Assessment of the Fresh Fruits Value chain in Indonesia

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"Helping Indonesia to Grow"

ASSESSMENT OF THE FRESH FRUITS VALUE CHAIN IN INDONESIA

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For the

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I. Executive Summary

This consultancy first recommends that the efforts of the AMARTA project to support the development of the tropical fruit industry be focused primarily on the axis from Bali to Lampung in east Sumatra, and also include the north Sumatra, Medan – Berastagi area. This represents a very large population base, and has a reasonable infrastructure that offers a reasonable possibility of the economic distribution of the fruit. It also includes the three major export ports: Jakarta, Surabaya, and Medan. Concentrating in this area will offer the greatest opportunity of generating significant benefits when compared to the allocation of assets.

Second, the consultancy recommends that the project be market-driven. This will be done by identifying the major fruit distributors, both for domestic and export sales, and determining with them the products that have the greatest potential for local and export sales. They will also be of great assistance in identifying the areas in Bali, Java, and Sumatra that have the greatest potential for the development of economic sources of the products that they would like to distribute.

Six distributors have been identified during the period of the consultancy, and the following projects are recommended as the top priority for intervention projects. These projects will consist primarily of production technical assistance, postharvest technical assistance, organizational assistance, as well as some very specific efforts, in the areas of tissue culture work, economic analysis, and greenhouse technology.

- Bananas in east Java, which will affect 800 farmers.
- Citrus in Bali, which will affect several hundred farmers.
- Mangos in Bali, which will affect 800 farmers.
- Pineapples in west Java, which will affect several hundred farmers.
- Bananas in north Sumatra, which will affect 1,400 farmers.
- Citrus in north Sumatra, which could affect several thousand farmers.
- Pineapples in north Sumatra, which will affect several hundred farmers.

II. Purpose of Consultancy

The overall objective of the assignment was to conduct a rapid assessment of the high value tropical fruit products supply chain in Indonesia, including a specific local assessment of cut flowers production and marketing issues in the Berestagi area.

Specific areas to be addressed were as follows:

- Current production levels
- Levels of technology used
- Postharvest handling practices
- Market channels identification
- Market segmentation
- Availability of local technical assistance
- Availability of local financial assistance
- Distribution and logistics issues
- Local sales and marketing practices and conditions
- Policy and regulatory issues

III. Conclusions/Recommendations

Conclusions

- Indonesia is a very large country, with poor infrastructure in a great deal of the area, and the AMARTA efforts should be focused on the regions where the greatest benefits will be received for the assets allocated to the projects. Kalimantan, Sulawesi, and most of eastern Indonesia are difficult areas to work in. However, the axis from Bali to eastern Sumatra, as well as the area around Medan in northern Sumatra, has a population base of 150,000,000 – 160,000,000 people, and an infrastructure that will allow the reasonable transportation of products.
- This should be a market-driven project, beginning with the identification of the distributors that have an existing local and/or export customer and distribution base, together with distribution assets, including cold storage capacity and refrigerated trucking.
- From these distributors, the products that have an immediate market demand should be identified.
- In addition to identifying the products, the distributors also will be able to specify to AMARTA the work that needs to be done to make these product s marketable. This will be some combination of assistance in the areas of production, packing, packaging, postharvest, transportation, credit, and organization.
- The next step for AMARTA will be to quantify the work that needs to be done for each of these projects, including the costs and the benefits that are anticipated to be derived.
- The last step will be to then prioritize the projects, and begin the process of implementation.

Recommendations

In the brief period of this consultancy, the following distributors were identified that meet the criteria specified (existing customer and distribution base, and preferably distribution assets, including cold storage and refrigerated trucking.) These distributors should be interviewed again to confirm all of the information contained in this report, and then work should proceed with the specified products and producers. In addition, there should be many other distributors, competitors of these companies, that remain to be identified and interviewed.

- **Sewu Segara Nusantara** – this company is the largest banana ripener and distributor in the country, with operations in Jakarta and Surabaya, in addition to a large banana farm in Lampung. The management is bright, well organized, and wants to grow it's business significantly, primarily with local products. Top on the list of agribusiness firms to work with.

- **Mulia Raya** – they are the largest fruit importers, with operations in Jakarta, Surabaya, Bandung, and Medan. They would be of great interest to work with, particularly in Medan, as they are the biggest distributors there.

- **Lotus Distribution** – this is an operation now focused on Bali and Surabaya, but with every intention of expanding to Jakarta. Good company to work with to expand fruit and vegetable production distribution from Bali.

- **Horti Jaya** – this is a very interesting group, as they are both growers and distributors, have a great deal of capital, and are very ambitious. They are a primary target for fruits or vegetables that can be produced in northern Sumatra.

- **Masari Multifruit** – though this woman owned firm is very small, she is of interest as she has a customer base in the Middle East, and badly wants product, especially mangoes.

- **Bali mangosteen shippers** – this company is very interesting, as they have an existing customer base in China, Hong Kong, and Taiwan, are accustomed to shipping refrigerated containers into these markets, and should be interested in expanding their product line.

Bananas

The first banana production group to be worked with is that found in east Java, outside of Lumajang, in Senduro. They are already packing and shipping fruit, and are reasonably well organized. However, there is no doubt but that they could use additional technical assistance, which will certainly raise their productivity and income levels. The next step with these growers is to examine the possibility of linking them with the mangosteen exporters from north Bali. They are already shipping to tropical fruit distributors in China and Taiwan, and it would seem to make sense to add the bananas to their product line.

The other banana production group that badly needs the assistance of AMARTA is that found in Talun Kanas, north of Medan, where the Pisang Barangan variety is grown. These

growers need help on many levels, including production, packing, organization, marketing links, etc. I would recommend beginning by spending time in the area to get to know the best leaders of the farmers group. I would then take these people to both Lampung, to see a modern banana operation, and then to east Java, to meet the Pisang Mas growers, to show them how they should be organized and where they should aim to go in the next couple of years. They need help in organizing modest packing facilities. And the last step will be to establish ripening facilities in Medan, so that work can begin on establishing the proper ripening procedures for this variety, as well as beginning the distribution of the fruit in north Sumatra. After that, shipments can probably be initiated to Jakarta, and perhaps to Penang or Singapore, if the quality, cost, and acceptability of the variety merit this final step.

The largest banana growing area in the country is the Cavendish area in east Sumatra, Lampung. But this operation is well established, and other than using it as a good example, there is no intervention that can be recommended here.

Another possibility of intervention in the banana growing industry that was presented during the consultancy was the possibility of developing a Moko resistant variety of the Pisang Kepok banana. This does not seem to make a great deal of sense to me. First, I was in many areas where the Pisang Kepok is grown, and never heard the growers complain of this being a significant problem. Second, the Pisang Kepok is a very minor banana variety, there are several alternative cooking varieties of bananas, and it does not appear to demonstrate nearly the commercial potential of the Pisang Mas or the Pisang Barangan. Rather than spend any funds assisting the Pisang Kepok growers in disease resistance, I would recommend taking those funds and assisting them in the conversion of their farms to the far more commercial varieties.

I would also recommend the possibility of introducing plantains to Indonesia. Cooking bananas are a food staple for most Indonesian households. I have not seen specific data, but I would assume that the productivity per hectare of the plantains developed by the research center in Honduras are far superior to the Pisang Tanduk and other cooking varieties here in Indonesia. Assuming that the regulatory issues are not major impediments, I would definitely recommend that some planting material be brought in from the Federacion Hondureno Instituto Agricultura (FHIA) in Honduras and a trial initiated.

Pineapples

The pineapple growing area east of Jakarta, in Subang, has very basic growing practices, and badly needs help. A minimal amount of assistance should result in a demonstrable growth in the incomes of these farmers. Noted production problems were nutrition deficiency, plant spacing, and rogueing to select best plant material to avoid genetic deteriation of the variety. Additionally, assistance in determining correct harvest practices and post-harvest handling would enable this excellent eating pineapple to enter the supermarket business.

The other area that needs assistance in pineapple is north Sumatra. In this case, I would begin by working with the fruit processing company of Agrosari Sentraprima, located outside of Medan. They are the largest pineapple processor on northern Sumatra, and they say that they are going to relocate their cannery to an area nearer to the pineapple fields. This is the key to success for this entire area, because the growers are currently very remote, and their field practices are nearly primitive. I would begin by assisting the cannery in the design of the new facility, to insure that it will meet modern sanitation standards, and that it will have the capability of processing various kinds of tropical fruits. (For assistance in the cannery design, I would recommend contacting Jack Auten, a retired Dole cannery expert.) Once the establishment of a modern cannery is assured, I would begin working with the local pineapple growers, assisting them will all of their production practices, including the installation of a variety that is better suited to the competitive canning business.

As with the bananas, there is a very large pineapple growing area located in east Sumatra, north of Lampung, ostensibly with more than 30,000 hectares of fruit going into a modern cannery. As with the bananas, there is no intervention that would seem to be needed here. However, it would certainly be advisable to get to know this company well, as the possibility always exists that they could be interested in a small farmer supply base, and that might be a project with some merit.

The other area to be addressed in the pineapple industry is the introduction of the MD-2 variety, the most notable advancement in fresh pineapple variety development in the past 50 years. This is the supreme fresh pineapple variety in the world today. No one knows more about this variety than the AMARTA COP, David Anderson, so I will not go into any details of the product introduction. But it will be a wonderful long term benefit to Indonesia if the variety can be introduced here.

