Diversity Dynamics of Semarang Apple (Syzygium samarangense)

by Pudji Widodo

Diversity Dynamics of Semarang Apple (*Syzygium samarangense*)

P Widodo[1] HA Hidayah[1] and T Chasanah[1]

[1] Fakultas Biologi Universitas Jenderal Soedirman Purwokerto Indonesia
E-mail: pwidodo@unsoed.ac.id

Abstract. Semarang apple (Syzygium samarangense) is one of tropical fruits which is popular in Indonesia. This research was carried out in connection with diversity changes due to various factors. There are many cultivars which are lost due to cutting down. The aim of this study is to find out the diversity change of semarang apple in Java. The method used in this study was survey. Some permanent plots were established in some locations in Java. The results of this study showed that on one hand there are some reduction in cultivar number, on the other hand there are some new records of semarang apples cultivars.

Key words: semarang apple, cultivars, diversity, decreasec

Introduction

Semarang apple (Syzygium samarangense (Bl.) Merr. & L.M. Perry) is one type of tropical fruit which is very popular, with high economic value in Indonesia. It consist of many cultivars which are highly variable in both shape, size, color, and taste. Semarang apple fruit is very good as fresh fruit, salad, juices, and jellies[1]. Plant breeders are trying to get high quality fruits for the future.

This research was carried out in connection with diversity changes due to various factors. There are many cultivars that are lost due to being cut down. On the other hand, there is a new cultivar which appears at a nursery. Some cultivars showing intermediate between semarang apple and water apple becomes scarce.

The long term goal of this research is to save the semarang apple cultivars. Specific target of this study was to determine changes in population of semarang apples, so as to know which cultivars are still there and what are missing. This research was conducted by survey and comparison between the present and past data. The benefit of this study is expected to determine the conservation strategies of various cultivars that have the potential as local superior fruit which can then be developed to improve the economy of the community.

The cultivation and maintenance of semarang apple is very easy. In general, the third year after planting, the plants begin to flower and fruit. In the fourth year, all the trees have fruits which can be harvested three times a year. The harvesting time may be variable depending on the cultivars.

We collected semarang apples as mush as possible for conservation. Although many cultivars are difficult to grow. Based on the data obtained, semarang apple which are either red, white, and green is easily to grow and produce fruit. But these plants are often attacked by pests, so bored plant owner to maintain it. Actually, other than as fruit trees, semarang apple is also suitable as an ornamental plant because of their beautiful color.

The diversity of semarang apple is very high namely white, green, yellowish, pink, red, maroon, brownish, and blackish[2] (Rudi 2007). Each color is still variable namely globose, bell shaped, or oblong. Each shape is still also variable in water content which may be low or high. In addition, there are also some variations in texture namely hard or soft. All of those character combinations have caused a lot of cultivars. In this research we will try to solve the problems such as: 1) tree cutting which cause the decrease of tree number.

The diversity of semarang apple may change due to natural factors such as climate change, land conversion, and other human human activities. A study on the dinamics of plant diversity has been conducted by some authors such as Gigon & Leutert[3] in 1996 who stated that those changes were due to disturbance. The diversity of semarang apple is relatively dynamic and it tends to decrease.

Some studies on vegetation change had been conducted such as by Jaya[4] (2000) who minitored the vegetation change in some cities by using Landsat TM. The results showed that method of post classification correction (PCC), direct multidate classification (DMC), and 6-dimension multidate post classification (6-D MPC) could detect the change of cover in urban areas and their vicinities. A plant diversity dynamics had also been done in ricefield to know the history of land use on the ricefields change[5] (Mardiyanti et al. 2017). Samsoedin[6] (2009) has also studied the diversity dynamics on trees in East Kalimantan. Furthermore, climate-driven diversity dynamics in plants was done by Nyman[7] et al (2012).

A study had been conducted by Widodo[8] on the semarang apple in some location in Java such as in Bogor, Cileungsi, Banyumas, Kebumen, and Yogyakarta. However, due to human activities such as prunning and cutting, had caused the decrease of their cultivars. Due to climate change, the phenology of flowering time might also changed.

