio Lebehn	Male	19. Eliou Peter	Male
4. Ritson Luhda	Male	20. Tonny John	Male
5. Nelson Albert	Male	21. Danson Obed	Male
6. Bruce John	Male	22. Kidron Dannis	Male
7. Marciano Edmund	Male	23. Sosol Jimina	Male
8. Biuleen Obed	Female	24. Nohreen John	Female
9. Nohreen Edmund	Female	25. Maraia Jim	Female
10. Kihna Lipai	Female	26. Grent Jossien	Male
11. Eddy Peter	Male	27. Scott Peter	Male
12. Richard Ben	Male	28. Danny Henry	Male
13. Ronald Albert	Male	29. Dr. Lois Englberger	Female
14. Charley John	Male	30. Amy Levendusky	Female
15. Spencer Obed	Male	31. Christina Caros	Female
16. Edward Dannis	Male		

Appendix 2

Recipes Presented by Dr. Lois Englberger – Samples for tasting provided

Preserved Pandanus or *Sehnkun en Kipar*
(recipe explained by key informants from the Marshall Islands and Kiribati)

1. Cook pandanus by boiling, using the variety that has a lot of pulp.
2. Scrape out the pulp. Clean out any waste pieces and remove fibrous parts.
3. For preserving for a longer period of time, cook again.
4. Put in sun to dry for 3-5 days, patting out as long sheets placed on plastic sheets.
5. The plastic sheets should be placed on elevated trays.
6. Watch over the pandanus pulp, fanning away flies and keeping away the animals.
7. When it is fully dried, then cut into smaller rectangular pieces.
8. These can be rolled up tightly and bound by pandanus in the traditional style.
9. These can also be folded (twice) and stored in plastic containers (as now done in Kiribati).
10. Serve as a sweet snack, like dates.
11. Or, as an option, this can be mixed with water to make a drink or can be mixed with coconut cream for making a jam-like pudding for eating with other locally grown foods as breadfruit or spreading on bread as a jam.

Only one lady said that she had ever tasted Sehnkun en Kipar in her life. Most said that they had never tasted only heard of Sehnkun en Mahi, made from the seeded breadfruit.

Green Papaya Jam (recipe explained by Anna Santos, Pohnpei)

1. Peel and slice green papaya.
2. Put on 1 ½ teaspoon salt, mix in, and cover for the night.
3. On following morning, rinse and wash out salt.
4. Cook the papaya until cooked and stir occasionally.
5. Measure the papaya roughly and then add an equal amount of sugar.
6. Cook again and stir until thick.
7. Add 1-2 limes and also the skin of the lime.
8. Add purple food coloring, if desired.
9. Pack into glass jar until almost full.
10. Turn upside down until cool to sterilize the lid and help preserve.

Appendix 3 Giant Swamp Taro (*Cyrtosperma chamissonis*) *Mwehng* Cultivars – List updated from November 2003

Cultivar-Variety	Corm Color	Stem Description	Thorns	Other comments
1. Jehm	Very yellow	Green/purple, black dots	no	Most sticky, good to eat just boiled and um.
2. Jeria	Yellow	Green	no	Corm has one bottom, but 2-3 stems.
3. Jikohki	White/yellow	Dark green, slender, long	no	Name means airplane, maybe fast-growing. Big corm, good for *maitahlik*.
4. Jimihden	Yellow	?	?	Rare, from Sapwuafiq, may be gone, they would like to get.
5. Joanpwongwenou #1	Very yellow	Dark red	no	Grows fast, good for *rodimadok*. There are two types.
6. Joanpwongwenou #2	Light yellow	Light red	no	Grows fast, good for *rodimadok*. Has a larger corm than the other one.
7. Nihn-Abrahm, Nihn-Allen	White	Red-purplish	yes	Thorns are scattered, develop only when plant is older.
8. Nihn-Dihjon	Light yellow	Green-reddish purple	no	Slender corm, big long plant, not many baby plants, at most 3.
9. Nihn-Dannis	Light yellow	Green	no	Many baby plants, plenty of roots.
10. Nihn-Eneri	Yellow	Light green	No	Big plant, big corm. Good for competition, fast-growing.
11. Nihn-Jaimon	White/yellow	Red with zigzag stripes	no	Fast growing, good for boiling, and for *pilohlo* and *rodimadok* recipes.
12. Nihn-Limwei	Light yellow	Green	no	Name refers to a woman, all rest of *Nihn* ones refer to a man's name.
13. Nihn-Ringlen, Nihn-Ring	Light yellow	Less purple to N-Doahm	yes-lots	More thorns than Nihn-Doahm but less than *Nihn-Simion*. Very sticky.
14. Nihn-Simion	Light yellow	Red-purple	yes-lots	More thorns than Nihn-Ring
15. Nihn-Doahmw	Yellow	Darker purple to N-Ring	yes	Less thorns than Nihn-Ring, thorns scattered. Big corm, good for boiling.
16. Saleng	Very yellow	Green,white zigzag stripes	no	Small growth called an ear on underside of the leaf. Very sticky.
17. Wiklale	Yellow	Red with black spots	yes	From seed of *Joanpwongweneu* (6-month). Fast growing strong plant
18. Nihn-Perehs	-	Light green	-	Usually a big corm.
19. Wahrau	-	-	no	Small plant, small corm.
20. Nihn-Kilinsen	Yellow	Green	no	They had it many years. Not very sticky
21. Nihn-Ropis	?	Light pink	yes	
22. Palingahling	Yellow	Green striped		Small corm, very sticky, good for boiling, gives many plants, easy growing.
23. Aikem	Yellow	Dark	no	Big corm, good for boiling and competitions.
*Don'tkeephim (*from Sapwuahfiq), *Tekaroi, Pahmedel*			-	Three varieties that they used to have, but they are now gone.