Citrus

The first area to be addressed in citrus is in Bali, in the area of Gobleg. There are two issues to be addressed here – organization and production. They are in the process of forming a cooperative, and need assistance in everything that that entails, including organizational matters, financial instruction, leadership training, legal matters, and operational issues. In addition, they badly need production assistance in nearly all areas, including pruning, thinning, spraying, weeding, etc. Their intention is to proceed beyond selling the fruit on the tree, and advance to harvesting, packing, and distributing their production directly.

The other citrus area in need of immediate attention, and the most important in terms of scope, is that in north Sumatra, in the Berastagi area. This area produces 17,000 hectares of tangerine citrus, involving approximately 20,000 growers.They appear to be at least one step ahead of the Bali growers, in that a local SOP manual has been introduced, with apparently impressive results. However, we were told that less than 10% of the farmers follow the procedures, and the rest badly need help. The assistance needed in this area will be virtually the same as that described above for Bali, in terms of both production and organizational assistance. The other intervention that can have great value in this area is the improvement of the Merek Sub-Terminal Agribusiness in the citrus area. This is a very large facility, poorly designed, but with great promise. In this case I would recommend bringing in a postharvest expert, such as Marita Cantwell or Lisa Kitanoja, who could assist with the design of turning the large building into a modern fruit receiving, grading, packing, precooling, and cold storage area. In addition, there is another room that is adjacent to the large building which could well be suitable for the processing of citrus byproducts. The building in the center of the property could be used for administration and training, and there is plenty of space on the property for the construction of a warehouse to be used for crates, cartons, finished goods, and farm inputs.

Cut Flowers

While the cut flower operations that we visited in Bali and Berastagi in north Sumatra were very basic, there seems to be a possibility here of assisting these growers with help in production practices. I don't think that the climate in either Bali or north Sumatra would ever support the creation of an export cut flower business for the principal products, such as roses, carnations, or chrysanthemums, but it would not be difficult to significantly raise the farmers' incomes by teaching them how to improve their production techniques for all of these flowers. We learned that the Medan area receives a large number of flowers from Malaysia and Thailand, and I would begin by learning what is being imported, and what is the cost and quality of these products. Then the Berastagi area could be developed on an import substitution basis. In addition, we were told that most of the growers buy their

planting material from the Bogor area. This should be visited, in order to determine if this business could be established in either Bali or Berastagi.

While Indonesia does not seem to have an appropriate climate for roses or chrysanthemums, it certainly does have the climate for tropical flowers, particularly orchids. In this case, I would strongly recommend bringing in Orchid expert consultant Nancy Laws for a few weeks, in order to do an analysis to determine if Indonesia can ever be competitive with Thailand, Malaysia, or Singapore in the orchid business.

Mangos

Indonesia has a number of mango growing areas, and apparently has at least one local variety that is acceptable in the international market (Harumanis). However, the mango growers are disorganized, their production practices are remedial, and there is not one modern postharvest treatment center (as in a hot water treatment) in the country. We were told several stories of attempts to export mangos, and they were all stories of failure. The mango industry seems to be a very appropriate one for assistance.

I would begin by selecting at least one of the groups to work with, in order to determine where the most progress can be made the most quickly. We met with a mango growers cooperative in Bali, in the area of Depeha, and they would certainly seem to be a likely candidate. However, we were told that there is a large mango growing area in east Java, near Probolinggo, but we did not visit that area. We know that there are nearly 1,000 hectares in the Takalar area, outside of Makassar in southern Sulawesi. And we have been told that there are large mango growing areas in west Java as well. It would not seem to make sense to work in multiple areas in the beginning. I would choose one of these areas, begin with production assistance, develop a Standard Operating Procedure for Indonesian mangos, and simultaneously begin the marketing and analytical work to establish the justification and the proper location for a hot water treatment (or some similar postharvest treatment) that would allow for the export of Indonesian mangos.

Other Products

The five products addressed above have the greatest potential for immediate intervention, in terms of successfully raising the incomes of large numbers of farmers. However, there are many other products that also have potential, though on a lower priority basis.

- **Papaya** – this has the highest potential in my mind, as all of the fruit distributors said that they needed it and wanted it, but couldn't get sufficient quantities of a

sufficient quality of the right variety. This is another area where the AMARTA COP has a great deal of experience, and after further discussions with the distributors, I would select on of our farmers groups near ripening rooms, perhaps in east Java or west Java, and begin a papaya production demonstrationproject.

- **Mangosteen** – though this is a marvelous product, this is not an easy intervention, due to the relative lack of organization of most of the mangosteen growers. However, if a true mangosteen production expert can be found, and if some reasonable mangosteen growing areas or organizations can be identified, this product holds some potential for a successful intervention.
- **Melons** – we were told that SSN successfully sources melons from east Java. This was a bit surprising to me, given the amount of rain in east Java, but I did not have time to do a thorough survey of Java, Bali, and north Sumatra to locate ideal sites for Melon growing. However, given the easy availability of melon experts from California, and given the expressed demand on the part of the fruit distributors, if a suitable location is determined, and well organized farmers groups can be found in the area, this is another product well worth supporting.
- **Fresh herbs** – this is a product that holds great promise. They are very high value, can be grown in very limited areas, and are very interesting for export in terms of their value to weight ratio. I would begin this area with a market analysis, both for the local market and for the Singapore, Hong China, and Japan import market. If the data are of interest, I would then initiate a project by bringing in a real herb expert, and support a project with either Mr. Widya of Bali or Horti Jaya in Berastagi.
- **Rambutan** – the comments made above on mangosteens are applicable to rambutans. They seem to be grown all over the country, and everyone loves to eat them. But given the lack of organization, and the (probable) difficulty of locating a true rambutan expert, this product would have a low priority for me.
- **Avocados** – once again, the distributors said that they would love to have a regular supply of Haas avocados. They are also the ones with the ripening rooms that are perfect for handling the Haas variety. I have no doubt but that a Haas expert could be found in California. In this case, if a suitable growing area can be located with a suitable climate, and reasonable access to one of the ripening areas, I would suggest finding an investor (such as the Horti Jaya group) and offer them the technical assistance in the establishment of a Haas avocado operation, and begin its introduction in Indonesia.
- **Litchis** – the demand for fresh litchis is growing rapidly all over the world, with Latin America and Africa both expanding production. However, Indonesia is right on the doorstep of by far the world's largest producer (China), and I would not recommend a litchi project without seeing some very compelling numbers.
- **Guavas** – this is another product which is grown locally, consumed locally, and is of interest to the fruit distributors. But I would again give this product a low priority, unless some compelling information becomes apparent, in terms of demand from the distributors or some unique production advantages.

- **Star Fruit** – this should be looked into. Our distribution friends in Surabaya said that they had a good market for it, but suffered 40% losses in bringing it in from west Java. We also saw a great deal of it on the roadsides in north Sumatra.

Postharvest Practices

We identified at least three packing facilities that badly need the assistance of AMARTA in the area of sanitation, food safety, and modern postharvest techniques. These are the Big Tree Farms plant in Bali, the Horti Jaya facility in Berastagi, and the Agrosari Sentraprima facility outside of Medan. In this area, I would highly recommend that AMARTA bring in Dr. Marita Cantwell of the U. of California in Davis. (If she is not available, Dr. Lisa Kitanoja is equally capable.) Both of these women are true experts in the area of food safety and postharvest techniques, and will bring in a great deal of knowledge for many products. In addition, Dr. Cantwell is probably California's leader in tomato practices, and can probably help the Horti Jaya folks a great deal. I would also contact the other large vegetable producer in the Berastagi area that we did not visit, as they should probably be on this list as well.

Greenhouse Technology

We observed a great range of greenhouse technologies in Indonesia, from the most rustic in Bali, to something partially modern in Berastagi. It is obvious that assistance is badly needed in this area. I would begin by doing a more thorough survey of greenhouse operators in Bali, java, and north Sumatra, to be sure that the greatest number of people can be affected by the visit of a greenhouse expert. I would then recommend bringing in someone like Zeb Jones or Robert Richardson, and begin trying to significantly improve the greenhouses and the greenhouse growing techniques of Indonesia.

Tissue Culture Development

We know that Sewu Segara Nusantara does their own tissue culture work for the development of the Cavendish banana plantings that they do in Lampung, and we were told that there are two or three other facilities in west Java. This is being addressed, however, as the need for a supply of disease free planting material of the appropriate varieties of a long list of products is critical for Indonesia. This could be used in the banana business (for both Pisang Mas and Pisang Barangan), for mangos, for cut flowers, for papayas, etc. I did not spend enough time visiting the existing tissue culture operators, to get a solid feel for this as a viable business, nor has the analytical work been done to determine the appropriate

location for the operation. However, there is no question but that it is a significant need for a modernizing Indonesian agricultural industry.

Analytical Work

We found time after time that, when discussing the commercial possibilities of other fruits or vegetables, the data base addressing the economics of these products was simply not available. This is a subject of critical importance for Indonesia, and we were told that the government is addressing this issue for some products. For the products that they are not analyzing, I would highly recommend that AMARTA employ a bright, young financial analyst, train him/her in the modern analysis of the economics of an agricultural product, and perform and publish the necessary economic data to be able to train farmers in production budgeting. This knowledge is absolutely basic for the needs of a local investor who wants to consider begging the farming of various fruits, vegetables, or cut flowers, either for local consumption or for export. Indonesia must be able to determine if it can be competitive with Thailand, the Philippines, and Malaysia in the international market.

IV. Consultant's Activities

Feb. 11, 2007

Feb. 11, 2007 was spent in travel to Indonesia.

Feb. 12, 2007

Feb. 12, 2007 was spent in travel to Indonesia.