The flowering and fruiting time of semarang apple may change because of the change of climatic factors such as rainfall, temperature, and seasonal change. In the last few years, climate and weather had changed very significantly. The dry season that in the past took place between April - October, now no longer valid. In fact, the rain continued to fall swiftly from April to October. This phenomenon is very influential on various flowering and fruit season.

In Indonesia, there has been anomaly limit of season change. In the past, the inclusion of the rainy and dry seasons was almost always predictable. As a tropical country, we have a view that the rainy season arrives when the sun is in the southern hemisphere from October to April. Dry season occurs when the sun is on the north of the equator that is in April-October. Now the time of entering the season is difficult because there has been a phenomenon of warming sea surface temperatures that the temperature has risen 1.5 - 2^{o}C in the south of Sumatra, Java, to Nusatenggara.

Methods

The material to be used in this research were the sample of semarang apples (*Syzygium samarangense*) from many areas in Java which consists of various cultivars such as apple, bangkok, camplong, cikampek, cincalo semarang, cincalo gondrong, cincalo merah, cincalo hijau, demak, madura putih, kaget hijau, lilin hijau, lilin merah, madura merah etc.

Sampling was done on permanent plots established in 2011 - 2018 at various locations in Banyumas, Kebumen, Cileungsi, Bogor, and Yogyakarta which has a rare collection. The method used in this research is survey method. Samples include leaves, flowers and S. samarangense fruits present in the field for each cultivar. The specimens were dried and labelled for the purpose of making herbaria to be stored at Herbarium Fakutas Biologi Unsoed (PUNS) as a reference in the future.

Results

The results of this study showed that some cultivars of semarang apples were absent due to cutting down and land conversion. On the other hand, there was only one additional cultivar namely Syzygium samarangense 'Variegatum' which is cultivated in Taman Buah Mekarsari Cileungsi Bogor in 2013. Comparison of the presence of trees from 2011 to 2018 showed in table 1.

Table 1. The presence of semarang apple cultivars from 2011- 2018 in Java

No	Cultivar Names	Year							
		2011	2012	2013	2014	2015	2016	2017	2018
1	Jambu kaget hijau								
2	BT3 Hijau								

No	Cultivar Names	Year							
		2011	2012	2013	2014	2015	2016	2017	2018
3	Madura Putih								
4	Kaget putih								
5	Demak								
6	Cincalo hijau								
7	Green Pudding								
8	Black Diamond								
9	Sukaluyu								
10	Jambu Citra								
11	Maroon Baturraden								
12	Jambu Unsoed								
13	Irung Petruk								
14	Pink Rose Apple								
15	Tangkweh								
16	Variegata								
	Cultivar number	**15**	**14**	**13**	**12**	**11**	**11**	**7**	**7**

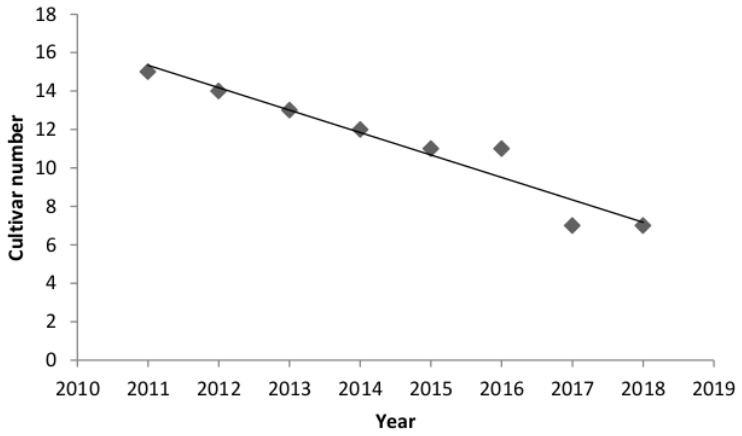

Figure 1. The trend of number of semarang apple cultivars from 2011- 2018 in Java

The results of data analysis showed that statistically, there is no significant difference amongst years. Although the number of cultivars decreases due to cutting in some places, however, as a whole it is a minor decrease (Table 2). From 2011 to 2018 there are changes in the presence of semarang apple cultivars. Nine of 16 cultivars observed (56%) were cut down and only one (6%) was newly found (Variegata), the rest (38%) were still existed. Thus, most number of semarang apple decrease very significantly.