Bulibul (term)	Stickiness of cooked taro, which is highly valued for eating quality.
Wehnmwehng (term)	All varieties growing from the seed, refers to taro such as *Nihn-Abrahm, Nihn-Dihjon, Nihn-Dannis* etc..

Appendix 4 Pandanus (*Pandanus tectorius*) *Kipar* Cultivars

Cultivar-Variety	Key size	Bunch size	Key color	Textur	Raw /Cook	Comments
1. Juaipwehpw	big/medium	medium	light orange	*	both	Common. Two kinds, one crunchy (keys fall from bunch), one not crunchy.
2. Jipwehrik	big	big	very orange	*	both	Getting a bit rare. Most all are tall trees; good for *maitahlik, peru*, baby food.
3. Doapwoahdin	small	medium	very orange	§	both	Common. Good for *maitahlik*, p*eru*, babies, much *mokwan,* soft sweet. Tall tree.
4. Kipar in Masal	big	big	orange	§	both	Variety from the Marshalls. Like Mwajak, but crunchy.
5. En Kehlen	medium	big	light orange	§	both	Very different, juice is more sticky. Some say it is same as Lehkmwahn.
6. Luarmwe	medium	medium	orange - 9	*	both	Common. One-keys fall when ripe. Other-if left on plant it splits. Sweet, juicy.
7. Mwajak, Kipar en Jelwij	medium	medium	light orange	*	both	Common. Very sweet, crunchy, good for handicraft. From Jaluit.
8. Mehkilkil	small	small	orange	**	raw	Rare. Very crunchy, you can eat almost all of it.
9. En Pesi	big	big		?	Both	Rare, much mokwan, best one for Maitahlik but rare so Jipwehrik is used.
10. Nehnkehdak	medium	medium	Light -5	∓	both	Rare. Almost like *Mehkilkil*. Rare, medium crunchy, a little itchy.
11. Insohl	medium	medium	very orange	*	both	Rare, may be gone, not very sweet. Keys look like *Deipw*.
12. Deipw	medium	medium	light orange	*	raw	Rare. Has a seed, eaten raw, extractable without knife. May be gone.
13. Lehkmwahn	big	big	yellow	med		Rare. Variety from the Marshalls.
14. Moakoskos	small	small	light orange		both	Rare, maybe gone, not so sweet and not so popular.
15.Johnmonoia	big	big	Light orange	*	raw	Rare, great favorite. Slow growing, harvest 1x in 1-2 years. Very sweet.
16. Mahngoron	big	big	very orange	§-	both	Rare. Same as *Doapwoahdin*, but bigger. Lots of *mokwan*.
17. Johrim (man name)	medium	medium	med.orange	?	both	Rare. Introduced after World War 2, good for *maitahlik*, babies, flat end.
18. Wetetet	Small, big?	big	light orange	**	both	Rare. Introduced after World War 2, sweet, not much mokwan.
19. Aida (woman name)	small	medium	light orange	*	raw	Rare. Very sweet, old one, real Mwoakilloaese. Rare, you do not often see.
20. Oarwehnin pehn pajjo	small	?	light orange	*	both	A type of *Oarwehn* pandanus that is edible.
21. Nelu	?	big	?	§	?	Several families were said to have it.
22. Kipar in Pid	?	?	?	?	?	Variety from Kiribati. Listed in dictionary.
Oarwehn	small		light orange		-	3-5 kinds, grow by seed, wild, inedible, very itchy. Good for building.
Ummahng	no fruit		-		-	
Pwenpwel, Jukpej, Mehusik, Lojokdad						Varieties that were once on Mwoakilloa, but no longer there.

