

Study No.3

Dissemination and Demonstration on the Chemical Treatment/Protection of Rattan, Bamboo, Palms, Twigs and Vines in Upland Communities

Terminal Report

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International Tropical Timber Organization
Yokohama, Japan

FPRDI-ITTO PROJECT PD 15/96 Rev. 2(M,I)

**Utilization, Collection and Trade
of Tropical Non-Wood Forest
Products in the Philippines**

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STUDY COMPLETION REPORT



A. Study Identification

Project Title : Utilization, Collection and Trade of Tropical Non-Wood Forest Products in the Philippines

Serial Number : PD 15/96 Rev.2(M.I)

Study Title : Dissemination and Demonstration on the Chemical Treatment of Bamboo, Rattan, Palms, Twigs and Vines in Upland Forest Communities

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Part I. Summary :

1. Background Information of the Study

Bamboo, rattan, palms, twigs and vines grow abundantly in various regions of the country and are considered our major tropical non-wood forest products (TNWFP). These forest resources comes in different sizes, forms and shapes making them very suitable for furniture or in the production of handicraft products and other novelty items for export.

The bamboo-rattan furniture and handicraft industries have been one of the major sources of livelihood for thousands of Filipinos specifically those in the upland forest communities or in the countryside. Recently, twigs and vines have become major components of baskets and handicraft products that are exported to Japan, Europe and the United States. The Filipino ingenuity resulted in the production of fine quality products that has captured the international market making it a top dollar earning industry during the past decades.

However, the extreme popularity and high demand for the products has led to the indiscriminate cutting and exploitation of the said resources. Further, there has been a neglect on the part of the gatherers of bamboo, rattan, palm, twigs and vine and also of the entrepreneurs on the proper handling of freshly cut materials or those that are in storage or in transit. There are reports that millions of pesos are lost in terms of time, money and efforts due to the damage caused by insect and fungal attack on the materials and finished products.

A. Specific Objectives

With the present situation of the industry, it is imperative therefore that the sectors who are engage in the harvesting, collection, storage and manufacture of furniture and handicraft products made of TNWFP be trained on the proper handling of the said materials and finished products. The training will provide them knowledge in determining the nature and cause of fungal discoloration or insect attack. These are important aspects in the application of control strategies in the protection of TNWFP. Likewise, they should also be familiar with the various methods of applying preservatives and remedial treatments of infested materials. It is also the objective of the study to train the sector on proper handling, preparation and disposal of chemicals or preservatives.

B. Strategy Adopted in Carrying out the Project:

Participants were members of our tribal groups, the Dumagats, Manobo, Mangayunan, Bugkalots, Ilongot, Mamanua and other migrant settlers who have acquired Certificates of Ancestral Domain Claims (CADC). There were instances when traders and manufacturers attended the training program.

The training program was organized through the cooperation of various government agencies, non-government organizations and private sectors namely:

1. Department of Science and Technology (DOST)
 - a. DOST III - Pampanga
 - b. DOST IV - Palawan
 - c. DOST IX - Surigao del Sur
2. Department of Environment and Natural Resources (DENR)
 - a. Community Based Forest Management Office (CBFMO)
 - b. Community Environment and Natural Resources Office (CENRO)
 - c. Provincial Environment and Natural Resources Office (PENRO)
3. Non-government Organizations (NGO)
 - a. Nagkakaisang Tribu ng Palawan (NATRIPAL), Palawan
 - b. NGO, Aurora, Baler
 - c. Casecan Handicrafts, Nueva Ecija
4. Municipalities
 - a. Municipality of Jiabong, Samar
 - b. Municipality of Kiamba, Sarangani Province

5. Private Sector

a. MIRCAN Furniture and Handicraft Industry, Pampanga

In order to attain the objectives of the study, lectures were presented using visual aids and flip charts either in English or Tagalog which can be easily understood by the participants. The lectures were supplemented with pamphlets in English and Tagalog versions which covers the various aspects of the technology. To familiarize participants with the various agents of deterioration, treated and untreated TNWFP samples were provided and shown during the training.

An open forum and discussion with the participants followed after the lecture presentation. In some cases, an interpreter of their local dialects was needed in order to encourage active participation during the open forum. Likewise, a plant visit to some processing firms in some training sites was done and appropriate measures were recommended in order to attain and maintain the high quality of raw materials and finished products.

As part of the program, a demonstration on the proper handling, preparation and application of chemicals was conducted by the trainers in every training site. This was followed by the "hands on" training by the participants.

After the training course, certificates of completion and appreciation were distributed to the participants and coordinators, respectively.

2. Study Achievements

a. Output

Dissemination and demonstration of the technology on the application of chemical treatment on bamboo, rattan, palms, twigs and vines in upland forest communities were conducted in 11 training sites:

1. Sabani Agricultural College
Dupinga, Gabaldon, Nueva Ecija
2. DOST IV. Puerto Princesa, Palawan
3. Jiabong Municipal Hall, Jabong, Samar
4. Kiamba Municipal Stadium
Kiamba, Sarangani Province
5. PENRO, Tandag, Surigao del Sur
6. Babuyan, Adlay, Norcia & Cantilan
CENRO, Surigao del Sur
7. DENR Training Center
CENRO Office, Baler, Aurora
8. Aurora Trading Center
Setan, Aurora
9. Diteki, Aurora

10. Casecnan Handicrafts
Caranglan, Nueva Ecija
11. MIRCAN Furniture & Handicraft
Manufacturing Inc. Angeles City , Pampanga

As planned, the study identified only four (4) training sites but it would be noted that the demonstration and dissemination of the technology covered 11 training sites for the period of two (2) years. As such, the study surpassed the target number of sites as planned. This indicates the technology on treatment of TNWFP is urgently needed and warrants dissemination to the industry nationwide.