Feb. 13, 2007

Jakarta was reached at noon on Feb. 13, 2007. I first met with David Anderson, COP of the AMARTA project, and reviewed the scope and purpose of the consulting assignment.

I then met with Made Utama, and we went directly to the office of Sri Kuntarsih, Director of Fruit at the Directorate General of Horticulture. We first explained the purpose of the AMARTA project to her. She said that she was already working with German (Ekonid) and Dutch (INA) projects that were basically involved in the same effort, and suggested that we coordinate with them. The Dutch project is focused on ten specific functional areas, and the German project is focused on the promotion of Indonesian products in the EU. (It turned out that David Anderson was already in contact with the leaders of these projects.) In further discussions with her, it turned out that she had a limited knowledge of commercial horticulture in Indonesia, but was pleased to assist the AMARTA project in any way she could.

Feb. 14, 2007

On Feb. 14, 2007, Made and I first met with Bugie (Bugiarto Utama) of PT Nusantara Tropical Fruit. The following represents the comments that Bogie made about the current state of their banana production and distribution businesses.

They rented ripening rooms in Surabaya rather than building them there. The Pisang Mas business has expanded significantly since we went there during the last visit. They would definitely be interested in papayas and watermelons for distribution. The fusarium wilt is also affecting the Pisang Ambon in this area. They source melons from east Java, and provide the seed, imported from Taiwan. They distribute only to Java and Lampung. They do Korean pears, mangosteens, and rambutans. He felt that the citrus from Medan holds real promise, but they need a lot of help with the spraying and other production practices.

The banana area has declined from the initial area with Del Monte of 3,500 hectares to a current 950 hectares. He now wants to take it down to 600 hectares, as he feels that he only has adequate water for that amount. In the beginning, they were only using the deep wells for watering, as they thought that the surface water would spread the fusarium wilt. But now with the more resistant varieties they are using all of the sources of water, but even with that they feel that they should only be doing 600 hectares. They are currently only harvesting 0.6 – 0.7 stems/mat/year, and they feel that with a reduction to 600 hectares and adequate water, they will produce the same amount of fruit (1,500,000 18 kilo boxes).

From there we drove out to the operations center in Tanggerang, and met with Martin Widjaja and Rully Hardinsyah. They are in charge of the distribution company, and the following is a summary of our conversation with them.

They are now selling Rp. 100,000,000,000/year in fruit, and want to do Rp. 500,000,000,000 by 2010. 70% of that volume is their own Cavendish bananas, and 18% of the total is imported fruit. Chinese pears and apples represent the largest part of that. Martin says that the local fruit market potential is Rp. 10 trillion/year.

They now focus on the Java-Lampung distribution area. They have 26 refrigerated trucks in Jakarta, 3 in Surabaya, 2 in Bandung, and 1 in Jogjakarta. They still have the 26 ripening rooms here in Tangerang, and are nearly doubling the size of the cold storage capacity here, by constructing new cold rooms, and there will have capacity to go three pallets high. They are nearly done with these, and they will be ready by March or April. They also have ripening capacity in Surabaya and Bandung, and cold storage capacity in Jogjakarta.

They feel very good about the Pisang Mas supplies that Martin and I initiated in 2004. There are now over 2,000 hectares of bananas in this area, and they are bringing in 23 tons/week into Tangerang for ripening. They are beginning to develop Rajah Bulu banana supplies there, working with growers in 100 hectare blocks on government land.

They are very interested in developing a source of papayas and watermelons. They now supply papaya and melon seed, but the seed is expensive and the risk is high. They are now bringing in melons (Golden Melons, Honeydews, and Cantaloupes) from east Java. He said that west Java has good land, but they don't have good sourcing from there. The growers are disorganized, and don't have any good production knowledge. Basically, they are eager to develop additional sourcing in east, central, and west Java. They do handle local mangos, but are very interested in anything that will extend the mango season. The same applies to mangosteens. There are two mangosteen seasons now – the large one in January-March, and a secondary one in June and July. Again, they are interested in anything that will extend the season. He said that there are large volumes of organic products available from Kalimantan. The comments about rambutans are the same as for mangos and mangosteens. Litchis are possible. He said that there are interesting apples in east Java, but they are disorganized and need help.

They are doing their own tissue culture work in Lampung, and he is aware of 2-3 other companies in west Java that should be looked at.

They need help in the organization and formalization of their relationships with outside growers. He is aware of all of the work we did in Dole in this area, and would like some help.

Feb. 15, 2007

On Feb. 15, 2007, we flew to Bali, and first met there with Bill Busch, the founder and owner of Lotus Distribution. He works out of a very attractive location, a retail establishment where he sells wines, cheeses, and other relatively expensive foods, beverages, and other sundries. His main business is a distribution one. He has focused on Bali, but is now opening up in Surabaya, and then wants to open in Jakarta. He principally does seafood, produce, and dairy items. He says that he definitely needs help with his cold chain. The operation in Surabaya has 3 rooms, and is intended for both local distribution and transit to Jakarta. (He feels that the Surabaya market is limited for his type of firm, as he really aims at the upscale market, and feels that Surabaya is a " cheap " market. His real goal is Jakarta.) He is now doing the analytical work for the infrastructure needed to establish this sort of distribution system. He now has 4-5 refrigerated trucks, with 15-20 tons of capacity. He needs analytical assistance to determine exactly what he needs to properly supply his targeted market areas.

He has begun to concentrate on the salad potential from Bali, and said that this is an area where they really need help. They need assistance in production, post-harvest work, packaging (packaging costs are a major element), etc. He also feels that the competitive

advantages (and disadvantages) of Bali need to be examined carefully, as the costs are high here.

From there we went to a small florist, Sharon, and met there with the owner, Timotius. This is a very modest operation, with no cold storage, and operating from a very small shop. He said that his roses and gerberas are from east Java. The gladiolas are also from Java. He also buys roses from the Bandung area. The chrysanthemums and gypsophila are from Budulgu. The anthuriums are also grown in Bali. He said that the big problems are a lack of technical expertise in growing, and a total lack of a cold chain. His main business is the hotels, and after that some funeral work. Most of his flowers come from Java. He buys everything directly from growers. His peak demand is in December, and he said that his supply is unreliable then also. July and August are also big months.

He said that he can sell more flowers if he can get more flowers of reliable quality. But I saw no evidence of much of a household business here. He also said that he should be able to get everything from Bali, but this would not increase consumption, but simply displace flowers from Java. In addition, I would have to assume that the hotel business is static, or at least related to the tourism business, so there would be little possibility of growth without household growth.

Feb. 16, 2007

On Feb. 16, 2007, we were joined by David Anderson, and began the day by going to meet with a group of citrus growers. On the way, we stopped at the wholesale market in Baturiti, and also went through an interesting area that had hydrangeas intercropped with young citrus.

This was a group that was represented here in the town of Gobleg by 13 of their growers. They began in the citrus business in 1994. There are a total of 5 groups of farmers in this one village, and a total of 80 farmers, who have a total of 300 hectares of citrus. If planted in a solid block, they plant about 1,500 trees/hectare. It is all the same variety, a mandarin type that they call " Siam ". They have about 5,000 trees in the group, and a tree should produce 60 kilos of fruit per year. The season is in August/September, and there is also a small season in January/February. It is good timing, as Bali comes in when Kalimantan and Medan finish, and then Mamuju enters in November.

This is an interesting deal, as they basically lease their fields to middlemen (about 10 middlemen deal with the village), who come there at the flowering stage, estimate the value of the crop, and then almost take over from there through harvest. The farmers are given a 50% advance at the blossoming stage, and then the balance at harvest. There is apparently no adjustment made for final outcomes of quantity or quality. The farmers are responsible for everything that happens on the ground, and the middlemen take care of everything that happens on the tree, including spraying. They said that their operating costs are about 20% of their revenues. The middlemen even bring in their own harvesting laborers from neighboring villages. They use 20 kilo wooden crates for packing the fruit. All of their members are within 4 kilometers, but there are 4 more villages in the area that focus on citrus as well. This group told us that they retain 10% of the production for local consumption. At harvest time, the local price is Rp. 40,000 per crate, and by October the price is Rp. 80,000/crate.

They said that if the farmer has 4-5 year old trees, the revenue should be Rp. 35-40,000,000/year. If the trees are as old as 9 years, the revenue decreases to Rp. 25-30,000,000/year, due to smaller fruit. (If all of this is true, that means an annual revenue of $2,800 – 4,400/hectare, which is certainly very good by my standards.)

Fungus is their biggest production problem, and after that it is the marketing system. They have tentatively organized a cooperative, and they want it to be functional for the 2008 season. But though there are Indonesian government regulations about cooperatives (and apparently some for of government assistance is available), they feel that they need help in legal matters, operational issues, leadership training, financial controls, and anything else involving a successful cooperative. There is an ag extension service here, but it's worthless, as far as they are concerned. They can use help in virtually every area, including production issues (pruning, fertilization, pesticide use, thinning, population control, etc.), as well as cooperative issues and marketing assistance.

From there, we visited a mangosteen packing plant located in Lovina. This was a very interesting deal, as they were stuffing a 20 foot refrigerated container with 8 kilo plastic boxes for export. They ship to Taiwan, Hong Kong and China. The packing plant is modest (no local refrigeration), but perfectly functional for their needs. They looked to be packing a decent quality product, and while we didn't see them actually packing, it appears as if they are conscious about the quality of their pack. The last season they did 72 containers, each containing 1,029 of the 8 kilo crates. They are the largest operation of this sort in Bali, and pull their fruit from up to 50 kilometers away. The field price can be from Rp. 8,000 – 27,000/kilo. The fruit is restuffed in other refrigerated in containers in Surabaya. They said that their growers get up to 350 kilos of fruit per tree per year.