Moang in kipar= key that is to be consumed. P*ej* = key that is already consumed and is to be thrown away. Kipar= tree, also the bunch. * Masak= hard §-Pidadad= soft ∓ -Pwudong= itchy.

Nigid= chew, how pandanus is consumed (not *kang*, eaten). ** *Sipwalpwal* or *ngorngor* = crunchy, referring to the highly valued crunchy characteristic.

Appendix 5 Banana (*Musa sp*) *Wus* Cultivars

Cultivar-Variety	Pohnpei name	Characteristics
1. Daiwang	*Taiwang*	Only one person grows it (on Urik Island), it is not harvested or eaten
2. Inahjio or *Kiewok*	*Inasio Pehses*	Most common banana on Mwoakilloa, has thin light-green skin
3. Ihpali	*Ihpali*	One person has it, but he will not share
4. Johrumw	*Inasio Poh Rotoro*	An *Inasio* type having thicker blackish-colored skin
5. Kalpohnia	*UtinMenihle*	Same as Pohnpei variety
6. Poupoulap	*Utin Ruk*	Same as Pohnpei variety
7. Wus Amerkoair	*?*	Documented in the Mwoakilloaese dictionary as having S America origins
8. Wus Karas	*Karat*	Four families were reported to have this banana, more want it
9. Wus in Kerenis	*UtinKerenis*	A number of families have the variety
10. Wus in Kuamw	*UtinGuam*	Same as Pohnpei variety
11. Luhda	*Mangat ?*	Very yellow flesh, is similar to *Ihpali,* long fingers, very curved
12. Pihji	*Utin Pihsi*	Fairly common in Mwoakilloa, same as Pohnpei variety
13. Prejil	*Praisihl*	It only grows on the uninhabited island Urek, same as Pohnpei variety.
Wus Akadahn, Wus in Yap	*Akadahn, Utin Iap*	They were previously grown, but died out

Appendix 6 Breadfruit (*Artocarpus altilis* and *Artocarpus mariannensis*) *Moai* Cultivars

Cultivar-Variety	Pohnpei Name	Seeded or Unseeded	Characteristics
1. Moai Pa	*Mei Kole*	Seeded	Very yellow flesh, eaten raw + cooked, now neglected, often left for the pigs.
2. Moai Si	*?*	Seeded	May no longer be grown; or may be on Urik (uninhabited island)
3. Moai Soal	*?*	Seeded	Skin is blacker, inside is yellow
4. Moai Kalak	*Mei Kalak*	Unseeded	Smooth-skinned
5. Moai Samoa	*?*	Unseeded	Smooth-skinned
6. Moai Soahid	*?*	Unseeded	Smooth-skinned
7. Moai Upw	*Mei Uhpw*	Unseeded	Smooth-skinned. Bearing almost continuously.
8. Moai in Pahdak	*?*	Unseeded	Type of *Moai Joapwoahroak* (rough-skinned)
9. Moai Ngeljoau	*?*	Unseeded	Type of *Moai Joapwoahroak* (rough-skinned)
10. Moai in Uhrek	*?*	Unseeded	Type of *Moai Joapwoahroak* (rough-skinned)
11. Moai Id			
12. Moai Soahid			

Appendix 7 Common Taro (*Colocasia esculenta*) *Jawa* Cultivars

Cultivar-Variety	Characteristics
1. Jawahn Anser	Variety name refers to a person's name
2. Jawa Boadi	*Boadi* and *Soal* both have black stem, Soal has a larger stem
3. Jawa Dawa	Used to grow on Mwoakilloa, but may now be gone
4. Jawahn Jeipan	Green stem. Big plant, you only eat the corms branching out from the main one.
5. Jawa Kajang	Red stem. Instead of 1, not a single corm.
6. Jawa Mweng	Very large corm
7. Jawahn Pihji	Variety coming from Fiji
8. Jawahn Palau	Variety coming from Palau
9. Jawa Soal	Black stem
10. Jawa Wasa	Red stem
Jawahn Yap	Variety coming from Yap, no longer on Mwoakilloa. Some other varieties may however be on Mwoakilloa