The dissemination of the technology was very timely in most training sites because of the current livelihood program being initiated by the local government for the upland forest communities. One of these livelihood programs is the production of furniture and handicraft products and other novelty items made of wood, bamboo, rattan, twigs and vines. In the course of the training program, it was noted that indigenous people and other participants are in need of such technologies as part of their livelihood programs. For this reason, the trainees were very thankful for having attended the training course.

The lectures were incorporated in three (3) pamphlets and these cover the nature and causes of biodeterioration, handling and preparation of chemicals and methods of application. The pamphlets were written in English and translated in Tagalog version which could easily be understood by the tribal groups. Likewise, treated and untreated TNWFP samples were shown to the trainees. This will make them familiar with the signs and symptoms of biodeterioration and the effects of applying chemical and non-chemical methods of controlling insect and fungal attack on raw materials and finished products.

The following are the pamphlets prepared and used in the training program:

English Version:

- a. Pamphlet No. 1E. 1998. Prevention and Control of Fungal and Insect Attack on Rattan, Bamboo, Palms, Twigs and Vines.
- b. Pamphlet No. 2 E. 1998. Treatment Procedures Against Insect and Fungal Attack on Bamboo, Rattan, Palms, Twigs and Vines.
- c. Pamphlet No. 3E. 1998. Handling and Preparation of Fungicides and Insecticides.

Tagalog Version:

- a. Pampleto No. 1T. Pagsugpo sa mga Amag at Bukbok sa Yantok, Kawayan, Anahaw, Sanga at Baging.
- b. Pampleto No. 2T. Mga Alituntunin sa Pangangalaga ng Yantok,

Kawayan, Anahaw, Sanga at Baging Laban sa Mga Amag at Bukbok.

- c. Pampleto No. 3T. Mga Patnubay sa Wastong Paghahanda ng Pamuksa sa Amag at Bukbok.

A guide on the grading rules entitled "Grading Rules in Rattan" (1948 and 1986) 1998 and a Tagalog version, "*Mga Panukala sa Pag-uuri ng Yantok*" were prepared.

A course outline and programme which briefly describe the scope of the training program and the pamphlets were distributed to the participants to recollect the principles involved in the application of the technology. The indigenous people who participated in the training program include the Mangayunan, Dumagats, Ilongot, Bugkalot, Manobos, Mamanua tribes and other migrant settlers. Some interested traders or manufacturers also attended and participated in the training program.

The pamphlets were also distributed to walk-in visitors in the Institute which include , local bamboo, rattan and handicraft manufacturers seeking assistance on the control of biodeteriorating agents of TNWFP. Likewise, these were also given to students as well as local and international scientists working in similar field of specialization.

Lectures were presented in English or in Tagalog language using visual aids to facilitate the easy transfer of the technology. Non-chemical treatment of bamboo strips by soaking in water was also discussed.

The participants showed interest and easily comprehend the nature of insect and fungal damage on the raw material, its prevention and control and proper application of chemical treatment. Likewise, participants acquired knowledge on appropriate remedial treatments on damaged raw materials and finished products. Proper handling, preparation, application and disposals of preservatives were thoroughly discussed. Precautions and safety on the use of chemicals were also emphasized.

Certificates of attendance were given only to the participants who completed the course. Certificates of appreciation were presented to the coordinators or cooperators for their assistance in organizing and facilitating in the conduct of the training.

On the other hand, the trainers of FPRDI and the funding agency, ITTO, received a certificate of recognition and appreciation for the Training on the Chemical Treatment of Rattan, bamboo, Palms, Twigs and Vines conducted in the Municipality of Kiamba on May 24-26, 1999). This was given by the Office of the Sangguniang Bayan of the Municipality of Kiamba through Resolution Nos. 99-111 and 99-112 dated July 13, 1999.

b. Specific Objectives

Participants in the training were expected to acquire and apply the principles on the chemical treatment of TNWFP on the following at the end of the program:

1. Knowledge on the nature and causes of biological deterioration in bamboo, rattan, palms, twigs and vines.
2. Techniques in determining or detecting signs and symptoms of insect and fungal attack.
3. Kinds of wood preservatives, preparation, handling and methods of application to prevent insect and fungal attack.
4. Techniques on remedial treatment of infected materials.

Safety precautions in handling, preparation, application of preservatives and proper disposals were included in the training program. This is to avoid the hazards of chemicals to applicators, environment and non-target organisms.

C. Contribution to the Attainment of Development Objectives

The active participation of the trainees and the cooperation of the various government units have been very helpful in the attainment of the objectives of the study.

3. Target Beneficiaries Involvement

The indigenous people in the target sites are the primary beneficiary of the technology on the chemical treatment of bamboo, rattan, palms, twigs and vines against insect and fungal attack. The group actively participated in the discussion and have presented problems they have encountered in handling and in the preservation of TNWFP. Likewise, the participants showed eagerness to learn by taking part in the "hands on" exercises of the training program.

4. Lessons Learned

a. Development Lessons

i. Aspects of project design which most contributed to its success.