This is a very interesting situation, and an interesting group to work with. They already have the logistics elements in place, and have an established customer base in three markets. The key would be to work with them in the mangosteens in various production and post-harvest areas, and then explore how their product line could be expanded.

Feb. 17, 2007

On Feb, 17, 2007, we began the day by going to visit the operations of I Wayan Widya, both a grower of cut flowers and of vegetables. He is a local horticultural magnate, and is regarded as a wealthy man. We met him at one of his homes in the area of Bedugul.

He began the business of producing vegetables for the local tourist trade in 1985. He started with potatoes, cabbage, and Chinese cabbage. He began the cut flowers min 2002, and currently produces chrysanthemums, anthuriums, gerberas, and some fern. He also has a hybrid lily, which he said was a cross between a Casablanca lily and a local variety. He has 1.0 hectare cultivated near his home, of which about half is covered. He has a total of 3.0 hectares available. The area is at 1,300 meters, and he says that there is land available in this area that is at 1,500 meters of altitude.

His main problems are the lack of good seed, the lack of good production knowledge, and no refrigeration. He said that he tried to get help from a local research center, but had no luck. He has some water collecting capability, and could probably gravity irrigate his entire operation. He said, however, that irregular rainfall patterns are a big problem for him, as well as high winds, which recently damaged his greenhouses. He gets his chrysanthemum cuttings from Bogor, as well as his gyp materials. He has a greenhouse with bell peppers planted there currently.

He is one of only two flower growers in the area, but said that there are several vegetable growers. He is currently producing tomatoes, shallots, strawberries, onions, and several herbs, in addition to his flowers.

This fellow looks like a very likely candidate to work with. He is bright, eager, and has available capital.

We then went to the site of the Big Tree Farms packing plant, and met there with Ben Ripple, the founder and CEO. In addition to the packing plant, they have a small organic

farm (less than .5 hectare) where they do potatoes, cabbage, carrots, and broccoli. However, he said that they want to expand this to over 15.0 hectares. They also want to include herbs. They brand some of this product as " Island Organic ". They also have a transitional brand, of " Island Fresh ". Their irrigation is currently manual. Lotus Distribution (Bill Busch) is currently doing most of his distribution.

This packing plant was part of the efforts of the USAID Cold Chain project. It was constructed in 2005. It's a total of 200 square meters, and has 3 rooms. One of them is a small freezer room, one is intended for vegetables, and one for fruit. They also have a 40 foot refrigerated container permanently spotted inside the building. The refrigeration capacity in the rooms is not complete. They have a stand-alone pre-cooler near the packing area, which is powered by diesel which ventilates inside the building. There is substantial administrative office space inside the building. The floors are tiled and the packing tables are stainless steel, all making it relatively easy to raise the hygienic standards. The internal drainage system looks good, and it all goes to a large septic tank. They use municipal power, and their water comes from their own well. Ben said that he tests the water every month, and it is clean water. The building is owned by Pa' Raka, who leases it to Big Tree Farms. Winrock still owns the equipment. Ben is in conversations with Bill Bush about an expanded joint venture.

The farthest they source product from is their own farm, which is 30 minutes away. They currently source 50% of their product from outside growers, and want to raise that to 75%. He said that they are currently exporting some fruit, and do 1.0 ton/week to Paris, and 1.5 tons/week to Singapore. They do a wide variety of fruit, including mangos, mangosteens, rambutans, jackfruit, durian, litchi, and coconuts. The flight to Singapore is direct, and there are also direct flights to the UAE. The vegetables are available 365 days/year in their area. The largest problem is the shelf stability of the product. He and Bill Busch are now beginning to distribute in east Java as well, sourcing product in Malang. But the problem there is the havoc caused by the mud slides, which has made the logistics quite difficult. They have 4 refrigerated trucks, of which two are owned and two are leased.

This is a very likely candidate for AMARTA intervention, as they have the production, the distribution, and a packing facility with a lot of potential. They just need a lot of help in all areas, including production, postharvest, and refrigeration management.

From there we went to the village of Depeha, and met with the representatives of a mango growing group. We met there with 12 mango producers. This entire area produces 90% Harumanis variety. This is a green ripe variety, which makes it difficult to export. They had a sign up in their meeting area which said " Subterminal Agribiznis Werdhi Tani Amertha Purina Yasa ". They have 800 families that produce mangos in the area, and they average about 60 trees/family. There are 13 farmers groups in this village, and this particular group has 62 members. They operate within a radius of 8 kilometers. This group has been around

since 1989, but is apparently not formally registered. They acquired government funds to assist in the construction of the packing facility.

The leader of the group indicated that they had a total of 800 hectares of mangos in this sector. He said that nearly all of the farmers here had mango production capability. He said that they have a capacity of producing 50,000 – 80,000 tons/year, but that last year they did only 12,500 tons. Their largest problems are thrips, aphids, and other insects. (It is also very probable that the declining productivity is due to forcing the trees every year without a rest. They use Cultar as the forcing agent, which has an active ingredient of Paklobutrazol.) They are trying pheromones for insect control, as well as sticky plastic. The season here is October to January. They buy planting material from a local nursery, which is then grafted onto a local root stock.

The fruit is brought into the village and the packing area on motorcycles in baskets. There it is packed by the middlemen in bamboo baskets for local sales, wooden crates for Java sales, and cartons for export sales. The export carton is a 10 kilo box that normally has 20 pieces. Singapore is their main export market. There is no washing or postharvest treatment of the fruit. They work with a total of 13 middlemen, who in turn sell to the traders. They estimate that they do 25 % for export, 35% to Java, and the balance is sold locally in Bali. They have 3 grades of fruit. A typical pricing range would be Rp. 3,000 – 4,000/kilo for Grade A fruit (450 grams), Rp. 2,500 – 3,000 for Grade B fruit (300-400 grams), and Rp. 1,500/kilo for Grade C fruit. They are normally paid within 30 days. They also produce dried mangos, and are considering drying jackfruit in the future.

This is a very likely candidate to work with. There is a lot of organization within the area, a lot of production, and a great lack of production and postharvest knowledge, as well as adequate packing facilities. An economic analysis should also be done of their marketing strategies.

Feb. 18, 2007

Feb. 18, 2007 was spent in Bali, and then returning to Jakarta.

Feb. 19, 2007

On Feb. 19, 2005, Made and I first met with Ir. Syukur Iwantoro, the new leader of the Agency for Agricultural Quarantine. This is a very capable fellow, who is obviously highly placed in the government, and actually participated in the project design and feasibility study for AMARTA. He began the conversation by stating that " there has never been a success story " in USAID projects in Indonesia, with the exception of " ADPA " (?), a human resources development project, in which he received a lot of training. He said that none of them have been sustainable, as there was always inadequate follow-up. However, he has hopes for AMARTA.

Within the horticultural world, he feels that cacao has the most potential, particularly for U.S. trade possibilities. He said that mangos also have a large potential, but the heat treatment facilities need to be developed. The mango potential can be found in east Java, west Java, Bali, and west Nusantenggara. Mangosteens have a lot of potential, but insect control is the key there.

For vegetables he said that they need a lot of help with postharvest work. He also suggested several times that model projects be developed close to Jakarta, in order to create high visibility for the politicians. He said that the leafy vegetables suffer 60 – 70% losses in the supply chain, indicating a great deal of work needs to be done in postharvest work and on the cold chain.

He also said that they need a great deal of " farmer education ", but cautioned that the targeted farmer groups need to be chosen very carefully.

He also said that there was a great deal of organic potential all over the country, and recommended that we work with the Bali Organic Association. He also recommended that we get to know the Environment Training Center (PLLH) in Mojokerto, east Java. The contact person there is Suroso, with a mobile phone number of 081 2327 9934. He has developed his own organic project, one of 8.0 hectares near Jakarta. The contact person there is Mr. Bagas, with a mobile phone number of 08888 154216.

We then met with Lie Po Fung, of Mulia Raya. This is one of the largest fruit handlers in Indonesia. The company was begun in 1989, when this business was still a government monopoly. When things opened up in 1991, they quickly began to expand, and started with importing apples and pears. They then moved on to citrus and grapes, and now import products from 24 countries. They sell to all of the modern markets, including all of the supermarket chains and hotels. They have D/Cs in Jakarta, Bandung, Jogjakarta, Semarang, Denpasar, Surabaya, and Medan. Some of the supermarkets are handled through their D/Cs, and they also do some store-door delivery. All of their D/Cs are refrigerated, and 70% of their trucks are refrigerated. They do 500 deliveries/day. In addition to importing fruit, he is

also responsible for dairy (Anchor brand from New Zealand), meat (non-prime cuts), Japanese foodstuffs, and local seafood. They bring in 2,000 containers of fruit per year. The receiving ports are Jakarta, Surabaya, and Medan (which is only 100 out of the 2,000 containers.) China has gone from supplying less than 10% of their product to over 30% in the last 5 years. They are getting their apples, pears, and grapes from China. They used to get all of their carrots from New Zealand, But he said that the New Zealand growers abandoned their efforts there, and have now moved to China and supply him from China.

Only 1.0% of their product is sourced domestically. They have tried local sourcing, but simply can't get the quantities or quality that they require. He is open to receiving any product that will meet their standards. He said that the mandarins from Soe in east Nusa Tenggera were good, but again couldn't meet their requirements. He felt that Sumatra has a big potential, but the road system badly needs development.

