

## Possibility of Up-scaling Sago Production in Sepik Area, Papua New Guinea

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### Abstract

The Food and Agriculture Organization of the United Nations (FAO) and four members of Society of Sago Palm Studies (SSPS) joined a technical cooperation project (TCP) titled, 'Enhancing food security and combating climate change through scaling-up sago production', and conducted researches in Papua New Guinea in collaboration with FAO Papua New Guinea Office. Among several suggested sites, two sites near Wewak, the capital city of East Sepik Province, have been chosen for the project. Preliminary research was conducted by three research members in August 2022, and they decided to carry out two things for up-scaling sago production; 1) to establish nurseries and to apply seed propagation method in order to increase the rate of germinating, 2) to introduce rasping machines for grinding sago pith tissues into small pieces in order to increase starch extraction efficiency. In November 2022, three members visited the research sites, and they gave the villagers instructions for making nurseries and seed propagation method. In addition to this, the research team organized a workshop titled 'Sago Planting Materials' in Wewak city, gave instructions for growing sago to local people. After that, the people in one of the research sites, following the advice from the research team, finished making a nursery in their village, which would be the first sago palm nursery in Papua New Guinea. They began to grow sago seeds with seedling bags in the nursery for seed propagation. A rasping machine was introduced in May, 2023. In this project, the authors found a possibility of up-scaling sago production in this area, while they found some social and cultural aspects they have to consider in carrying out the project.

**Key words:** Nursery, Papua New Guinea, Seed Propagation, Social aspects

### Introduction

Papua New Guinea (PNG) has a large resource base of sago with over 1 million ha, and almost 30 % of its total population consider sago as staple food. The rate of sago as the major food staples is around 10 %, although it is gradually decreasing. Traditionally sago making has been the mainstay of low and wetland communities of PNG, and played a significant cultural role as a commodity of trade or were used in barter exchanges for other foods or goods (Temu and Saweri 2001). Almost all sago starch in PNG is produced on a subsistence level, and commercial cultivation is virtually nonexistent (Pue 2018). Compared with the situation in Indonesia and Malaysia, it is not yet widely commercialized.

FAO, who acknowledges food security and climate change are urgent issues, considers that sago (*Metroxylon sagu* Rottb.) is an underutilized indigenous crop that is well adapted to PNG conditions, and that it has great potential in addressing the food insecurity status of the country. Therefore, FAO considers that scaling up sago production would be one of the effective ways to combat climate change and tries to find ways of upscaling sago production. The PNG office of FAO asked the Society of Sago Palm Studies (SSPS) to provide technical assistance that could enhance the production of sago, training and post-harvest management, processing and value adding technologies.

It is reported that the total annual amount of sago in PNG is estimated to be around 100,000 mt (Gibson 2001). Considering the total space of growing area is around 1 million ha, however, there is scope for more sago production. If the area has 20 stands of sago per ha, and if we expect 50 kg per stand, then 1 mt per ha is possible, which leads to the total amount of 1,000,000 mt (Pue 2018).

After the PNG office of FAO and SSPS consulted the possibility of technical cooperation project, it was decided that four members of SSPS, who have an experience of research on

sago in PNG, would join the project. The members are, Ehara, Toyoda, Naito and Mishima. The title of the project was 'Enhancing food security and combating climate change through scaling-up sago production'. The objective of this project is to provide technical assistance to enhance the production of commercially viable sago palm nurseries to cater to large-scale plantings, training the sago-dependent communities on nursery development and management, harvest and post-harvest management, processing, and value addition technologies.

Due to the administrative affairs, the partner of the agreement was made not with SSPS, but with Tokai National Higher Education and Research System (TNHERS), which includes Nagoya University, to which the leader of the project, Ehara, belongs. The project is supposed to be conducted from August 2022 to August 2023 in collaboration with FAO Papua New Guinea Office.

This paper is a report of the activities of the current project and the authors discuss the social and cultural issues they face with, when conducting the project.

### Methodology

One of the authors, Toyoda, has been conducting anthropological research on sago in Papua New Guinea for some 30 years, and the contents of this paper is partly based on this experience. In that sense, the research of this paper was conducted with anthropological fieldwork. Also, interview with those local people who are involved with sago growing was conducted with semi-structural method.

Another methodology was the Rapid Rural Appraisal (RRA), which was used while staying in the field area, in order to assess the utilization of sago in Sepik area and the potential for commercial utilization of sago starch, based on interviews with many local people.