The project was conceived to solve the problem of insect and fungal attack on TNWFP which are utilized by local producers of furniture and handicraft items especially in the upland communities. The raw materials are very susceptible to discoloration and powder post beetle damage which results in the reduction in the quality of the products.

The dissemination on the methods of preventing such damage was very timely because of the current program of the government on the installation of livelihood projects especially in the rural areas. Likewise, the Community Based Forestry Management Office (CBFMO)-Natural Resources Management Program (NRMP) were instrumental in the successful implementation of the study. Certificates of Ancestral Domains Claims (CADC) were awarded to tribal groups and the technology shall serve as a guide in protecting, developing and managing ancestral lands. These contributed to the success in the implementation of the study.

ii. Changes in Intersectoral Links which Affected the Project's Success.

The original cooperators of this training were DENR, Industries Development Corporation (IDC in Quezon Province), Development Corporation (SUDECOR in Surigao) and San Jose Timber Corporation (SJTC, Samar). All of these companies were contacted prior to the conduct of the training program however, SUDECOR and IDC as cooperators are not operational or not involved in TNWFP industry during the implementation of the study.

As such, there were changes in the linkages of cooperators in order to attain the objectives of the study. The DOST, DENR, local government units and NGO's were tapped to coordinate with the Upland Forest Communities and have played a major role in the success of the study.

iii. Additional Arrangements that Could Improve Cooperation between Relevant Parties Involved.

It was not foreseen that there are other government agencies that would be interested in the training program. A written memorandum of agreement should have been signed with the incorporation of other parties who have shown interest in the program.

iv. Factors that will most likely affect project sustainability after completion.

The sustainability of the project shall depend on the market demand for high quality raw materials from TNWFP. It is necessary that a standard be set so that products which are damaged by fungi or insects are not accepted and only those materials which are clean, blemish-free shall be accepted in the market. It is only through this that our products can be competitive in the world market. Once this has been established, it shall always be the objective of the raw material supplier to produce high quality products.

In addition, assistance to the indigenous people in marketing their raw materials and finished products should be provided. This would

ensure the continues application of the technology in order to meet the demand for high quality materials and finished products.

b. Operations Lessons

There was no problem in the project organization and management, documentation and on monitoring and evaluation. The responsibilities of each of the institution mentioned in the study were well-defined.

The restrictions or non-issuance of license or permit to cut TNWFP was a major factor that influenced the implementation of the project. However, conduct of the training program was done in other areas which need the technology on application of chemical on NTWFP.

5. Recommendations

In order to maintain blemish-free and high quality products from TNWFP, the dissemination and demonstration of the chemical treatment has to be a continuous process. There are still various areas around the country producing TNWFP and it is necessary that the technology be introduced in order to attain high quality materials. Consequently, this results in the conservation of our forest resources.

There should be a close coordination among the various sectors of the furniture and handicraft industries, i.e., Department of Environment and Natural Resources, Non-government Organization (NGO), Local Government Units (LGU's), Department of Trade and Industry, Philippine Chamber of Furniture and Industry, Phil. Chamber of Handicraft Industry. There should be a link between these sectors and indigenous people so that the former can provide assistance to the latter for continues marketing of their products. Marketing of their products has been a major constraint in the development of the industry in their particular areas.

PART II. MAIN TEXT

1. Introduction

Furniture and handicraft products made of bamboo are susceptible to fungal and insect attack. Damage caused by these organisms results in the degradation of the raw materials and consequently reducing market value of the finished products. Fungal attack is usually manifested in the form of bluish to black discoloration on the surface of the raw material or may occur as deeply penetrating stains that extend beneath the surface of the affected product. On the other hand, degradation due to powder post

beetles occurs as minute, pin-head size holes and their presence is manifested by beetle holes and fine powdery masses.

The problem can be remedied by the application of appropriate preventive and control measures that will provide and ensure clean and blemish-free products. Technologies on the protection of TNWFP against biodeteriorating organisms are available and these were disseminated through the conduct of seminars and "hands on" training programs to the target clientele.

Basic knowledge on the nature and causes of deterioration by fungal and insect attack in the above mentioned forest resources formed a part of the lecture to understand better the reasons why there is a need to protect the materials while these are in transit or in storage. Skills of participants were developed by hands on exercises on the preparation, proper handling, treatment application and maintenance of freshly cut or finished products of bamboo, rattan, palms, twigs and vines. Application of remedial treatment was also dealt with in the training module.

2. Methodology

a. Materials

Pamphlets (English and Tagalog)	Long Sleeved shirts
Audio visual aids/flip charts	Masks/Gloves
Raw materials (i.e., bamboo, rattan vines, etc.)	Spade/Shovel
Samples of damaged/sound bamboo rattan, twigs, palms and vines	Plastic sheet
Knapsack and Tree Sprayers	Projector
Chemicals (TCMTB, Deltamethrin)	Generator
	Camera/Films

b. Methods

1. Preparation of Pamphlets and Audio Visual Aids.

Three pamphlets which cover the different topics on the chemical treatment of bamboo, rattan, palms, twigs and vines were prepared. These served as a guide for the participants in the course of the training program. An outline of the training course and a program were also prepared in English and in Filipino. The program was modified depending on the locality and needs of the participants in the various areas that were visited.

In order to further facilitate the attainment of the objectives of the study, audio visual aids on the various aspects of the course were also prepared.

2. Schedules and Conduct of Training Programs.

The conduct of the training program was coordinated with DENR, Local government Units (LGU), DOST (Regions IV and IX), NGO's, and local manufacturers of products made of bamboo, rattan, palms, twigs and vines. The Coordinators in each training program presented an overview of the course.