Feb. 20, 2007

On Feb. 20, 2007, made and I flew to Lampung, and were met there by Paulus Gunawan, the plantation manager of the banana farm of P.T. Nusantara Tropical Fruit. We drove from the airport about two hours to the farm, located near Kodya Metro.

The bananas are 80 kilometers to the northeast.This operation has a total of 3,900 hectares. They peaked in the bananas at about 2,200 hectares, and are now down to 950 hectares. As noted above, they feel that they have inadequate water for this amount of land, and only get 1,500,000 boxes/year (18.0 kilo equivalents). They think that they can reduce to 600 hectares, and can produce the same volume of fruit. The area gets 2,500 mm. of rain per year, but nearly all in a 6-8 month period. They are now doing 2,000 hectares of cassava on their land, all of which is sold to local starch factories. Paulus said that there are 40-50 starch factories in the Lampung area, and the area produces 60,000-70,000 tons of cassava annually. 30 – 40 of the factories have a minimum of 500 tons/day capacity. Some of them can handle up to 2,000 tons. (There are also 200,000-250,000 hectares of sugar cane in the area.) The current price of Rp. 350/kilo for cassava makes it a profitable venture. Nearly all of the cassava produced locally goes into starch, not for food. They are considering rotating the cassava and bananas, which is feasible, as they practice an annual cropping with the bananas. They do a relatively deep plowing before planting the cassava. I believe that he said that they have 3 of their own starch factories.

Because of the ease of shipping his product, he is able to cut and pack every day. It takes him 10 hours to reach the ripening rooms in Tangerang, so he doesn't use refrigerated trucks. They also export about half of the fruit, going out in refrigerated Maersk containers

directly from Lampung. They are now exporting to Iran, Saudi Arabia, Hong Kong, China, and Kuwait. They expect to begin shipping to Bulgaria soon. 50 – 60% of the shipments are domestic. The export boxes are 13.0 kilos and the domestic boxes are 18.0 kilos.

They apply an organic source of nitrogen mainly cow manure. They have their own spray plane, and do 10 – 14 day Sigatoka cycles, depending upon the rainfall, and spray an oil and a fungicide. They plant and harvest every day. They have about 1,500 – 1,600 workers, including the 5 packing plants. It is all cableway in the farm. The cartons come in on the trucks returning from Jakarta. They bag when all hands are exposed, and counting from that point, they harvest on a 9 – 10 week cycle. The irrigation is a combination of drip and sprinkler. They do their own tissue culture work for the planting material. They are using a Taiwan variety because of its relative resistance to the Fusarium Wilt. They plant a double row with a population of 2,500/hectare. Because of the Wilt (about 6 – 7%), bunchy top, and other viruses, they normally harvest about 2,000 stems of the 2,500 planted. The stem weight appeared to be 25 - 27 kilos. They use bamboo poles for the propping. They begin to replant when 10 – 15% of the fruit is still hanging in the field.

This operation surely doesn't need much of our help, though it is possible that the tissue culture capability could be used for small growers, producing many different products. However, Paulus said that the small cassava growers in the area definitely needed assistance in cultivation techniques. The average size of a small cassava grower is less than 1.0 hectare. They also tend to harvest their product when the starch content is too low, in the 20 – 30% area.

He said that the pineapple operations of Great Giant are 33,000 hectares, and that they do 450,000 tons/year in the cannery. The pineapples are located about 60 kilometers almost due north of the Lampung airport.

Feb. 21, 2007

On Feb. 21, 2007, Made and I flew to Surabaya. We first drove through some small wholesale markets. They were very modest affairs, mostly some small stands along the river banks. They sold primarily fruits – citrus (similar to the Sulawesi fruit), rambutans, etc. It was all quite small, given that Surabaya is the second largest city in Indonesia (over 5,000,000 people.)

We then went to the distribution center of Sewu Segara Nusantara located in Sepanjang, in the district of Sedoarjo, and were met there by the manager, Andreas Kristanto. This is on

the outskirts of the city of Surabaya. The facility was opened two years ago. They are renting the facility from an owner who originally did seafood in the rooms, and the odor of the seafood is still present. The facility has 12 cold storage rooms, each one of them about a size that could handle 700 – 750 18 kilo banana boxes. They currently use two of the rooms for ripening, one for holding green fruit, and one to hold ripened fruit. The rooms have temperature control and ethylene injection capacity, but no humidity control nor pressurization. The upper rooms are accessed via a freight elevator. The other 8 rooms are four two story rooms, connected by a stairway. These are used for the larger volumes of the imported fruits when they come in, such as apples. (He had some small volumes of apples at the time, and was holding them in one of the banana rooms in order to save electricity, but that meant that he was mixing the fruits and had either the apples too warm or the bananas too cold.) If they really increased their volumes here, they would do well to cut doors on the 2nd floor of each of these rooms, and use a forklift for access.

All of the Pisang Mas that is handled from the Lumajang area is collected here, and then sent to the ripening facility in Tangerang, except what he distributes locally. He sources his Pisang Mas cartons in Surabaya, and sends them out to the field to the local growers. He goes out for 100 kilometers, including shipping to Bali. (The Pisang Mas ripening procedures are identical to those of the Cavendish.) He handles all of the Sun Pride products, including the Cavendish bananas, apples, pears, melons, and star fruit. The star fruit is grown near Bogor, west Java, and has a 40% loss rate. (This would be a good candidate for some assistance.) The star fruit is a year-round product, though I didn't see any when we were there. Melons are also a year-round product, and are grown in east Java. He ships them back to Tengarang with the Pisang Mas bananas. He doesn't handle mangos, mangosteens, or rambutans, as he says that he can't compete with the local grower's prices. (Andreas said that his pricing is generally a problem for him locally, as the prices of all of his products are established by the home office in Tangerang, and by the time their overhead and transportation are added in, he is often priced out of the market.) He has trucks going back and forth to Tangerang every day. He has 3 trucks – two small ones and 1 medium size. He sells to the supermarkets both through their D/Cs, and also some store door delivery. He handles the hotels through a food service distributor, as the hotels are slow payers. He sells all of the supermarket chains in the area. He does 200 – 250 boxes of Cavendish/day, and 1,200 – 1,500 boxes of Pisang Mas/month. Mulia Raya (the company of Lie Po Fung) is his largest competitor. His price of the Pisang Mas to the supermarkets is Rp. 132,000/box, delivered, year-round. On his box, they have " Cavendish ", Pisang Mas ", and Pisang Barangan ", which I never did get to see.

This facility needs redesigning, but it holds terrific potential as a large consolidation and distribution center.

We then met with Cahyadi Hiunardi, the Assistant Manager of Maersk Lines in Surabaya. Maersk began in Indonesia in 1958, and really began growing with the arrival of containerization in the mid-1980s. They are primarily containerized, though they still do some bulk shipping, primarily in sugar, corn, and rice.

Jakarta is their biggest operation in Indonesia, then Surabaya, and then Semarang. Surabaya is the largest handler of refrigerated containers, with seafood being the largest volume, and after that cigars. Fruit is a small percentage of their business. They do some mangos from west Java. They did a mango trial with Emerald from Singaraya in Bali to the middle east, but it was unsuccessful. A real anthracnose problem, apparently. They also handle the bananas from Lampung, as well as some ginger from Lampung. He said that the largest mango producing areas were Probolinggo (right on the way to the banana areas in Lumajang), Singaraya, in Bali, and then Makassar, south Sulawesi, in an area called Takalar. The Probolinggo area has a lot of fruit, but they are apparently very disorganized. The Makassar area is easily transshipped to Surabaya, as is anything from Bali. Everything they handle goes to their port, Tanjung Pelepas, in Malaysia, apparently right across the water from Singapore. From there they transship to about 140 countries around the world. This transshipment point is only 40 – 48 hours from Surabaya or Jakarta.

They bring in 1,500 FFE containers/year of garlic from China to Surabaya alone. Jakarta does another 3,000 of garlic. Surabaya brings in about 1,000 containers of fruit per year from China, and Jakarta does another 5,000 – 6,000 of fruit from China.

The cost of a refrigerated container from Jakarta or Surabaya to the middle east is about $4,000, with another $1,500 for full CA capacity. This means the control of temperature, humidity, CO2, O2, ethylene, and nitrogen. They give 3 free days of spotting.

From there we all drove the 3 ½ hours to the banana growing area in Lumajang, and spent the night there.

Feb. 22, 2007

On Feb. 22, 2007, we began the day early by going to the banana market in Senduro. There we were joined by Pak Lili, the Agricultural Extension Agent who acts as the agent for the local banana growers, and interfaces between them and PT Sewu Segara Nusantara. He seems to be a very capable fellow, and has a lot of good data about the agriculture in the area. He also handles their packing materials, and had several banana dehanding knives in his office.

There were a great deal of potatoes, sweet potatoes, and yams in the market, in addition to great quantities of bananas. There were also cassava and coconuts. The market is held 4 days/week. Similar to many local banana markets in the world, the fruit was coming in from the local growers and then being picked up by the traders in larger trucks, and being transported to various markets, some going as far as Jakarta. The fruit was all being handled in stems. They also said that they export mangosteens from the area to Taiwan and the Middle East (Abu Dhabi) .

We then went to the banana growing areas with Pak Lili, visiting the village of Burno. Most of the farms are located at 500 – 750 meters of altitude. He said that SSN takes 60% of the Pisang Mas produced locally. There are 4 farmers groups, with about 200 members each, and they have 5 small packing plants. We visited a couple of the plants, and they are nothing more than a large front porch of a house, with the fruit being washed in a bathtub. They can do about 100 18 kilo boxes/day in these plants. They do no spraying for crown rot, and probably don't need to do so, as their fruit reached its customers in 4-6 days. If they export to the middle east, that will have to change. All of the Pisang Mas intended for SSN is then trucked to Surabaya, and Andreas takes possession there. He keeps track of the volumes received by farmer group, and relays the information to Tangerang. They in turn get the money back to Pak Lili, and he pays the farmers. Andreas does a QC check in Surabaya, but never rejects the fruit. (This is a great opportunity to put in a real banana QC system.)

