



Policy Brief

Sago Palm: A Sustainable Solution for Food Security and Peat Conservation in Indonesia

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Grating sago trunk using a traditional tool (tokok)

Highlights

Sago palm is a very starch rich staple food that is commonly found in the eastern parts of Indonesia. Once the crop has reached maturity it becomes an extremely productive and starch rich staple: over 6 times higher than rice paddy. Sago palm has the potential to provide substantially to food security in Indonesian, while also protecting Indonesia's peatlands and potentially reducing the annual peat fires. In addition, the health benefits of Sago palm due to its high fibre content and low glycaemic index can help Indonesia to deal with some major public health issues such as diabetes and obesity. Up until now, Sago palm is still not recognized and utilized to a scale where it can make a real difference to these issues. In this policy brief several suggestions are given that may pave the way towards fully utilizing the benefits of Sago palm and helping Indonesia cope with the food security, public health and the environmental problems it is facing.



What is Sago?

Sago (*Metroxylon sago*) is a palm species native to Indonesia, the starch from the trunk is traditionally used as a staple food in communities in the eastern part of Indonesia. In fact, many communities in Tanah Papua and Maluku use sago as their main source of carbohydrates¹. The trunks of this species are rich in starch, which after processing is used to make noodles, cakes and sugar amongst others.

The natural distribution of this species covers approximately 5.2 million hectares of wetland areas in Indonesia². It has a very high tolerance to harsh environmental conditions such as peat and wetlands and can therefore be found in habitats that are unsuitable for common staple crops. It can grow in neutral to highly acidic soils, organic and mineral soils and even tolerates highly sulfuric soils³. It can also tolerate moderately saline waters and can thus be found in freshwater as well as brackish wetland areas⁴.



Extraction process of sago pith



Advantages of Sago

Sago offers several advantages over other staple crops that are commonly used in Indonesia. Firstly, the yield of edible starch ranges between 25 to 40 ton per hectare per year (depending on the environmental conditions)⁵. Which is more than six times higher than rice paddy, the most common staple crop produced in Indonesia. Figure 1 displays a comparison between the yield of different staple foods. It clearly shows the enormous differences in productivity⁵.

Secondly, due to its high tolerance to harsh environmental conditions it can be grown in areas that are unsuitable for other crops such as peatlands. Unlike most other crops, peatlands do not have to be drained in order to grow Sago. This provides great opportunities to reduce carbon emissions from these extremely carbon rich soils.

Additionally, Sago offers two important health benefit in comparison to white rice: 1) Sago starch is high in dietary fibres and therefore improves the gut environment and helps in reducing constipation⁶ and 2) Sago has a very low glycaemic index (GI) and is therefore highly suitable for people suffering from diabetes and obesity⁶.

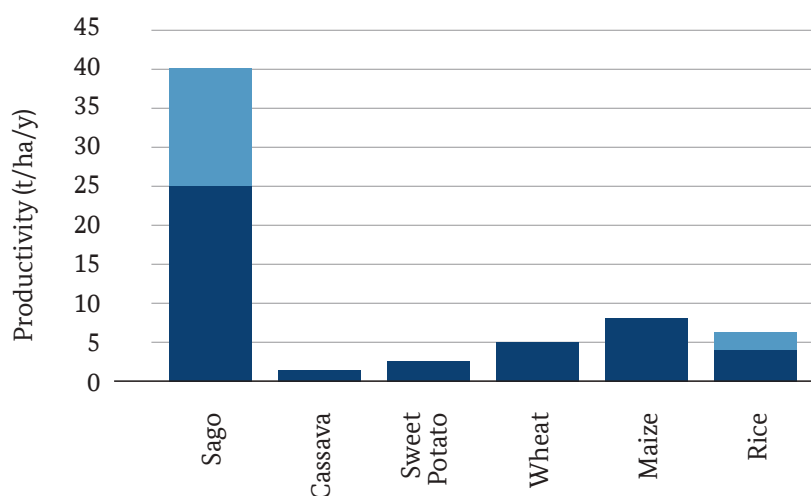


Figure 1. Comparison of the productivity of different staple foods in ton per hectare per year. Light blue shows the maximum of a crops's range in optional condition



Community in Papua picked a Sago palm to be felt.



How can Indonesia benefit from Sago?

Indonesia is currently facing several high priority challenges that are being addressed by the current administration. Firstly, food security is a major issue in this populous country. Indonesia has a population of approximately 271 million people, which is expected to rise to 300 million people by 2025⁷. Currently 2 million tons of rice are being imported from other countries annually, despite the vast land area that is available in Indonesia⁸. In order to counter this problem, the Indonesian government has set out to develop approximately 2 million hectares of new farmlands in so-called Food Estates (*Peraturan Presiden No 22/2009 tentang kebijakan percepatan penganekaragaman konsumsi pangan lokal, Keputusan Menteri Pertanian Republik Indonesia nomor 64.1/kpts/rc.110/j/12/2017 tentang petunjuk teknis pengembangan pangan pokok lokal tahun 2018*). Most of these Food Estate are planned in peatlands.