Lectures were presented and each is followed by an open forum. The training proper was actively participated by the group. Participants were allowed to give their impression about the training program.

Certificates of completion were distributed to the participants who completed the course.

2. RESULTS AND DISCUSSION

a. Preparation of Pamphlets and Audio Visuals

The lectures were incorporated in (3) pamphlets and were translated in Pilipino language or Tagalog dialect. A pamphlet on the Grading Rules of Rattan was also prepared as requested by the rattan gatherers. These including visual aids were very helpful in imparting the information which we wish to convey to the participants. They were able to understand the importance of having properly treated and handled rattan canes and other TNWFP's. An open forum followed every lecture session.

b. Conduct of Training Programs

The format of the program and course outline was the same for all training sites. It was composed of a lecture, demonstration and hands on exercises. Lectures were presented either in Tagalog or English language depending on the prerogative of the participants in which language they will easily comprehend. Damaged and undamaged NTWFP samples were shown to the participants during the lecture. This provided the participants to visualize the actual damage being caused by the different agents of deterioration. Likewise, this resulted to the familiarization of the participants on the nature of damage and identification of the causal agents of deterioration. This initiated also their interest to participate during the open forum.

An open forum was conducted after each lecture session. Most of the participants can comprehend Tagalog language but found difficulty in expressing their problems on NTWFP. To resolve this problem, Interpreters within each group were asked to assist their fellow trainee during the discussion proper. The participants gave an appraisal of the course and the trainers after the training.

The trainers presented certificates of recognition and appreciation to the participants and coordinators, respectively. Likewise, samples of chemicals were provided for demonstration purposes. The participants were able to acquire knowledge on the nature and causes of biodeterioration in the raw material and finished products made of bamboo, rattan, palms, twigs and vines. Likewise, they were able to determine the signs and symptoms of insect and fungal attack and their methods of control. The various methods of applying chemicals were also learned by the participants.

1. Training Program at the Sabani Agricultural College, Dupinga, Gabaldon, Nueva Ecija.

The participants were rattan gatherers who are interested in the subject matter. This was shown by their active participation in the discussion of the topics that were presented. Likewise, their interest was also very evident as shown by their active participation during the actual demonstration and 'hands-on' training on the preparation, handling and application of chemicals.

The rattan gatherers would like to increase or upgrade the quality of rattan poles that they gather. Apparently, traders would dictate the price of the commodity because of the lack of knowledge of the gatherers on factors that will control prices. They also lack knowledge on how to classify rattan nor determine the quality of the poles that they sell.

The training program has given them the basic information on the proper handling of rattan. The participants were able to acquire knowledge on the various aspects of protection and preservation of TNWFP specifically, rattan. A lecture on grading of rattan was also provided to the participants to become familiar with classification and grading of rattan.

2. Training Program at DOST IV, Puerto Princesa, Palawan.

Rattan is the major raw material being processed by the group. The materials are sent to Manila since their product does not meet the specifications required by the industry in Cebu. Just like the previous course, the group is also in need of such a training program since rattan is the major source of their livelihood.

The technology on the chemical treatment of raw materials and grading rules in rattan has given the group various methods by which they would be able to obtain high quality rattan materials. Apparently, no treatment is applied on the rattan poles that the participants use in the manufacture of handicraft or furniture products. The participants were trained on handling and various treatment of rattan.

3. Training Program at Jiabong Municipal Hall, Jiabong, Samar.

The conduct of the training program was very timely since the governor of the province has approved an allocation for livelihood project on the use of bamboo in mussel culture. The Municipal Mayor who was represented by the Executive Secretary was very thankful that a training program of this sort shall be conducted. The technology would also be applicable to other industries that make use of bamboo as a raw material.

Bamboo is the major TNWFP in the area and is used mainly as props in mussel production. One of the problems in the area is the occurrence of barnacles which attacked the poles even on the first year of service. It is unfortunate however, that the available chemical is not applicable for bamboo that has to be installed in water. A technology to prevent leaching of the preservative will have to be developed. Meanwhile, the use of resistant and mature bamboo species was recommended.

There was only one rattan concessionaire who was very thankful that a training program on rattan treatment was conducted. The problem of staining fungi or discoloration in the poles occur during the rainy season. A visit to his warehouse was made and proper handling, storage and treatment of wickers and poles were recommended.

Questions that were asked during the training were similar to the queries in the previous training programs. Although the pamphlets were easy to understand, the group requested for a translation of the pamphlets in the Visayan dialect.

4. Training Program at Kiamba, Sarangani Province.

The training program was part of a Livelihood Program of the province which was fully coordinated by the town officials. The participants were rattan licensees and manufacturers. The latter were accepted in the seminar since they encountered problems on fungal discoloration. Termed as "water damage", the participants were made to understand why the problem occurs especially during the raining season. Likewise, the importance of having clean blemish free materials was emphasized.

The participants had a "hands on" training on the application of chemical treatment to protect the materials from insect and fungal attack.

The town officials extended their appreciation to FPRDI and ITTO for having sponsored such a worthwhile seminar.

- 5. Training Program at Tandag, Surigao del Sur.**
- 6. Training Program at Babuyan, Adlay, Norcia and Cantilan, Surigao del Sur.**

Most of the handicraft products were attacked by molds and showed black discoloration. The Manobos noted that the problem occurs during the rainy season and they do not apply measures to prevent the damage. The baskets were stain-free after processing but grayish discoloration would occur once these are stocked for a long time or while the products are on display in stores.