The development of the Pisang Mas business has been a great thing for this area. 50% of the expansion came from the conversion from other banana varieties, and 50% came from planting new land. All of the fruit that we saw was bagged, mostly with old fertilizer bags. It appeared as if there was a fair amount of the Fusarium, and Sigatoka was present as well. They said that they could expand another 500 hectares immediately with available land. They developed their own planting material for the Pisang Mas with meristemming, doing 20,000 pieces.

We visited a banana processing area. Here they were doing yam chips and banana chips. They use the Pisang Tanduk for the banana chips. They do about 500 kilos/day of the combined products. The banana chips are cooked in oil, and then packed. They also have drying ovens for a product made from the Pisang Ambon. It's a soft, chewy product, wrapped in plastic, and very sweet. They have a total of three processing centers in this area.

These folks are awfully well organized. They have banana color charts on the walls of their centers, QC charts, production charts, etc. They would be very good groups to work with, on a multitude of projects. They can all use production and postharvest help. In addition, it would be an ideal place to finally develop the comparative economics for the various banana

varieties. It would also be an interesting place to consider the introduction of plantains. These folks could also easily export the Pisang Mas to China and Hong Kong and Taiwan, working with our mangosteen exporters from Bali.

We then returned to Jakarta later that afternoon.

Feb. 23, 2007

On Feb. 23, 2007, Made and I were met in Jakarta by Amelia Binti and her two sons, and we proceeded to go with her to her mangosteen growing area. This piece of property is located in the area of Jonggol, about 3 hours from Jakarta. The last hour into the property is over a horrible road.

The total amount of land is 70 hectares, of which 15.0 hectares are planted to mangosteens. They planted the trees in 2002, and they are just beginning to harvest them now. They harvested 2.0 tons of fruit in this season's harvest, which is normally expected to peak in January/February in this area. The fruit was all sold to SSN. They were sending the fruit there in large cartons and plastic crates. The planting material came from Bali and east Java. They have a total of 1,600 trees on the 15 hectares. They expect to move into full production in another couple of years. They also have 10 hectares of litchis on the property. They get their water from a well, which is only 9 meters deep. They were unsure of the altitude there, but it seemed to be about 700 - 900 meters high.

Feb. 24, 2007

On Feb. 24, 2007, Made, David Anderson, and I went to Subang to visit a pineapple growing area. This is located about three hours to the east of Jakarta.

The pineapple fields are located in the middle of a rather large tea growing area. They did not know the altitude, but it appeared to be about 500 – 700 meters high. The fields that we visited were located on government property. The growers were allowed to use the land without charge, but they understood that they would have to vacate the property if the government ever wanted it back. The fellow who took us around was farming 3.0 hectares, but he said that the average grower had less than 1.0 hectare. In this area, virtually 100% of the fruit goes for fresh fruit, as there is very limited processing capacity in the area. They apparently do have some form of pineapple grower's organization.

They plant either in rows with a 1.2 meter spacing, or on a triangular basis with 40 – 50 cm. spacing between plants, for a population of about 50,000 – 60,000/hectare. . They harvest the plant crop after 18 months (making the first ethrel application after about 11 months), wait about 1-2 months before forcing with ethrel, and then harvest the first ratoon in another 5 – 6 months. They were using both very large suckers and crowns for planting material. They do not replant on a regular basis, but simply continue to ratoon the plants. They said that the average fruit weight was 1.5 kilos on the plant crop and about 1.0 – 1.2 kilos after that. The grower who took us around said that he harvests about 20,000 pieces of fruit per hectare per year. They get about 30 – 40% NDF in June – July. They use both Urea and goat manure for fertilizer.

They sell to middlemen, and they sell the larger fruit at about Rp. 600 – 800/kilo, and the smaller fruit sells for Rp. 400 – 500/kilo. Interestingly, when we stopped at a roadside stand just a few kilometers from the fields, the large fruit was selling for Rp. 5,000/piece, and the small fruit was selling for Rp. 2,000. (Or that was the first price quoted to the foreigners.)

Feb. 25, 2007

Feb. 25, 2007, was spent in Jakarta in report preparation.

Feb. 26, 2007

On Feb. 26, 2007, the initial part of the day was spent in report preparation. At that point, Made and David Anderson and I met with Ir. Tara Plutania E., the owner of PT. Masari Multifruit.

She was originally an exporter and importer of fruit. She had focused on mangos, but had a serious fruit fly and anthracnose problem with her mangos shipped to the Middle East. (This used to be a trip of 27 – 28 days, but she says that she can now do it in 24 days with Hyundai. She also gets better rates from them, and said that she has been quoted $4,600 from them, $4,400 from APL, and $7,000 from Maersk, which I assume is with full CA capacity.)

She got fruit from all over Java and Bali, but got most of her best mangos from west Java, and was doing primarily Harumanis and Gedong Gincu, which they renamed Alfonso, presumably from the resemblance to the Mexican mango of the same name. She has

stopped exporting the fruit (she only did mangos, as none of the other tropical fruits will make the trip), but says that she has a customer base for 2-3 containers/week. She essentially needs a lot of postharvest help. She also used to import fruits, primarily from Pakistan and China. She has no distribution capabilities or cold storage, but rented everything that she needed. She sold primarily to the wet markets.

She now makes her living in a new business, which is the export of plants to the Middle East (Kuwait). She has done one container so far of plumeria, bougainvillea, and some other plants, shipped in coco peat and rice hulls. The plants are sourced from west Java.

David Anderson continues the conversation with her, and Made and I then flew to Medan.

Feb, 27, 2007

On Feb. 27, 2007, we began the day by meeting Arman Ginting, and proceeding to the office of Horti Jaya. There we met with Daman Leo and Sunario Chan, the President Director of the company. This is a very interesting company, and a very likely candidate to be an AMARTA partner. (The following summary includes information developed to a subsequent visit to the Horti Jaya processing area near Merek, where we met again with Sunario Chan.)

The Chan family seems to have a substantial amount of capital. The father's primary business is oil palm, operating in both north and southern Sumatra, the sister owns 200 hectares of citrus in west Australia, and Sunario manages this effort into agricultural diversification. They have 200 hectares of citrus in the Berestagi area, near Merek. They planted this just a few years ago, and will really only begin knowing the results of their experiments in 2008. They have planted over 20 different varieties, bringing in the best, pest free, from all over the world, and have done some " trials " of over 30 hectares. They are mostly easy-peel varieties, though they do also have some Valencias. We visited the greenhouse where they were preparing the bud wood for many of the varieties that were to be tested.

They have 50 hectares of vegetables, of which 7 are in very modern greenhouses, and the rest are open field. One of the hectares is located next to the spinach processing area, two hectares are in another location, and the balance (4.0 hectares) is in a third location. The greenhouses are all using coco peat for the medium, and they do various colors of bell peppers, as well as tomatoes. Of the open field production over half is in spinach, and they will continue to increase the spinach. This is processed in a very modern facility in the area

of Tanko, less than 2.0 kilometers from the growing area, where it is washed, blanched, dried, and then block frozen for export to Japan. The entire area is very large, with the building alone over 5,000 square meters. It has its own 100 meter well, with high quality water. He also uses settling ponds for the water quality, as well as a UV treatment. There are three cold storage rooms, each one at 9x12x14 meters. Two are kept at 7 degrees, and one is kept at minus 35 degrees for the spinach. He has three importers that he sells to in Japan. He said that he can't begin to supply the market. The balance of the farm is planted to corn, potatoes, sweet potatoes, lettuce, Chinese cabbage, and other products. They use all imported seed, purchased from local seed suppliers. The farm area is at 1,200 – 1,400 meters of altitude. He has 30 – 40 outside growers, and would love to have some assistance in technical knowledge with them. 40% of the spinach comes from outside growers. He has 4-5 technical assistants who regularly visit the spinach farmers (primarily) to evaluate and record all of the farm practices.

The spinach processing area has about 200 employees, with over 150 working in the spinach cleaning and grading area, and the balance working in the packaging areas.

The tomatoes and bell peppers from the greenhouses look to be of very good quality. He is selling the tomatoes both locally and exporting to Singapore. He harvests at various color stages, from mature green to nearly a vine ripe. He is growing beefsteak, cherry, and grape type tomatoes. This business offers a substantial opportunity.

He exhibited recently in Japan in an Asian Food Exhibition, one of only 3 Indonesian firms chosen to show there.

He developed a terrific business with a leaf, Perilla, that is widely consumed to eat in Japan with sashimi. He developed a full production capacity to deliver 2.0 tons/week, satisfied the Japanese quality standards, but has abandoned the business due to the lack of adequate air freight service. Most lines such as Garuda, Singapore Air, and JAL all have unacceptable transit times in various airports. The only one fast enough was Malaysian Air, but they continually left the product on the runway in KL, destroying it. So he dumped the business.

Transportation is a major issue for him. The road to the farm is so steep and curvy that 40' containers are just too risky. In addition, there are regular landslides on the road. There is container service out of Medan, to Singapore, Jakarta, and Malaysia, but the port is notoriously expensive and unreliable. It's a 4-5 day truck trip to Jakarta. But right now up to 100 trucks a day carry the Berastagi citrus to Jakarta.