Simultaneously, Indonesia is committed to reduce its carbon footprint. Indonesia consists of $\pm 17,500$ islands and will suffer tremendously from rising sea levels due to climate change⁹. As a country that suffers unlike any other country from natural disasters, it is of utmost importance to reduce any such negative impacts on its population. Peatland destruction forms one of the most important carbon emissions of Indonesia, therefore the government has set out to protect its peatlands wherever it is possible (*Peraturan Pemerintah Republik Indonesia Nomor 71 Tahun 2014 Tentang Perlindungan dan Pengelolaan Ekosistem Gambut*).

In addition, sago production systems also have the potential to reduce the frequency and intensity of severe flooding events which may result from climate change. Increased soil infiltration, reduced overland flow, reduced water velocity in channels and increased evapotranspiration in sago production systems all help to increase the water retention capacity of the landscape in comparison to rice paddy dominated landscapes^{11,12}. Therefore, it helps to alleviate the socio-economic burden associated with flooding on local communities living in wetlands and peat areas.

As Sago has a much higher yield than rice and is suitable for growing in waterlogged peatlands, it can contribute significantly to the food security issues while reducing the impact on carbon emissions simultaneously. In addition, due to the fact that no major water draining is needed within the Sago production system, using Sago on peatlands will reduce peat fires that occur annually and have apart from a carbon emission also cause tremendous health issues.

Referring the health benefits of Sago it should be noted that in the last three decades Indonesia has moved towards the top of the world 's most obese countries⁸. In addition, 6.2% of the population is suffering from diabetes and 18.3% from chronic constipation^{12,13}. These numbers are of great concern and were one of the priority areas for the Ministry of Public Health prior to the COVID-19 crisis. The rich fibre content and low GI of Sago would also help to address these major public health issues. These health issues are also addressed in the regulation for the aforementioned Food Estate development.



Two community members are debarking a Sago palm trunk.



Figure 2. Sago palm tree



Figure 3. Measuring diameter of Sago trunk



Figure 4. Debarking Sago trunk for grating



Figure 5. Measuring the length of Sago trunk



Community involvement in processing Sago trunks towards edible starch



Recommendations

Before Indonesia can fully benefit from the advantages that Sago palm has to offer, there is still a long road ahead. It is unlikely, that Sago palm can and will replace rice consumption, but it can be a healthy alternative and complement the current diet. Sago palm can help the Indonesian government towards achieving its goals in both food security, carbon emission and public health. But for this Sago palm must become part of both the Medium-term and Long-term Development planning: *Rencana Pembangunan Jangka Menengah Nasional (RPJMN)* and *Rencana Pembangunan Jangka Panjang Nasional (RPJPN)*. The following are several suggestions that may help towards these goals:

Promote Sago

In many parts of Indonesia Sago palm is still considered a poor-man's diet. Using smart and innovative marketing techniques, such as social media campaigns sago can be promoted as a healthy and organic alternative to other staple foods such as rice-noodles. Hooking into the trend of healthy and organic foods the current image of Sago could be changed towards a fashionable Health food.

Limit the use of rice flour

Considering the shortage of rice and the need for importing rice from other countries, it could be considered to reduce the use of rice being processed into rice-noodles when enough alternatives are available. Here, a government quota on using edible rice for noodle production may reduce the shortage of rice and increase the use/production of Sago as substitute.

Supply chain

For Sago production to really take-off, it is important that farmers have easy access to the market. Therefore, a network of collectors and processing facilities needs to be established. The palm oil industry has completely changed the agricultural landscape of Indonesia within a few decades. Some important lessons can be learned from this, especially on how smallholders have become an integrated part of this through the Plasma programme. The government can also play an important role with developing a solid supply chain by creating a favourable climate for investors.

Product innovation

Sago palm can be used for many purposes and further research and development is needed to be able to up-scale the production of Sago palm. In addition, Sago palm are not only good for their starch, but the waste can also be used to create biodegradable plastics, bioethanol and much more. However, little research and development has been conducted towards utilizing waste from Sago palm. The government could promote further development of such products through for example providing research grants.

Paludiculture

Paludiculture is the practice of agriculture on wetlands, in particular peatlands¹⁴. The government could support farmers to plant Sago on peat soils by providing seedlings. In addition, using Sago palm could become a precondition of existing agricultural schemes such as transmigration into peatlands.

Transition

Sago palms require 8 to 12 years before they can be harvested, depending on environmental conditions⁴. This is a considerable long period for which many, especially smallholders, can't wait. Nevertheless, Sago palm can be combined with other crops (chilli, morning glory and watermelon) that can be harvest during this transition period. Providing training in Sago cultivation and agroforestry practices may help farmers to cope during this period. The government could also support farmers during this period through for example giving subsidies or other incentives. Several examples exist how to achieve this already.



Community involve in tokok (grating sago trunk using a traditional tool)

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