The Mamanua tribe are engaged in the manufacture of woven mats made of pandan leaves and baskets made of rattan wicker. The residents of Norcia are involved in the manufacture of bracelets, hair bands, rings and necklace made from vines called "agsam" Apparently, the material is resistant to fungal and insect attack just like nito. The latter was found to be resistant to deterioration (Giron 1992).

- 7. Training Program at DENR Training Center Baler, Aurora.**
- 8. Training Program at Aurora Trading Center, Setan, Aurora**
- 9. Demonstration at Diteki, Aurora**

Three consecutive training programs were conducted in Province of Aurora. The first was held at the PENRO Office in the town proper of Aurora. The participants were from Casiguran and other far places of Aurora. Lectures were presented in Tagalog.

An open forum followed the presentation of each of the above topics. Demonstration of treatment procedures was also conducted.

It appeared that issuance of permit to cut rattan to new applicants was suspended and only existing permittees can collect the said commodity. On the other hand, vines like hagnaya, nito and hinggiw are being collected by the indigenous people. The materials are processed and sent to Manila through a subcontractor. Bamboo is only used for the production of local furniture or for construction purposes. They have not tapped the utilization of bamboo as a source of material for livelihood program.

The second was held at the Aurora Trading Center, Setan, Aurora attended by participants from the National Commission for Indigenous People (NCIP). The group was on a 4 day seminar entitled, "Support to Certificate of Ancestral Domain Titles (CADTI) Program - Validation" at the Aurora Trading Center with 40 participants. The trainers presented the course on Chemical

Treatment and lectures in Tagalog. This was followed by an open forum.

The third training held in Diteki, Aurora was mainly a demonstration on the treatment application of chemicals. A demonstration on the proper handling, preparation of chemicals and application procedure was conducted.. The tribal house of the Dumagats was visited. It was made of bamboo in combination with wood. It was observed that termites and powder post beetles have damaged the structures. The use of termiticide and replacement of damaged portions of the house were recommended. Proper disposal of preservative was emphasized.

10. Training Program at Casecnan Rattancraft, Casecnan, Nueva Ecija.

The Bugkalots were awarded Certificates of Ancestral Domain and had to develop a livelihood program in Caranglan, Nueva Ecija. The program includes the intensification of a livelihood program on Furniture Manufacture which is aimed to make them self-sufficient. They have to conserve the rattan resources in the area as well as start production of rattan and bamboo.

Protection and preservation of rattancraft will support the conservation of rattan resources in the area. It was therefore necessary that they be informed on the current treatment practices in lengthening the service life of their products. Consequently, this will result in obtaining and maintaining high quality products that would be competitive in the world market. Acquisition of knowledge on the proper handling of bamboo and rattan was also necessary.

To address the above issues, lectures on the proper preparation, handling, storing, and application of treatments were presented. Precautionary measures and safety in handling preservatives were also emphasized. Discussions on the various aspects of protection and preservation of TNWFP were conducted.

As with the other groups of participants, this group actively participated in the actual application of treatment.

11. Training Program at MIRCAN Furniture Manufacturing Corp., Angeles City, Pampanga

Rattan, bamboo and agricultural wastes like abaca, grasses used in the manufacture of furniture, and other handicraft products are the raw materials available at the stockyard of the company. Managing large stocks was quite a problem and maintaining high quality raw materials and finished products is a major concern. It was felt that a seminar on the proper handling of the above

mentioned products be undertaken in order to produce competitive products.

The nature and cause of deterioration due to insect and fungal attack in NTWFP were discussed thoroughly. Likewise, application of chemical treatment on newly arrived materials were also explained. Accordingly, they boil rattan in kerosene but the inner portion gets dark in color and scraping of the cane was difficult. The use of a preservative that is water soluble was recommended.

It appears that some improvements in their processing system of raw materials need modifications. It is the prime concern of the company to produce clean, blemish-free and high quality materials that are competitive in the world market.

c. Indicators on the Acceptability of the Technology

The acceptability of the technology on the application of chemical treatment on TNWFP was manifested by the increase in the number of inquiries regarding the availability of chemicals and copies of the pamphlets. Additional pamphlets were printed and sent to requesting parties. Likewise, requests to conduct training program in other sites were done as per endorsement of organizations or individuals who have undergone the training. This indicates that the disseminated technology is being applied by the target clientele.

Upon the completion of the study, other requests which were not accommodated during the implementation shall be continued.

It was also learned that some participants had ventured into the treatment application and have produced raw materials which are of the required specifications. Likewise, manufacturing firms have also adopted the technology because of the current competition in the world market.