He said that there are 14,000 hectares of citrus in this area, and he wants to build his own citrus processing plant.

He said that some of his growing areas are very foggy, which is a big problem for citrus. However, it might be an ideal area for fern, particularly given the good shipping access.

This is a first class candidate for an AMARTA partner. They have capital, have a production, processing, and distribution base, do both domestic sales and export, and would very ,much like to have production (including open field and tomatoes and bell peppers in greenhouses), postharvest, greenhouse technology, refrigeration, food safety, and small grower management assistance.

From there we went to the Pisang Barangan production area, which is about 1 ½ hours from Medan. There we visited first the SubDistrict head, Mr. Binar Sitanggang, whose office is located in STM Hilir. We all then went to Talun Kanas, where the government is assisting the banana growers in the construction of a STA.

The facility that we saw is a very modest affair, with simply a concrete slab, and a number of wooden partitions, where I assume that the farmers place their harvested fruit and wait for the buyers. We were soon joined by a number of the banana farmers, and proceeded to one of their fields.

They said that they have 56 farmers groups in the area, with about 25 farmers in each group. The average farmer has about 0.6 hectares of producing bananas. (We got some conflicting statistics in this area, and it all needs to be verified.) The farthest farmer is about 10 kilometers away. The middlemen comer to the growing areas and buy by the stem, and pay about Rp. 35,000 – 40,000/stem. The stems appeared to weigh 20 – 25 kilos. Stems are brought in every day in the afternoon, and they said that they receive 15 – 20 stems per day per group. The middlemen pay cash for the fruit. They plant 1,100 per hectare. The area appeared to be very dry, and no one irrigates. They said that there is no surface water available, but that the water table is at 9.0 meters of depth. They do not know how to prune. They do no deleafing. They use no pesticides. They had no drainage. They do no propping. They do apply KCL and TSP, but didn't know the amounts. This is a tall variety, nearly the height of plantains. About 10% of them bag the fruit, and the quality difference that we saw with the bagged fruit was remarkable. They have Sigatoka, and possibly Fusarium, but I was not sure. They have been steadily expanding the business of the Pisang Barangan, as it is a much better business than the corn and coconuts that they are removing.

They did a trial of selling to SSN, trucking to Jakarta, but stopped shipping when SSN insisted on beginning payments only after the third shipment.

We stopped in at a very rustic ripening area, where they had some stems covered with fertilizer sacks, and they said that they were using calcium carbide under the sacks.

This is an area with a lot of papaya, and we passed through a great deal of oil palm, cacao, and coconuts on the way. The altitude was said to be 100 – 200 meters.

This is an obvious opportunity, and there appears to be no reason why the same success story created in Lumajang with the Pisang Mas could not be duplicated here, with the principle unknowns at this point being the cost of transporting the fruit to Jakarta and the market acceptance of the fruit. But we can certainly increase their productivity significantly, raise their quality standards, and organize their packing to duplicate the east Java efforts.

From there, we went to the branch office of Mulia Raya in Medan, and met with Edie Swandi, the Manager. The firm here is called Sekar Mulia Abadi, but it is a branch of the main company.

The operation here is only 5-6 months old, and they are in a new cold storage and distribution center. They have three cold storage rooms, triple racked and managed with a forklift, and two spotted 40' containers. One of the containers held frozen goods, primarily their daily products from New Zealand. One room was not functioning at the time due to low volumes. The other two rooms held primarily Chinese citrus, apples, and pears, though he did have some Washington state apples. The facility is 2,500 square meters, and has plenty of room to double the cold storage capacity. The rooms will hold 5,000 of the 20 kilo apple and pear boxes, and 7,500 of the 10 kilo citrus boxes. In addition, there is plenty of room on the grounds at the back to build banana ripening rooms. It is 100 tons of storage capacity. They have 3 refrigerated trucks and one non-refrigerated one, though the two trucks that we saw were pretty small. When all 3 rooms are in operation, one is at about 0-2 degrees for the grapes, one is at 5-7degrees for the apples and pears, and the last is at 10 degrees for the citrus.

They only import fruit, and do no vegetables nor do they buy local fruit. They tried the local citrus, and did have a quality problem, but the main problem was price. There is such a flood of fruit when it begins to come into season that the local prices are very low. They had some of the company's dairy products. In addition to the product we saw, they also

bring in grapes from China. Their customer base is Sumatra, primarily Medan and Padang. They sell to all of the supermarket chains in Sumatra, as well as wet markets. They do 40 – 50 deliveries/day.

He said that there is enough volume of local mangosteen to make it an interesting business, and someone now exports mangosteen to Singapore. He would be interested in this.

He also brings in Chinese carrots (the old New Zealand growers that Po Fung told us about), and their imported cost is so low that they sell the carrots at Rp. 40,000 for a 10 kilo box.

He said that during the recent Chinese New Year, two of his competitors brought in 30 containers each of Chinese citrus, and they were selling them for Rp. 65,000 per 10 kilo box. They stuff 2,650 per 40' container. Arman got the names of the competitors and will visit them.

That evening we were joined by David Anderson, and met with Khairul Mahali, the founder and owner of PT. Sahara Tranindo, a freight forwarding and logistics company.

They do nearly a full line of services, including freight forwarding, documentation, warehousing, export certification, cold storage, etc.

He confirmed that the local port, Belawan, is expensive and very frustrating to use, primarily due to a lack of facilities. They have been pushing the government for addition capital investment for years, but there is no sign of progress. They have also talked about privatization, but no progress here either. The port belongs to the central government, not the state government. It's a wonderful location, as Penang is only 4 hours away, and only 6-7 hours to the Maersk transshipping point of Tanjung Pelepas. There are three shipments to this point per week. There is direct shipping to Singapore, with the cost of a dry container being about $600-700 for the basic cost, and probably $1,000 with all costs. They offer three to five free days of spotting. Trucking to Jakarta is not recommended by them, as it's a 5-7 day trip, full of problems. The cost to Jakarta for a reefer container is Rp. 6,000,000, plus all of the extras. He said that they can get to Kuwait in 14 days, by transshipping wither through Tanjung Pelepas or Singapore.

There are direct flights to KL, Singapore, and Penang, and of course domestic flights. He strongly recommends the Silk Air flight to Singapore, which can then feed into nearly anywhere in the world. In addition, Singapore is a reliable airport, with good cold storage.

Medan to Singapore is about $0.50/kilo, plus extra costs. The full cost all the way to Tokyo would be about $1.70/kilo, and could go down to $1.50/kilo. This is on ANA Airlines.

He used to export mangosteens to Taipei and Hong Kong. They did up to 3 tons per day, all by air freight. But problems developed with the supply.

Feb. 28, 2007

On Feb. 28, 2007, David, Made, Arman and I were joined by Bharty, and we proceeded to Berestagi. From Berastagi, we drove about 45 minutes to the village of Dekan, located in the Karo Highlands, and there we met with about 20 local citrus growers. These folks represented about 14 of the local citrus groups in the area, with each group having about 25 – 30 members. We began by going out to the fields with them, and visiting what they called a demonstration plot. They are growing the Siam Madu variety here, which they called the preferred local variety. The big deal in this area is that the government apparently released in 2005 a Standard Operating Procedure manual for this type of citrus in this area, and if followed carefully, can make a significant difference in production and quality. We were told that the SOP will raise production costs from Rp. 800/kilo with the old methods to a cost of Rp. 1,500 – 2,000/kilo/ However, the productivity will increase from 50 – 80 kilos/tree/year to an estimated 100 kilos/tree/year. As they are planting at 400 trees/hectare, this means an increase of tonnage of 14,000 kilos/hectare/year, if we compare with the median of 65 kilos under the traditional method.

They also told us that the fruit sold if produced following the SOP will sell for Rp. 2,500 – 5,000/kilo, with an average of Rp. 3,500/kilo. The fruit produced under the traditional method sells for an average of Rp. 1,500/kilo. If this is true, this means that the traditional method yields an annual earning of (65*400) * (1,500 – 800) = Rp. 18,200,000/year. The new method will earn (100*400) * (3,500 – 2,000) = 60,000,000/year. If they are only half right, they are nearly doubling their annual earnings. The visual difference between the demonstration plot we visited and the contiguous plot next to it certainly lent credibility to this story. (The large price difference between the two types of fruit is due, they say, to the size of the fruit, the appearance of the fruit, the taste of the fruit, and their ability to time the harvest and get it out at a better time for the markets.) They estimated that no more than 5 – 10% of the farmers follow the new SOP. This is due to a normal slow dissemination of new information, a normal conservative skepticism on the part of all farmers, and in some cases a lack of capital to begin implementing the system. The agricultural extension service is responsible for the dissemination of the information. They are doing 0.5 hectare demonstration plots in various area around the sector.

Their peak season is July/August, and they have a small peak in November/December. However, this is nearly March, and we saw a great deal of fruit hanging in the trees. They said that they had the ability to manipulate the timing of the harvests through a controlled application of fertilizer and water, and that they could have 5 different stages of fruit hanging on the trees simultaneously. We certainly saw fruit of all stages hanging on the trees, but whether or not they caused this is certainly open to question. (The irrigation is done manually, with tanks brought from the villages, and then applied with hoses.)

They said that their average daytime temperatures are 26 – 27 degrees, and the nighttime averages are around 16 degrees. They also said that these fields are at around, 1,250 meters in altitude. They said that there are about 700 hectares of citrus in their area alone, and that the average farmer has about 0.5 hectares. Everyone owns their own land. All of the fruit sold in this area goes for fresh product.