Appendix 8 Coconut (*Cocos nucifera*) *Nih* Cultivars

Cultivar-Variety	Characteristics
1. Atol	The husk can be eaten, either raw or cooked. When cooked, it may be eaten with copra.
2. Nihnpwinso #1 and #2	Dwarf tree brought from Pohnpei, fast-growing, may harvest after 5 years. #1-Green-skinned coconut. #2- Orange-skinned
4. Nih regular	Tall tree, several kinds (green and orange-skinned). Best for drinking coconut and for copra.
5. Nihsik	Tall tree, the coconut is smaller than the regular one, sweetest of all coconuts.
6. *Nihroam*	Yellow-skinned coconut. (Nihroam is pronounced “Nihrahm”)

Terms for coconut stages

Kurup	1st stage. Very small amount of liquid.
Upw	2nd stage. Some liquid but little flesh
Pen pwulopwul	3rd stage. Some liquid, some flesh, but still the shell is very soft.
Pen mere	4th stage. Drinking coconut.
Pen mwangas	5th stage. Flesh is not quite hard, not yet copra.
Oaring	6th stage. Flesh is hard, this is the copra stage.
Par	7th stage. Sprouted coconut.

Appendix 9 Citrus (*Citrus aurantifolia*) cultivars

Name	**Description**
Karer en Sashimi	Used frequently for preparing raw fish (sashimi). The common one on the island.
Karer Lopwlopw	Highly valued, planting material is needed.
Karer en Richard	Large fruit with rough skin. Fibrous, little juice, and thus not so well-liked.
Karersik	Called *Karertik* or *Kalamansi* in Pohnpei, planting material is needed. Presently only one tree on the atoll.

Appendix 10 Traditional Recipes for Selected Food Crops

Pilolo in Mweng

1. Grate raw giant swamp taro.
2. Add a little starch.
3. Add coconut cream and mix well.
4. Cook sugar until caramelized (or molasses), add water and pour into baking tin.
5. Make oval-shaped balls about a cup in amount and place in baking tin.
6. Bake in charcoal oven about an hour.

Note: There are variations on this recipe. Kehn Albert pointed out that he prepares a pilolo with grated giant swamp taro, pounded ripe banana, and the pulp extracted from boiled pandanus (mokwan).

Pilolo in Maai (this is considered a new recipe)

1. Peel breadfruit, cut in pieces and boil.
2. Take the boiled breadfruit and mash.
3. Add a little starch and sugar.
4. Shape into oval pieces and place in baking tin or pot.
5. Bake or boil about 30 minutes until done.

Maitahlik

1. Boil pandanus keys.
2. Squeeze out juice (*mokwan*).
3. Mix with coconut cream.
4. Put in a little sugar.
5. Grate giant swamp taro.
6. Make balls.
7. Add the pandanus and coconut cream mixture and put in baking tin.
8. Bake.

Beru

1. Boil pandanus keys.
2. Squeeze out the pulp (*mokwan*).
3. Mix with coconut cream.
4. Put in a little sugar.
5. Mix all together.
6. Put in pan and bake for about an hour.

Rodima

1. Grate raw taro.
2. Add coconut juice, or water and sugar.
3. Put into baking pan.
4. Bake for an hour.

Rodimadok

1. Grate taro.
2. Put in parcels (taro leaf) and put in oven and bake.
3. Take baked taro from parcel, put in basin, and break apart.
4. Add coconut juice, or water and sugar, mix, and it is done.

Rodima Wus

1. Grind taro.
2. Pound ripe banana.
3. Add coconut juice or water and sugar.
4. Put in baking tin and bake for about an hour.

Pilolo Sawa

1. Cook common taro, *Colocasia esculenta*. (It is too itchy to grind raw)
2. Pound it and break it apart.
3. Add coconut cream.
4. Cook sugar and add.
5. Put in baking tins and bake.

Rugol

1. Grate coconut.
2. Add flour, sugar, and water making a batter.
3. Prepare banana parcels, soften banana leaves, and de-rib leaves.
4. Put about a cup of batter on a banana leaf and wrap up.
5. Place in the charcoal oven and bake for about an hour.