CONCLUSIONS AND RECOMMENDATIONS:

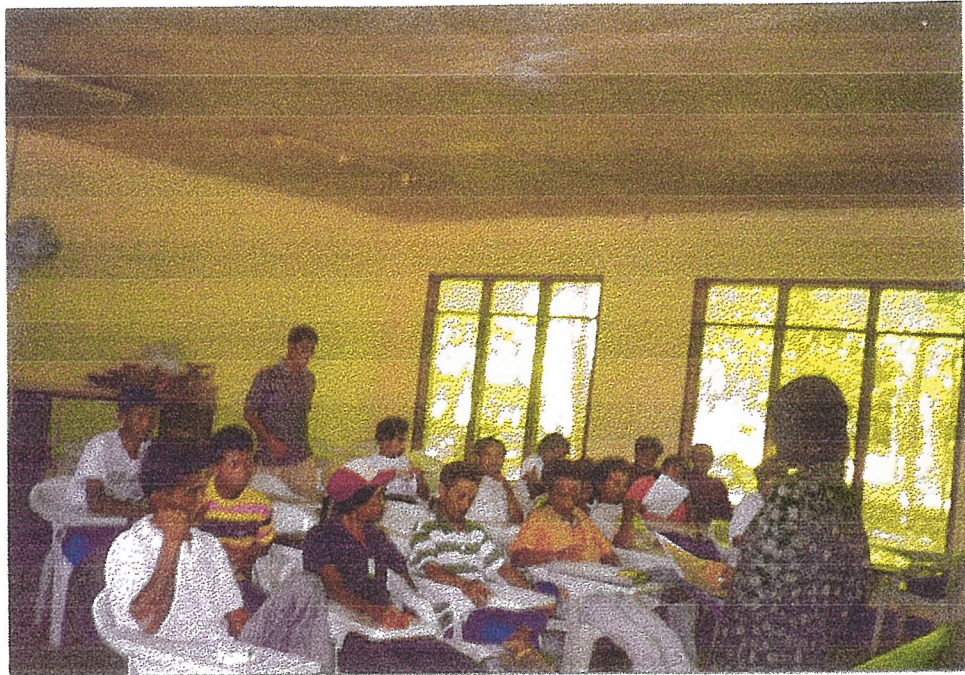
There was a positive response of the participants as substantiated by their active participation in the seminar, adoption of the technology and appreciation of the tribal groups and the cooperators. Likewise, the conduct of the training program was very timely because of the installation of Livelihood Programs in most of the target areas where the technology was disseminated.

Lecture on the grading of rattan poles was included due to the lack of knowledge on the classification and grading system in most training sites. Likewise, participants were interested on bleaching process for stained rattan. Copies of the technology were sent to interested participants.

Participants in Jiabong Samar had a difficulty in understanding the pamphlets in Tagalog. For this reason, they would like to have them translated in the Visayan (Waray) dialect.

It is recommended that the dissemination of the technology on the chemical treatment of bamboo, rattan, palms, twigs and vines be continued. It is further recommended that assistance on marketing of the raw materials be extended to the indigenous people. A training program on manufacturing process or product design has to be pursued. Likewise, assessment on the impact of the technology on the lives of the people who are entirely dependent on TNWFP be continued.

To further address the needs of the tribal groups, coordination has to be intensified with Non-Government Organizations, National Organization of Tribal Communities, Local Government Units, Department of Trade and Industry, DENR and other relevant agencies. These agencies play a significant role in the implementation and sustainability of livelihood program nationwide specifically the upland forest communities.



Ms. Balanan giving the rationale of the training program to the participants to the Mangayunan and Dumagat tribes.



Lecture on the nature and cause of biodetroration in rattan, bamboo, palms, twigs and vines.



Lecture at the Aurora Trading Center, Setan, Aurora.



The indigenous people in Setan, Aurora.



Handicrafts products made of bamboo and rattan at Babuyan and Adlay, Surigao del Sur.



Lecture at Babuyan and Adlay, Surigao del Sur.



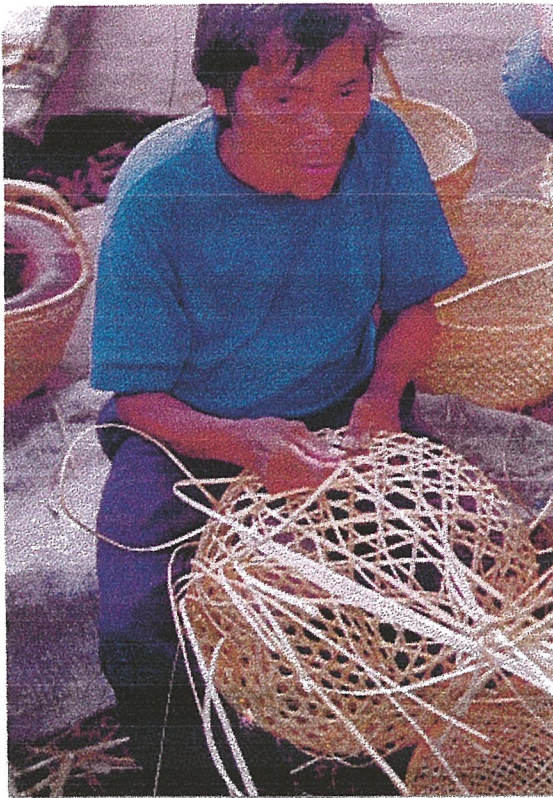
Demonstration on the preparation and handling of preservatives.



Handicraft products made of bamboo and rattan.



The participants in Kiamba.



Weaving of baskets by tribes. Baskets are attacked by staining fungi during transit.



Anahaw leaves being woven into mats and roofing material.



Demonstration on the application of preservative.