They have two systems of selling to the middlemen. The first is similar to that of Bali, where they basically lease the field to the middlemen, and get out of the way. The biggest difference is that they don't receive a 50% advance, but get paid everything upon harvest. In the second system, the farmers themselves do the picking and grading, and hand over the product at the roadsides. The fruit is supposedly then weighed at roadside.

They have three grades of fruit, with the only difference communicated to us being fruit weight. Grade A fruit has 6 pieces per kilo, Grade B is 7 pieces per kilo, and grade C is 8-9 pieces per kilo.

We did an informal survey of the farmers there in the field, and asked them what their most serious problems were. The greatest number of them were pretty well divided between production problems, credit problems, and marketing problems. A few complained of inadequate water, and one complained of poor local infrastructure (roads).

From the fields we returned to the village and held a meeting with the farmers, where they presented to us a summary of the " state of citrus " in their area, as well as a wish list of the things they would like from AMARTA. They wished assistance in organization and the implementation of the SOP. They would like a 4WD vehicle, and some motorcycles to have better access to all of their members. They need a computer plus appropriate software to better manage themselves. They would like to build a network of the farmers, and then install a farm store where they would sell agricultural inputs. They would like to develop a promotional program, to increase the consumption of their fruit in Indonesia. They need better access to credit. They want to shut out imported citrus. They are also very eager to install a planting material program, to generate pest free seedlings of the best varieties. (The fellow who is apparently the leader in this effort was quite disdainful of the nearby

Horti Jaya varietal experiments, as he seemed to feel that the foreign/Australian varieties would not be suitable for the locale. They feel confident about expanding their Siam Madu variety, and also seemed confident about a Fremont variety.

We then went with some of them and visited a large STA built for them in the village of Desa Merek. This is a large piece of land, with one very large building which could be converted into a fruit receiving, packing, and cold storage area. Another building had tiled floors, and could be used for fruit processing. There was another building that would be suitable for administration and training. There was plenty of external space to build warehousing. They have their own well access to municipal power, and access to telephone lines. They had some corrugated cartons stored in the large buildings. These were too big and too strong, said to be able to hold 25 kilos. They were said to cost Rp. 7,000 each, a good price for the amount of cardboard in that box. There was also a small amount of processing equipment still in its crates, including a brusher and a circular table to be used in the grading or packing process.

From there we drove nearly an hour from Merek to a pineapple growing area. When we did the same informal survey of these folks concerning their principal problems, they all responded that access to credit and marketing were their main problems, with no one mentioning production. But when we went to the fields, we quickly found that the reason for this is that they were ignorant of the most basic production practices. This was a " plant and let it grow system ". This area is supposedly at 1,350 – 1,450 meters, already very high for pineapple. They probably have NDF all year. But since they let all of the suckers grow without pruning, they would never know. They apply no fertilizer and no pesticides. They do no forcing. The area consists of a lot of small, scattered fields. The plant spacing is very irregular. There is ostensibly a processing plant about 10 kilometers away which is shut down due to labor problems. This district was said to have about 200 hectares of pineapple.

There is no question but that they can use all of the help they can get. The question will be where they will fall in terms of the priorities for the programs.

We then went to Kabajahe, and visited a local cut flower grower. This operation was managed by a family by the name of Zainab Berukaban, though it appeared as if the wife was responsible for the cut flowers. This area is located at an altitude of 800 meters, they said. They have three greenhouses. The principal one, which was dedicated entirely to chrysanthemums, appeared to be about 20 meters by 40-50 meters. Two smaller ones were planted to roses and chrysanthemums, and were both 8 by 24 meters. They said that the smaller ones cost Rp. 6,500,000 to build, which represented the structure cost only, and did not include plumbing or electricity.

She sells currently to three flower shops in Medan. She said that she could sell a great deal more if she had the product. She competes against both imported and domestic product, and 85% of the Medan market is supplied by non-local suppliers. Thailand and Malaysia supply on a regular basis. The Cameron Highlands supply roses and other products, which are air freighted from Penang.

She gets most of her planting material from Java, from between Subang and Bandung. In addition to her roses and chrysanthemums, she had some very poor open air carnations, and small amounts of limonium, solidaster, and gyp. She said that there is a Korean rose grower in her town who is larger than she is. There are a total of about 15 flower growers in the area. For the chrysanthemums, she harvests about 70 stems per square meter. She sells in 10 stem bunches, at an average price of Rp. 15,000 per bunch, with the price going to Rp. 45,000/bunch on the holidays. The roses sell for about Rp. 7,000/stem, and about double that on the holidays. The chrysanthemums looked pretty good, produce regularly on a year-round basis, though there was a lack of uniformity, and we saw scale in one bed. The roses badly need help, though they are just beginning the formation of the plants.

Mar. 1, 2007

On Mar. 1, 2007, we were joined by Rafael Jabba of USAID, and went first to visit a coffee processing operation in Berestagi. There we were guided around by Mr. Kusna. The variety of coffee that they are processing here is North Sumatra Lintong.

We were told that they have two site of operation. The first is in Tiberang, where they have a collecting and bagging operation for green coffee. The plant that we visited is the site of their cleaning, grading, and bagging.

This operation recovers about 80% of its product, with the other 20% sold locally in Indonesia. Of the 80%, 90% is exported to the U.S. 3-5% is sold to Australia, and the balance goes to the UK. Of the quantities going to the U.S. 80% is sold to Starbucks. They generate about 18 tons of day for export, or one container per day, and 30 containers per month.

They have about 240 workers in the plant. The girls doing the sorting are paid Rp. 400 – 500/kilo sorted, and they can do 900 kilos/day, which puts their earnings far above the local average.

They do two to three quality control, or " cupping " tests per day. They selected 9 separate samples in the testing that we witnessed, and do their own roasting and grinding for the testing. They said that a poor test may mean the halting of export of a given grade of coffee. But given the way that all of the product is mixed together for processing, it was hard to imagine how they can isolate a certain grower or middleman.

They are one of 5 exporters to Starbucks in Sumatra, and they are the 3rd largest.

They keep samples of every export shipment, and retain them for one year. They also send samples to th3e customers as soon as the product is ready for shipment.

They receive product from about 230 middlemen, who deal with about 1,200 farmers. The farmers average about 0.5 hectares each. They bring in coffee beans from a radius of 200 – 300 kilometers. They are currently paying about Rp. 12,000/kilo, and the normal range is Rp. 9,000 – 13,000/kilo.

From there we proceeded to the processing area of Horti Jaya. The results of this visit have been included in the Horti Jaya section above, under Feb. 27, 2007.

From there we returned to the Medan area, and visited the fruit processing plant of PT. Agrosari Sentraprima, and met there with the founder and Director, Sanjaya Lawyer, together with his wife. This is a plant located outside of Medan. The total piece of land is 1.7 hectares, and the operation was begun in 1984. Most of the machinery appears to be quite old, and the sanitation levels are very low.

They receive pineapple from the middlemen, from areas as far away as 200 – 300 kilometers, with a lot of it coming from the Tapanuli area. They receive about 20 tons per day, with an incoming brix of around 12. The pineapple is peeled manually, and they have a couple of manual ginaca tools for the slicing when they do it. They are currently paying about Rp. 650,000 – 700,000 per ton. They normally produce slice, tidbits, crush, and a 62 brix concentrate, that is sold frozen, and maintained at minus 10 degrees C. . (The remaining solid material is sold for animal feed, as well as for a paper mache product that is used fro egg containers.) However, the price of cans went so high that they stopped canning. But the Chinese suppliers recently offered a lower price, and he said that they have ordered cans and will resume canning soon. He sells the concentrate for $0.90/kilo, FOB port. If it is packed in aseptic bags, it receives a higher price. Most of the exports go to Taiwan, with some going to China.

They also producer some other products, including a tropical fruit cocktail, a rambutans stuffed with pineapples, and a rambutans in litchi syrup. We suggested that he consider putting in a line in the new plant that could pack the tropical fruit cocktail in either glass or plastic, which have a much higher market value.

They are planning on relocating the cannery within a year to a location nearer to the fruit supply. They have already purchased the land and half of the equipment, but have not begun the design work. Mr. Lawyer is a graduate of the Chung Ching Food Processing University in Taiwan, and intends to do the design himself. The new cannery is intended to have a 50 tons/day capacity, and he currently feels that 40% will be canned and the balance will go for concentrate. He estimates that there are 2,000 hectares of pineapple available in the area. In addition, he will have little competition from other canneries in the area. Having a cannery located nearer the fruit source will both raise his yields and lower his incoming fruit cost.

He also deals in mangosteens. He concentrates the fruit and exports it. He then dries the hulls and packs them in 40 kilo bags, and exports them to India and China, where their apparent principal use is for food processing for the purpose of the high level of anti-oxidants in the hulls.

This is a likely candidate for AMARTA intervention. A serious piece of analysis should be done first, to understand the economics of the entire supply chain. However, a successful new cannery could positively affect the lives of several hundred small farmers. Therefore the assistance could be first in all of the aspects of the new cannery, including design work, food safety assistance, etc. Then the work could concentrate on the pineapple growers in the supplying area.

Mar. 2, 2007

Mar. 2, 2007 was initially spent in report preparation. Subsequent to that, a preliminary summary of the findings of the consultancy were presented to Rafael Jabba in the AMARTA office in Medan. After that, the entire group returned to Jakarta.

Mar. 3, 2007

Mar. 3, 2007 was spent in report preparation, and the initiation of travel to Washington, DC.

Mar. 4, 2007

Mar. 4, 2007 was spent in the conclusion of travel to Washington, DC.

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VI. Acknowledgements

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