Joampwul

1. Grate green banana.
2. Add a little coconut cream.
3. Wrap in hibiscus or banana leaves, plastic, or tin foil.
4. Boil.

Mwul in Wus

1. Grate green banana.
2. Put in a little sugar.
3. Prepare coconut cream separately and put in a pot with water (about 1 cup coconut cream to 2 cups water) and bring to boil.
4. Scoop the green banana mixture by spoonfuls into the boiling water.
5. Cook about 20-30 minutes.

Joampwul

1. Grate green banana.
2. Add a little coconut cream.
3. Place small scoops of the banana mixture on pieces of hibiscus or banana leaves or tin foil or plastic.
4. Boil in a pot of water.

Appendix 11 Photographs Taken

Trip #1, November 2003. Photos by Dr. Lois Englberger

Arrival on island	Photo on beach of team, photo in boat to go to town center
Community meeting	Photos of Dr. Johnson presenting talk to the community
	Photo of Ms. Paul presenting food display
	Photo of man looking at the Pohnpei Food Cultivars album
	Photo of wall display of Pohnpei Vitamin A-rich Foods
Giant swamp taro	Photos of local expert, Nelson Albert, in the taro patch
	Photos of 8 varieties of young taro plants, showing differences
	Photos of stems of mature taro corms and colorations
	Photo of rows of taro and irrigation ditch
	Photo of flower of giant swamp taro
	Photo of hand taro grater with Kehn Albert
	Photo of child eating cooked taro piece
	Photo of man cutting peeled taro into pieces
	Photo of woman grating taro with grater
	Photo of family preparing *Pilolo Mweng* with 6-moon taro
	Photo of team preparing taro corm samples
	Photo of *Wiklale* cut taro corm
Pandanus	Photo of keys of *Kipar en Jelwij, Mwajak en Kehlen, Jorum, Mehkilkil, Kipar en Majal, and Doapwatin* comparing colors
	Photo of keys of *Mwajak*
	Photo of children eating pandanus keys
	Photo of the *Waikong* utensil for scraping pulp from the keys
Banana	Photo of *Inajio* bunch and photo of woman pounding *Wus en Pihji*
Coconut	Photo of low-bearing dwarf coconut with woman
Cooking	Photos showing the preparation of fire, de-ribbing banana leaves, *Rugol* batter, putting *Rugol* mixture into banana packets, and putting banana packets into the charcoal oven by Caroline
Group photo	Group photo of team assisting in the sample collection including Dr. Eliaser Johnson, Yumiko Paul, Kehn Albert, Marciano Edmund, Nelson Albert

Trip # 2, October – November 2004. Photos by Dr. Lois Englberger

Giant swamp taro	4 varieties of plants, Nelson Albert
	Nihn-Ringlen, Nihn-Doahm: 2 sets/10 plantlets, Lincoln Lebehn:
	Nihn Eneri: plant sets of 10 with owner Edward (photo too dark)
	Nihn-Palihnaling, Jehm: 2 plant sets, owner (photo too dark)
	Nihn Robis: plant with owner lady
	Flowers of plant, different colors per variety, reddish vs pink
	Taro stems: *Nihn-Ringlen* and *Nihn-Doahm*
	Taro stems: *Nihn-Palihngalign, Nihn-Eneri*
	Taro stems: *Nihn-Robis, Nihn-Jehm*
	Taro stems: *Nihn-Dijohn, Abrahm, Robis, Jehm*
	Taro stems: *Nihn-Dannis, Jaimon, Palihngaling, Eneri*
	Taro stems: *Nihn-Dijohn, Abrahm*
	Taro stems: *Nihn-Dannis, Jaimon*
	Taro patch
Pandanus	*Wetetet* bunch, green, still on tree (by roadside near Ikaikai's)
	Nehnkedak bunch, green, still on tree (by coast side)
	Nehnkedak bunch, ripe, still on tree (by coast side)
	En Kehlen bunch, ripe, still on tree (by school)
	En Pesi bunch, green, still on tree (by coast side)
	Child chewing *Mwajak*
	Child chewing *Juaipwehpw*
	Children including baby RC chewing *Mwajak*
	4 keys including *Juaipwehpw, Luarmwe, En Kehlen, Nehnkedak*
	5 keys including those above and *Doapwoahdin*
	Key next to stem (mwak) with stem
	Mwajak cut bunch
	Kehn preparing and labeling pandanus cuttings
Food	*Pihlolo mweng* dish
	Pihlolo mahi dish
	Pihlolo wuhs dish
	Ladies preparing the buffet line of plates of food (2)
	Rodimadok, Jaipok, and Fish- served on plate
Mwoakilloa	Aerial views, front side of island and back side of island
	View of the village, taken from the boat in the water
	View of Kehn and Tina Albert's home, taken from boat in water
Other	Kehn Albert showing Vitamin A Cards, pointing out pandanus
	Kehn and Tina Albert, Amy, Christina, RC, and Irene holding cc
Children	Amy with children (2 photos)