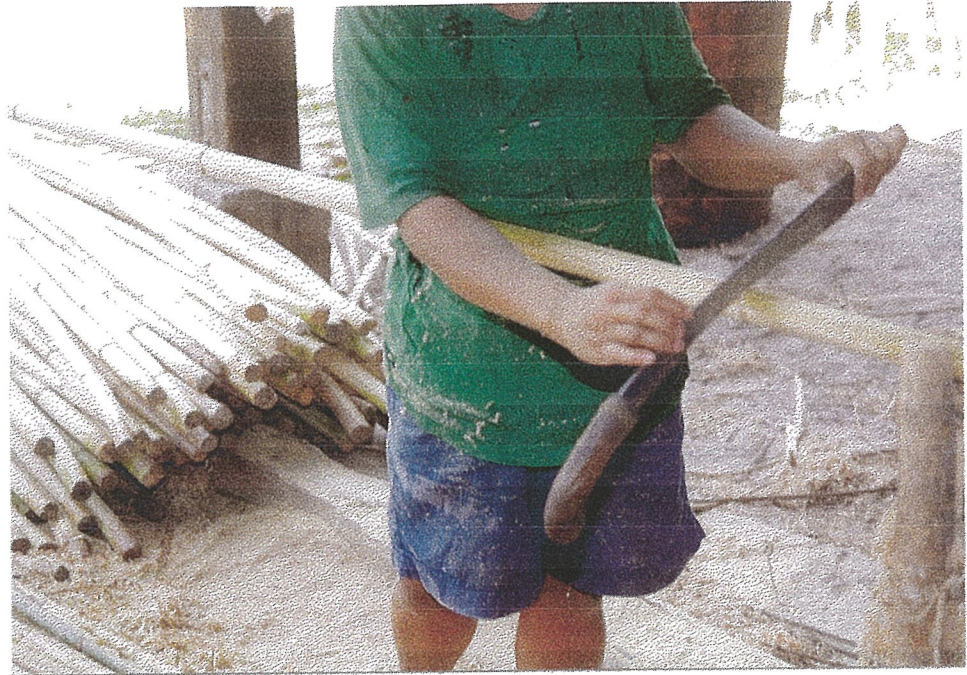
Participant applying preservative.



Untreated scraped rattan with black stains.



Untreated unscraped rattan poles with black stain.



Scraping of rattan pole in Tandag.



Scraped rattan left untreated in the stockyard.



The participants laying the plastic sheet in the Trench.



Participant tried putting bundled rattan in the Chemical solution.



Spraying of rattan with a tree sprayer.



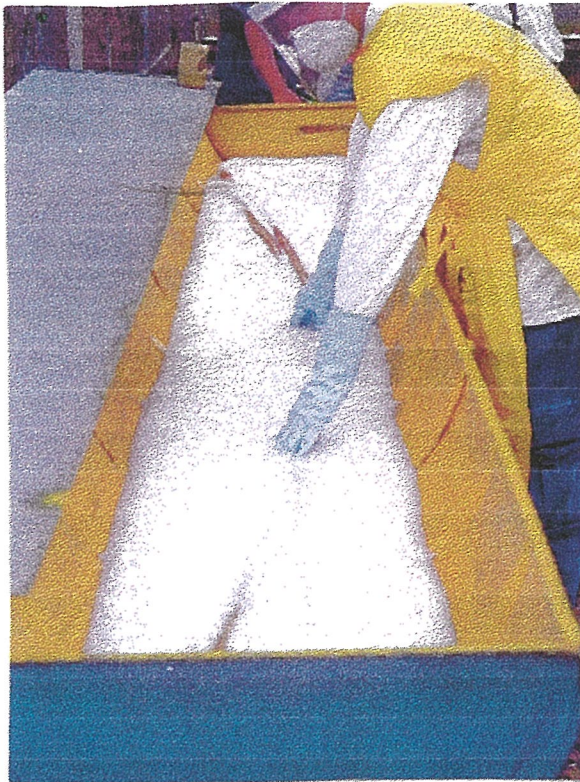
Trench with chemical solution.



Mixing of chemicals in the trench.



Preparation of chemicals in a dipping vat made of steel drum split into halves and welded along the length.



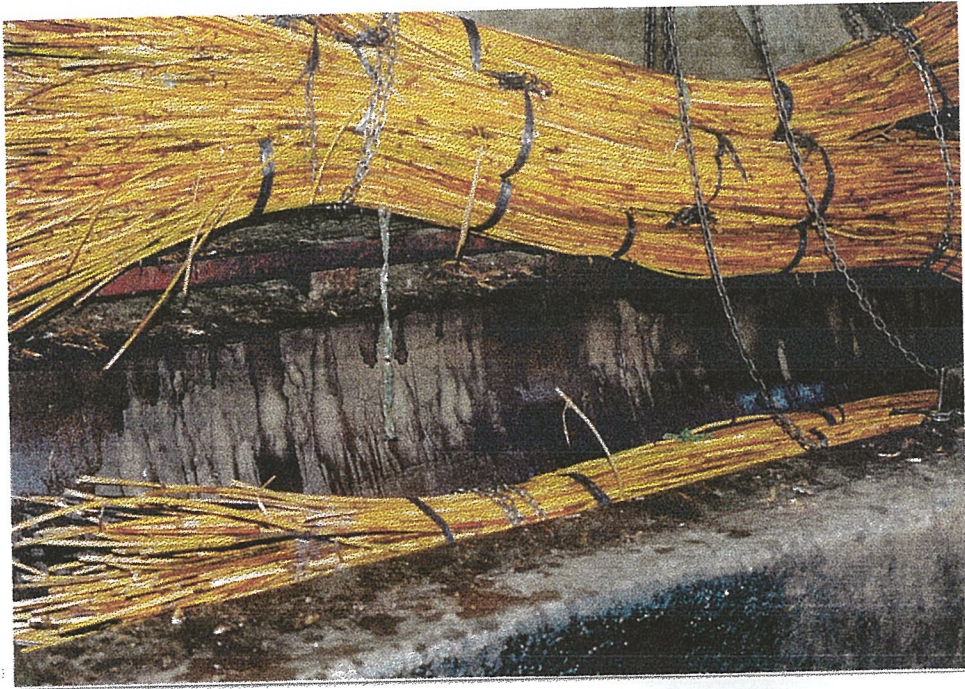
Dipping of rattan poles in the chemical solution.