### Purpose of the Project

After discussion between FAO PNG Office and the research members, the purpose of the project has been decided. The letter of Agreement was exchanged between FAO PNG Office and TNHER, and it says the purpose of the project as follows;

### Outcome

The Services will contribute to the following outcome:

Increased sago production through improvement of cropping, management, and value addition practices in the three targeted locations.

### Outputs

The Service Provider (TNHERS) will produce, achieve or deliver the following outputs:

- 1) Implement an improved sago cultivation system in the selected locations in the provinces;
- 2) Increase sago production (sago palm production) through community-based cropping, management, and value addition practices in the targeted locations;
- 3) Improved post-harvest management practices and value addition methods introduced to the farmers in the targeted provinces;
- 4) And develop sago palm cropping and management capacities of farmers and technical staff in the targeted provinces at the national, provincial and community level.

### Activities

The Service Provider (TNHERS) will undertake the following activities:

- 1) Conduct survey and assessment of cropping and or production system in targeted provinces;
- 2) Set about the work for establishing sago palm nursery in the targeted provinces;
- 3) Set about the works for establishing 2-3 community-sago based household food security and income generation program
- 4) Conduct capacity training on cropping and management of sago palm for increased sago yield;
- 5) Conduct capacity training on mechanized improved harvesting practices and post-harvest management practices; and
- 6) Conduct capacity training on downstream processing of sago starch.

### Research Site

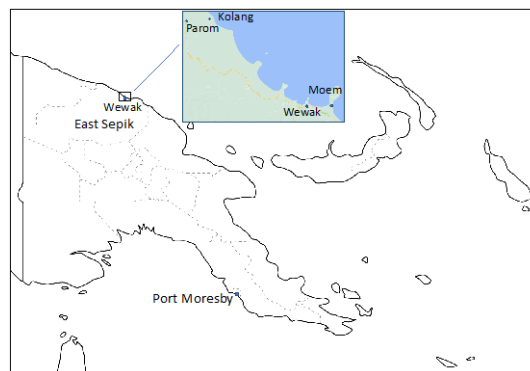
To complete the project, the authors decided to arrange 4 trips to the research areas. In August 2022, they had a first visit to PNG, and they decided to conduct preliminary research during the 1st visit. First, the authors had a meeting with the landowners of the areas, and explained the objectives of the projects to them beforehand, and got a permission from them to conduct the project.

Among several suggested sites, two sites near Wewak, the capital city of East Sepik Province, have been chosen for the project. Later it was found that one of these two sites were to be considered as 2 villages, and 3 villages have become project candidates. Preliminary research was conducted by three research members in August 2022.

### Activities of the Project

The authors planned to upscale the sago production through their technical assistance, based on their experience of previous research in Papua New Guinea. For the project, some provinces are planned as candidate sites from the office of FAO PNG Office, and among these provinces, the authors have chosen East Sepik Province, where sago is the staple food, and

the authors can expect that the result of the project will contribute directly to the people's life in this province. Later, Manus Province was added to the project site, and additional activities were conducted in August 2023.



**Fig. 1. Map of research sites in East Sepik**

During the 1st visit, the authors had a look on some of the candidate sites, and finally, they have chosen 2 villages for the research sites, which were Moem and Parom (Fig 1). The authors had a talk with local people, and they decided to carry out two things for up-scaling sago production; These are , 1) to establish nurseries and to apply seed propagation method rather than vegetative one for efficient propagation of planting materials. 2) to introduce rasping machines for grinding sago pith tissues into small pieces in order to increase starch extraction efficiency.

In order to increase sago production, first, the authors planned to establish nurseries and to apply seed propagation, not vegetative propagation, which is through using suckers. It is reported that the rate of growing through seed propagation is better than using suckers (Ehara (2006), Ehara et al. (1998, 2001, 2006), Naito et al. (2006), Takagi et al. (2019). Therefore, the authors expected that they can expect more efficient sago growing with this approach.

As for the rasping machines, they are widely used in Malaysia and Indonesia for small-scale farmers. But in PNG, they have never been used so far. The people in PNG get sago starch mostly by scrapping by hands, mixing with water. Therefore, by introducing rasping machines, the authors expected that the procedures of grinding sago pith will be easier, and also more efficient, since the rate of starch extraction through rasping machines is better than the one through scrapping by hands. In order to introduce a rasping machine, the authors arranged importing one from Indonesia.