Trip # 2, October – November 2004. Photos by Amy Levendusky

Pandanus	Doapwoahdin bunch, ripe, on tree
	En Kehlen bunch, ripe, still on tree (by the school)
	Insohl bunch, green, still on tree
	Jipwehrik bunch, green, still on tree
	Johnmonoia bunch, green, still on tree
	Juaipwahpw bunch, ripe, still on tree
	Luarme bunch, ripe, still on tree
	Mehkilkil bunch, green, still on tree
	Mwajak bunch, ripe, still on tree
	Nehnkehdak bunch, ripe, on the ground
	Wetetet bunch, green, still on tree
Other	Karlise Ben holding Coconut crab
	Sunset over the water

Appendix 12 Sample Descriptions (from November 2003 and 2004)

Giant swamp taro: Details on Whole Corms (Samples taken in November 2003)

Cultivar name	Corm Weight pounds	Length cm	Girth cm	Corm Edible Portion Roche Fan Color Measure
1. Nihn-Jaimon (2 corms)	8, 14.7	29, 29.5	47, 65	1
2. Jikohki (1 corm)	4.5	22	45	<1
3. Six-moon white (1 corm)	7.5	25	65	1
4. Six-moon red (1 corm)	14.75	35	58	1 in middle 4-5 in outer part
5. Jehm (3 corms)	8.5, 11.25, 11	20, 23, 18	47, 53, 55	1
6. Wahrau (1 corm)	8.5	23	50	1
7. Wiklale (1 corm)	9	29	48	<1
8. Nihn peres (1 corm)	6	19	48.5	1

Pandanus: Details on whole keys (edible and inedible portions) (Samples 2003/2004)

Cultivar name	Key Weight grams	Length cm	Girth cm	Key Edible Portion Roche Fan Color Measure
1. Mehkilkil (7 keys)	Range 44-82 Mean 64	7	Range 12-15 Mean 14	5 inner 50% 9 outer + streaks 50%
2. Doapwoahdin (6 keys)	Range 130-212 Mean 156	11	Range 17-21 Mean 18	3 inner 35% 9 + 11 middle 30% 14 outer 25% 11 outer 10%
3. Mwajak (6 keys)	Range 134-158 Mean 143	9	Range 19-20 Mean 20	9 inner 45% 11 outer 45% 14 outer streaks 10%
4. Kipar en Majal (7 keys)	Range 126-202 Mean 165	10	Range 17-21 Mean 20	8 inner 90% 11 outer 10%
5. Jorum (7 keys)	Range 74-112 Mean 89	8	Range 15-18 Mean 16	9 inner 50% 11 outer + streaks 50%
6. En Kehlen (6 keys)	Range 94-126 Mean 111	9	Range 16-16.5 Mean 16.5	9 inner 90% 14 outer streaks 10%
7. Nehnkedak	Range 90-114 Mean 99	8	Range 16-18	Range 5-6. mostly uniform color
8. Juaipwehpw	124	8	20	3 inner 20% 8-9 middle 70% 12 outer ring 10%
9. Luarmwe	Range 98-130 Mean 115	9	Range 16-18 Mean 17	Range 10-11 mostly uniform

Pandanus Taste Description

Cultivar name	Sweetness	Flavor/Aroma	Texture/Pulp	Overall Comment
1. Mehkilkil	Very sweet	Very flavorful.	Crunchy. Less fibre, you can almost eat it.	Easy to extract, not much fiber, good flavor, and favorite of all.
2. Doapwoahdin	Very sweet	Very strong nice flavor. Smells like fresh paint.	Very pulpy.	Would be nice for using pulp for making a fruit salad dressing.
3. Mwajak	Very sweet	Most flavorful.	More pulp.	Easy to extract juice and pulp.
4. Kipar en Majal	Very sweet	Citrusy and fanta-like.	Strings not too tough.	Easy to eat, top half much more citrusy.
5. Jorum	Less sweet	Not as flavorful.	More strings.	Slightly itchy.
6. En Kehlen	Very sweet	Pear-like flavor.	Pear-like consistency.	Easy to extract.
7. Nehnkedak	Sweet	No itchiness after being in refrigerator		Medium juicy
8. Juaipwehpw	Very sweet	Flavorful	Crunchy	Easy to consume
9. Luarmwe	Very sweet	Flavorful	Juicy	Different to others

