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Potency of sago (*metroxylon* spp) crops for food diversity

Abstract

Indonesia has remarkable potential for the centre of sago production, because of its sago forests. There is no doubt that Indonesian Sago palm diversity should have great future value for food of the world. Therefore Sago is one of the tropical forest biodiversity that needs to be conserved and preserved to maintain more food production, food security and healthy diet, and also food sustainability forthe futureof human diet in the world.

Keywords: *metroxylon* spp., sago diversity, food diversty, food security, healthy food, sustainability

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Introduction

Indonesia is known as one of the best biodiversity countries in the world. Biodiversity for food and agriculture includes an important component to feed the human population and improve the quality of life. Indonesia to date has a population of more than 250 million people. The vast majority of the human population lives in an area where food production and nature co-exist. Human population growth accelerated rapidly, causing more than fourfold in the last century. Meeting the additional human needs of 2 to 5.5 billion people over the next half century will place an ever increasing burden on Earth's ecosystems. The expansion of agricultural land through forest conversion has become the most common practice in the world today. This can lead to the loss of biodiversity and enormous environmental damage. The extraordinary rate of biodiversity loss and environmental damage, coupled with the rising human population and the level of consumption, clearly threatens the sustainability of Earth's life support systems.[1] Biodiversity itself is believed to be one of the most important assets and tools for future human civilization to adapt and mitigate global climate change and to ensure the availability of food, human health and environmental protection to provide services for our survival. Forests, in particular tropical forests, should be an excellent source of species for future food to meet human needs. More than 1.9 million living species have been discovered, millions more extinct, but only a few hundred species of plants and animals have been domesticated over the past 10,000 years.[2] Meanwhile, thousands of other species are untouched and remain wild.

The important of Indonesian sago palm (*Metroxylon* spp)

Sago is one of the important sources of carbohydrates to meet caloric needs. Sago palm (*Metroxylon* spp.) is a tropical plant adapted to marginal land as fresh water swamp, peat swamp or brackish water. Sago (*Metroxylon* spp) is one of the palm species of wet tropical region. This species grows well in freshwater swamps, peat swamps, watersheds, surrounding water sources, or swamp forests. Sago plant has a high adaptability on marginal land that does not allow optimal growth for food crops and plantation crops.[3] Indonesia has the biggest sago palm (*Metroxylon sagu* Rottb.) forest and cultivation as well as its rich of genetic diversities. The areas of sago palm forest and cultivation in the world were predicted two million hectares and estimated 50% of that area located in Indonesia. Papua is one of the provinces in Indonesia with the largest and even widest sago potential worldwide. It is estimated that approximately 2 million hectares of sago land grows naturally and can produce about 2.5 - 50 tons of dried sago flour from each hectare. With cultivation can be produced dried sago flour up to 25 tons per hectare.[4] Predicted production of 50 tons per hectare, allowing Sagu (*Metroxylon sagu* Rottb.) to be a potential starch-producing plant in the future.[5]

Sago palm (M. sagu Rottb.) and related species can store a large amount of starch in the trunk. The total amount of starch storage in a trunk is approximately 300 kg (dry wt.) in case of sago palm, the elite species among the starch producing palms.[6] Sago palm has long been cultivated as food like banana and taro.[7,8] This palm species is a carbohydrate resource and is one of the oldest crops that has been used by human being since ancient times, similar to banana and taro.[8] The importance of sago palm as a staple food has not changed in some areas such as Siberut Island in west Sumatra, the eastern archipelago of Indonesia: Maluku and Papua, and western Melanesia: Papua New Guinea. As a staple food, the sago palm continues to be important in some areas of Southeast Asia and in areas inhabited by the Melanesian people.[9] The carbohydrate (starch) can be further processed into various basic raw materials for human and animal consumption, as well as an industrial energy source. *Metroxylon* palms, especially sago palm is considered to be potential starch resource for not only food production but also ethanol production.

Kertopermono[10] reported that sago palm areas in Indonesia were larger than proposed by Flach.[4] According to measurement of Kertopermono,[10] sago palm areas in Indonesia were 1,528,917 ha and it was distributed into several locations in Indonesia. The distribution of sago palm areas in Indonesia was not evenly distributed as well as their diversities. Flach[4] predicted that sago palm diversities in Indonesia were found higher in Papua islands (New Guinea) than other islands in Indonesia. Sago plants grow naturally in Papua, Maluku and other parts of Indonesia, such as in Sumatra, Kalimantan, Sulawesi and used by most of the population as daily food. Sago Papua has many accessions with different characteristics in stem and leaf morphology,