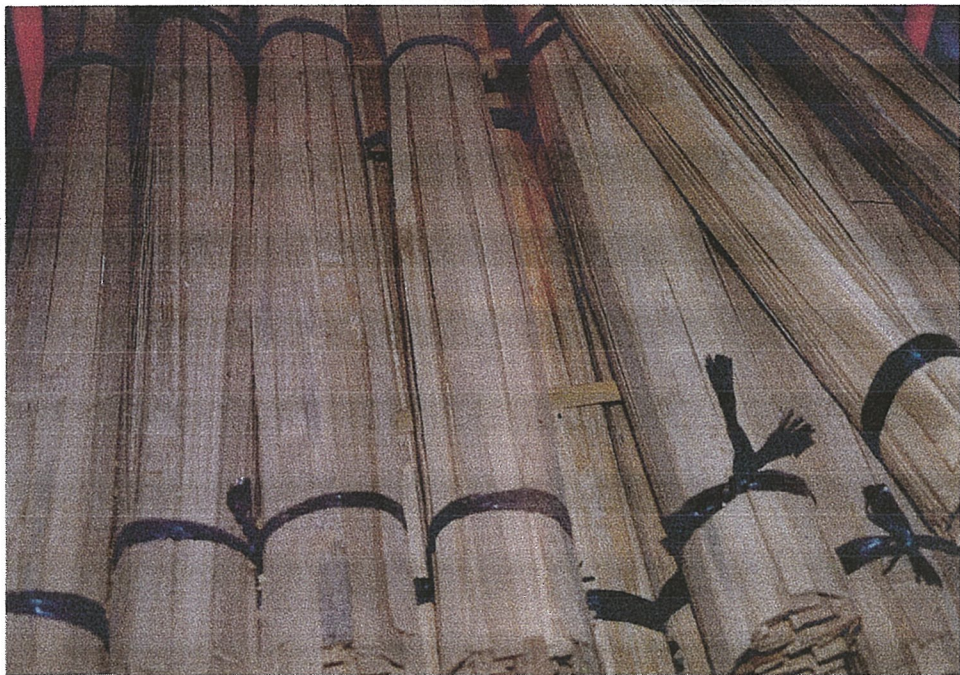
Stored Rattan poles with dark colored fungal stain.



Untreated rattan wicker in storage yard.



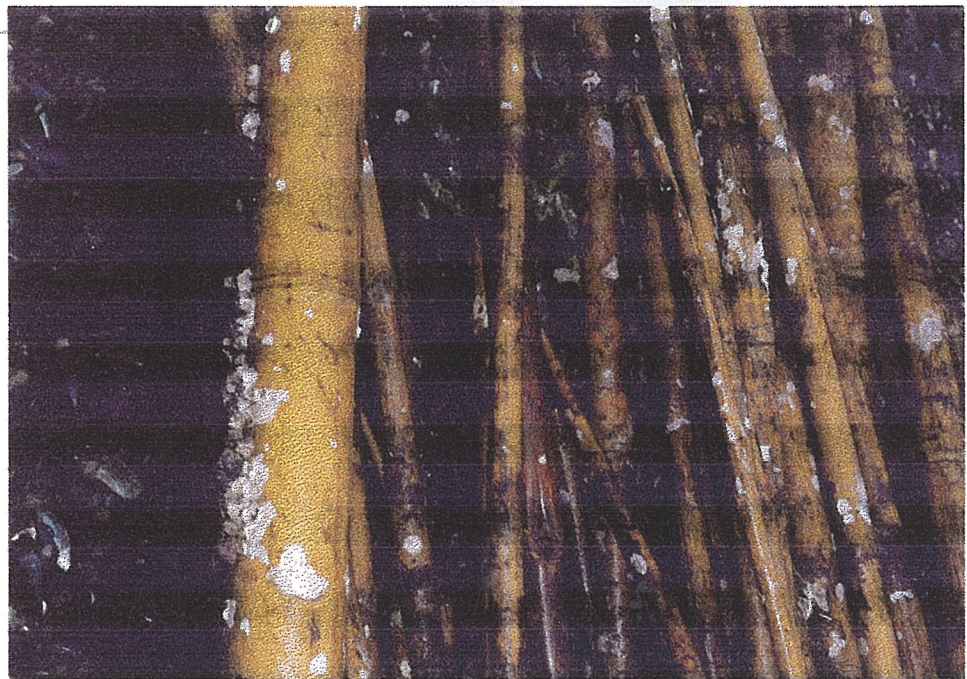
Boiling of rattan canes in kerosene results in dark colored inner core with skin is also difficult to scrape. Use of water borne preservative was recommended.



Method of piling split bamboo in the warehouse. Use of stickers in between bundles was recommended.



Bamboo mussel props being dried under the Sun.



Barnacles on surface of bamboo props.



Abaca waste for the manufacture of woven products.



Woven products from abaca and other agricultural wastes.