Description of methodology: The taste description and documentation was carried out in Pohnpei as a panel of two persons, Dr. Englberger and Ms. Catherine Sundvall, thanks are extended for her assistance. It is noted that Ms. Sundvall had had no prior experience of tasting this food but she liked the taste greatly and was enthusiastic about the fruit. The keys were very ripe and had been kept in the refrigerator for three days after harvesting. The inedible ends of the keys cut from the part taken for the samples were used for the tasting exercise as there is always some pulp remaining in that end. For some cultivars, the keys were very large for the samples (amount which was kept at total weight 150-250 grams due to the logistics of storage and transport to the laboratory). Thus the large keys were cut in halves, and half of each key was used for the sample, leaving the other half for the tasting panel, and also a few replicate samples for possible analysis at a second laboratory.

Results and recommendations: Each cultivar had a distinct taste. Further work on taste description and documentation of the different cultivars, including comments from a wider range of persons, including Mwoakilloaese and other Micronesians would be useful.

Appendix 13

Table 1 Carotenoid content of selected cultivars of ripe pandanus *Pandanus tectorius* (µg/100g edible portion, means of duplicate analyses)

Cultivar Name[a]	Raw or cooked[b]	N[c]	Color of edible flesh[d]	ß-carotene	α-carotene	ß-cryptoxanthin	Lutein	Zeaxanthin	Total carotenoids[e]	% Water
Kapingamararangi										
Dolongahai	Raw	10	Orange. R5-30%, R9- 60% R14- 10%	300	50	20	130	220	2510	80
Dalinga	Raw	6	Orange. R8- 90%, R14- 10%	180	10	10	40	100	1920	79
Mwoakilloa										
Kipar en Majal	Raw	7	Orange. R8-90%, R11-10%	280	10	20	20	110	1470	79
Mwajak	Raw	6	Orange. R9- 45%, R11- 45% R14- 10%	250	10	10	20	160	1670	80
Jorum	Raw	6	Orange. R9- 90%, R11- 50%	240	40	<10	180	160	1500	80
Mehkilkil	Raw	7	Orange. R5-50%, R9-50%	190	30	<10	90	LOD	1510	82
Doapwoadin	Raw	6	Orange. R3- 35%, R9-11-30%, R14- 25%, R11- 10%	180	20	10	70	110	1170	78
En Kehlen	Raw	6	Orange. R9 inner 90%, R14 outer 10%	110	<10	20	40	20	1100	81

Note: HPLC analyses carried out by DSM Nutritional Products, Switzerland. Kapinga samples were collected July 2003. Mwoakilloa samples were collected November 2003. Samples were delivered to the laboratory December 22, 2003; analyses carried out in March 2004. na-not available LOD: Below detection limit.

[a] Names are those used on the respective islands. All samples were also analyzed for lycopene, but contained LOD.

[b] Samples were prepared raw or cooked. If cooked, the keys were boiled for 30 minutes in a covered stainless steel pot.

[c] Number of keys in one composite sample. Samples were composed of one bunch.

[d] Color was described visually and also measured on raw or cooked keys using the Roche Color Fan, numbers ranging from 1 to 15 for increasing colorations of yellow and orange.

[e] Estimated by calculating total peak areas recorded in the chromatograms (using the response factor of ß-carotene); this includes xanthophyll- and cryptoxanthin-like compounds.