nutritional and mineral content, productivity, and flour color. Sagu Yepha, Rondo, Para, and Ruruna can be identified from different characteristics, and these characteristics can be used to determine the potential for production and its usefulness. Sago planting materials are derived from superior sago species, especially from high starch production potential. The famous sago species with high production levels include Molat, Tuni, Ihur, Makanaru, and Rotan (in Maluku). Types of sago in Papua are among others thorns namely Para, Rondo, Wimir, Witar, and the non-prickly namely Osukulu, Yeba, Folo, while in West Papua as in Sorong sago type with high starch production ie Iwa Binis, Iwa Muluk, Iwa Snan , and Iwa Rwo. The aadvantages of sago palm development based on an agronomy aspect in terms of: (a) can grow in swamps and peat areas[11] which generally crops cannot be grown, (b) tolerant to low pH, and high concentrations of Al, Fe, and Mn,[12] (c) can be harvested at any time after reaching the age of about 8 to 11 years, (d) can be harvested continuously without renewing planting as a resulting of many suckers,[11] (e) have the ability to produce high starch, and (f) are not required intensive maintenance as well as other crops and vegetables. Sago is the only commodity that does not use additional fertilizers, pesticides, herbicides and other ameliorants in the nursery and plantation stages.

In terms of land use aspect, sago uses the lowest area to produce one ton of sago starch (0.05 ha / ton sago starch) compared to two other commodities, rice (0.17 ha/ton of rice) and oil palm (0.24 ha / ton CPO). This is caused by the highest productivity of sago (22.36ton/ha/year), rice (6.15ton/ha/year), and CPO (4.11 ton/ha/year).[13] In terms of productivity of these three commodities, the highest is sago: 22.36ton/ha/year. In Sulawesi, the productivity of sago in minerals reaches 8.4tons/ha/year,[7] even 20-25 tons/ha/year.[14] Thus, in some parts of eastern Indonesia, sago is the staple food to meet food needs as rice in other areas.Starch sago, other than as food is also widely used as raw materials in the cosmetics industry, food, paper, and plastic.

Conclusion

Indonesia has remarkable potential for sago forests, although sago production is currently still low, but with the development of science and technology, Indonesia will be able to increase its sago production through sago plantation and flour industry in the future. There is no doubt that Indonesian Sago palm diversity should have great future value for food of the world.

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Conflict of interest

Authors declare there is no conflict of interest in publishing the article.

References

1. Cavender-Bares J, Heffernan J, King E, et al. *Sustainability and Biodiversity*. In: Levin S, editor. *Encyclopedia of Biodiversity*. 2nd ed. Academic Press; 2013. p. 71–84.
2. Samper C. *Biodiversity, nature and food security: A global perspective*. Biodiversity and World Food Security: Nourishing the Planet and Its People. Crawford Fund for International Agricultural Research, Parliament House, Canberra, Australia; 2010.
3. Suryana A. *Arah dan strategi pengembangan sagu di Indonesia*. Makalah disampaikan pada Lokakarya Pengembangan Sagu Indonesia. Batam; 2007; p. 25–26.
4. Flach M. *The Sago Palm: Domestication Exploitation and Products*. Food and Agriculture Organization of the United Nations. Rome; 1983.
5. Limbongan J. Morfologi beberapa jenis sagu potensial di Papua. *Jurnal Litbang Pertanian*. 2007;26(1):16–24.
6. Ehara H. Geographical distribution andspecification of *Metroxylon* palms. *Jpn J Trop Agric*. 2006;50(5):229–233.
7. Barrau J. The sago palm and other food plants of marsh dwellers in the South Pacific Islands. *Econ Bot*. 1959;13(2):151–162.
8. Takamura T. Present research activities and the problems on sago palm. *Jpn J Trop Agric*. 1990;34(1):51–58.
9. Ehara H, Susanto S, Mizota C, et al. Sago palm (*Metroxylon sagu*, Arecaceae) production in the eastern archipelago of Indonesia: Variation in morphological characteristics and pith-dry matter yield. *Econ. Bot*. 2000;54(2):197–206.
10. Kertopermono AP. *Inventory and evaluation of sago palm (Metroxylon spp.) distribution.* In: Jose C, Rasyad R, editors. *Sago: The Future Source of Food and Feed*. Proc. 6th Intl. Sago Symp. Universal Academy Press; 1996. p. 53−62.
11. Watanabe H. *A view on density management of sago palm in Batu Pahat, Malaysia.* In: Yamada N, editors. Sago Symposium Tokyo, Japan; 1986. p. 71–74.
12. Tan HT. Sago palm review. *Tropical Agriculture*. 1982;8(9):9–23.
13. Montagnini, Florencia, Jordan C. *Tropical Forest Ecology: The Basis for Conservation and Management*. Heidelberg: Springer; 2005.
14. Lubis, Wahyono T. Keragaan konflik pengusahaan lahan pada perkebunan kelapa sawit di Sumatra. *Jurnal Penelitian Kelapa Sawit*. 2008;16:47–59.