Before finishing the 1st visit, the authors suggested the villagers of Moem to build a nursery, and gave them a blueprint, specification, and some constructing materials. After the 1st visit, the authors received a report saying that the villagers of Moem people began to build a nursery for sago growing. Before the authors' second visit, they had almost completed the nursery.

In November 2022, three members conducted a 2nd visit to the research sites. During the 2nd visit, the authors conducted the following things;

- 1) To give instructions for seed propagation method to the villagers
- 2) To organize a workshop to give instruction to the villagers how to scale up sago production

As for the instructions for seed propagation, the authors showed the ways of seed propagation as follows;

- 1) Preparing clean seed after removal of seed coat tissues, pericarp (exocarp and mesocarp) and sarcotesta, from the fruit. To minimize practical work and save time, cutting of

husk of fruit (top part of husk above embryo) will be acceptable

- 2) Soaking the clean seed in enough amount of water (one seed/100 mL water) for a few days with frequent renewal of water (To save time or in case of husk cut fruit, the soaking process will be skipped.)
- 3) Planting the seed/husk cut fruit one each in a pot (seedling bag) filled with soil at an angle of embryo by 90 degrees to the soil surface
- 4) Covering the seed /husk cut fruit with soil up to the seed/fruit
- 5) Supplying water well every morning and/or evening considering atmosphere
- 6) Recording the growth (appearance of each organ) especially the number of leaves to consider preferable timing for transplanting (As basic information, leaflets will appear from the third leaf stage)

The authors also organized a workshop titled 'Sago Planting Materials' in Wewak city, and gave instructions for growing sago to local people. In the workshop, 21 local people from the province joined in the discussion. In the Q&A session, a lively discussion was held between the participants and the team members.

After the 2nd visit, the people in Moem village finished making a nursery in their village, which was the first sago palm nursery in Papua New Guinea, and began to grow sago seeds with seedling bags in the nursery for seed propagation.

The rasping machines were introduced in May, 2023. It was used just for demonstration to show its possibility to the local people and is not yet used regularly. The effect of the introduction of rasping machine is, therefore, not yet evaluated at the time of July, 2023.



**Fig. 2 Sago Nursery and Seedling of Sago in Moem**

When the authors had a 3rd visit in May 2023, they did not have enough time because of the delays of air flights and they had only a ceremony of opening a sago nursery, and also a demonstration of using a rasping machine (Fig. 3) to the villagers.



**Fig. 3 Rasping machine of sago introduced in Moem Village**

## Conclusions

As the result of the authors' activities,

- 1) The people of Moem village have constructed a sago nursery as a community.
- 2) They learned a way of seed propagation of sago and began to grow sago seeds in a nursery.
- 3) The people of other areas in East Sepik Province got interested in constructing sago nurseries and a landowner of Sepik River area began to construct one.
- 4) Not only Moem people but also the people of surrounding area joined a workshop and got lectures of growing sago efficiently.
- 5) The Moem people got a rasping machine and they are ready to use it.

Therefore, the authors found a certain amount to possibility of up-scaling sago production in East Sepik Province, Papua New Guinea.

## Discussion

As the activities of the project shows, the authors found a possibility of up-scaling sago production in this area in that showing the ways of seed propagation and introducing a rasping machine. But at the same time, some social and cultural aspects to be considered were found when the authors are carrying out the project as follows;

- 1) Issues of management

To keep the project going, the people have to manage common properties, such as nurseries and rasping machines, and other equipment. But they have little experience of managing these things. The issues are: who will hold these properties, and, if someone wants to use them, who will handle the procedures. Also, to maintain these facilities, they need some cash for repairing and fuels, and the problem is who will pay for that.

- 2) To keep the people motivated to continue the project is not easy

The authors introduced these two approaches, seed propagation and introducing rasping machines. The efficiency of rasping machine is easy to understand, but the results of new propagation method is not easy to understand. The timing of getting starch is some 10 years after they plant seeds, and far ahead. Therefore, it will not be easy to keep the people to continue the project. In order to keep people motivated, continuous guidance might be necessary.

- 3) Financial problems

When the authors start the project and also keep the project going, they need some funds for that. With this current project, the authors provided the local people building materials for constructing nursery, and also a rasping machine. But when the authors leave the project, the local people have to manage with their own funds for that. Not so many people have such enough funds to keep the project going.

Therefore, the authors found that there is a possibility of up-scaling sago production, but at the same time they are facing these social and cultural problems.

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