Table 2 Carotenoid content of selected cultivars of Micronesian giant swamp taro *Cyrtosperma chamissonis* (µg/100g edible portion, means of duplicate analyses)

Local name[a]	Source[b]	Cooked or raw[c]	Corm age	N[d]	Color of raw flesh[e]	ß-carotene	α-carotene	ß-crypto-xanthin	Lutein	Zeaxanthin	Total carotenoids[f]	% Water
Yubekmang	Palau	Cooked	5 y	2	Yellow: R6.5	1510	450	10	260	LOD	2270	49
Bolabei	Palau	Cooked	4 y	1	Yellow: R 3	630	320	10	90	LOD	1090	51
Adbuweg	Yap	Raw	3 y	3	Yellow: R 1.5	500	100	<10	160	LOD	760	49
Jehm	Mokil	Cooked	na	3	Yellow: R 1	380	150	<10	80	LOD	690	55
Jikohki	Mokil	Cooked	na	1	Yellow: R 1	380	140	<10	30	LOD	600	58
6-moon red	Mokil	Cooked	na	1	Yellow: R 1	350	150	10	50	LOD	730	60
Teggur	Yap	Raw	5 y	3	Yellow: R 1.5	330	90	LOD	60	LOD	550	57
Teggur	Yap	Cooked	5 y	3	Yellow: R 1.5	180	70	<10	40	LOD	380	52
6-moon white	Mokil	Cooked	na	1	Yellow: R 1	310	90	<10	30	LOD	480	70
Adid	Yap	Raw	4 y		Yellow: R 1.5	310	110	<10	50	LOD	570	51
Adid	Yap	Cooked	4 y	3	Yellow: R 1.5	290	110	<10	80	LOD	520	59
Wiklale	Mokil	Cooked	na	1	Yellow: R 1	290	150	<10	30	20	490	65
Nihn Peres	Mokil	Cooked	na	1	Yellow: R 1	280	140	<10	90	LOD	540	62
Wahrau	Mokil	Cooked	na	1	Yellow: R 1	240	100	<10	20	LOD	430	50
Jaimon	Mokil	Cooked	na	2	Yellow: R 1	150	40	LOD	40	LOD	300	71
Gamaigul	Yap	Raw	1 y	3	White: R <1	50	10	LOD	60	LOD	160	69

Note: HPLC analyses carried out by DSM Nutritional Products, Switzerland in March 2004. Yap and Palau samples were collected in August 2003; Mwoakilloa samples were collected November 2003. The samples were delivered to the laboratory December 22, 2003. LOD: Below detection limit.

[a] The local name is provided for each cultivar by country or island. All samples also analyzed for lycopene, but contained LOD.

[b] Samples from Palau and Yap (main island), Federated States of Micronesia (FSM), and Mwoakilloa, FSM were collected from the main islands.

[c] Corms were peeled, cut into pieces around 3 cm thick and 10 cm in diameter according to size of corm, and boiled for 40 minutes in a covered stainless steel pot. Some samples were frozen raw, due to difficulties of preparing boiled samples at the place of collection.

[d] Number of corms in one composite sample.

[e] Color of raw corm was described visually and also measured using the Roche Color Fan, numbers ranging from 1 to 15 for increasing coloration of yellow and orange.

[f] Estimated by calculating total peak areas recorded in the chromatograms (using the response factor of ß-carotene); it includes xanthophyll- and cryptoxanthin-like compounds.

Table 3 Carotenoid content of selected cultivars of other fruit (µg/100g edible portion, means of duplicate analyses)

Name[a]	Source[b]	Raw or cooked[c]	Maturity	N[d]	Color of flesh[e]	ß-carotene	α-carotene	ß-crypto-xanthin	Lutein	Zeaxanthin	Lycopene	Total carotenoids[f]	Moisture %
Apuch	Chuuk, FSM	Raw	Ripe	2	Orange. R6	1070	10	10	30	20	40	1460	83
Te Bero	Majuro, Marshall Islands	Boiled	Ripe	80	Orange.R12-skin, R6 inner flesh	160	10	20	590	1420	320	2830	86

Note: HPLC analyses carried out by the DSM Laboratory, Switzerland. The *Apuch* sample was collected in September 2003; the *Te Bero* sample was collected December 2003. Samples were delivered to the laboratory in December 2003 and analyzed in March 2004.

[a] *Apuch, Crataeva speciosa; Te Bero, Ficus tinctora.*

[b] The *Apuch* sample was collected from Weno, Chuuk; the *Te Bero* sample was collected from Majuro Atoll.

[c] The *Te Bero* berries were boiled for 30 minutes, as per normal cooking methods in Kiribati, where they are prepared and eaten in a few recipes.

[d] Number of fruits in one composite sample.

[e] Color was described visually and also measured on raw corms using the Roche Color Fan, numbers ranging from 1 to 15 for increasing colorations of yellow and orange.

[f] Estimated by calculating total peak areas recorded in the chromatograms (using the response factor of ß-carotene); it includes xanthophyll- and cryptoxanthin-like compounds.