Discussion

Syzygium maroon baturraden was found in 2011 in Kemutug Lor Village Baturraden. Its fruits were maroon or blackish red. However, in the year 2012, the tree was cut down. Another semarang apple which was cut down was jambu silado on Jl Raya Sumbang Padamara and possibly extinct. Some other semarang apples cut down in 2013 were: 1) jambu kekuningan in Purwokerto Lor, to the westof

Satpol PP office, 2) Jambu kaget Putih at Jl Gelatik Kebumen, 3) Jambu hijau demak at Jl Suharso, to the west of GOR Satria Purwokerto.

The trees cut down in 2014 included: 1) Pink Sukaluyu, to the north of Cikebrok Market, 2) a semarang apple near the east gate of IPB Darmaga Bogor. On the other hand, a new cultivar found in 2014 was Jambu semarang variegata in Taman Buah Mekarsari Cileungsi Bogor. The reason for cutting was mainly due to pest, less delicious fruit taste, and land conversion.

Another reason for tree felling is because it can destroy and house roofs. Many semarang apples were planted close to houses, so they may cause roof leak due to branches reaching roof. It can also damage the building because the root can also reach the house foundation. Thus the dynamics of cultivated plants depends on human needs.

Conclusion

In the last eight years from 2011 to 2018, there has been a change in number of cultivars of semarang apples, either the decrease or the addition of new cultivars. The missing semarang apples include 'Kaget Putih' and 'Maroon Baturraden'. While the new cultivar appears include the 'Variegata' cultivar.

Acknowledegement

This study was funded by Ministry of Research, Technology and Higher Education Republic of Indonesia. We would like to appreciate the owners of semarang apples for permission to observe their plants.

References

[1] Morton, J. (1987). Water Apple. p. 382–383. In: Fruits of warm climates. Julia F. Morton, Miami.

[2] Rudi. (2007). Tabulampot Jambu Air Banyak Varian, Mudah Berbuah. Flona 47: 3 PT.Samidra Utama. Jakarta.

[3] Gigon, A. and Leutert, A. (1996), The Dynamic keyhole-key model of coexistence to explain diversity of plants in limestone and other grasslands. Journal of Vegetation Science, 7: 29–40. doi: 10.2307/3236413

[4] Jaya, I.N.S. (2000). Monitoring Vegetation Changes in Urban Area using Landsat TM Imagery. Jurnal Manajemen Hutan Tropika. Vol 6 No 1: 33-42

[5] Mardiyanti D.E., Wicaksono, K.P., dan Baskara, M. (2013). Dinamika Keanekaragaman Spesies Tumbuhan Pasca Pertanaman Padi. Jurnal Produksi Tanaman Vol 1 No 1. 24-35

[6] Samsoedin I. 2009. Dinamika Keanekaragaman Jenis Pohon pada Hutan Produksi Bekas Tebangan di Kalimantan Timur. Jurnal Penelitian Hutan dan Konservasi Alam 6 (1): pp 69-78.

[7] Nyman T, Linder HP, Peña C, Malm T, Wahlberg N. (2012). Climate-driven diversity dynamics in plants and plant-feeding insects. *Ecol Lett*. 15(8): pp. 889-898

[8] Widodo, P. (2013). *Syzygium samarangense* 'Unsoed' a New Cultivar from Central Java. Proceeding on 4th International Conference on Global Resource Conservation 2013. Brawidjaja University Malang.

Diversity Dynamics of Semarang Apple (Syzygium samarangense)

ORIGINALITY REPORT

2%	%	2%	%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

MATCH ALL SOURCES (ONLY SELECTED SOURCE PRINTED)

2%

★ Rokhmani, Darsono, Edy Riwidiharso. "Diversity of Trichodina spp. on The Larvae of Freshwater Fish in Banyumas and Surrounding Areas of Central Java", IOP Conference Series: Earth and Environmental Science, 2020

Publication

Exclude quotes	On	Exclude matches	< 8 words
Exclude bibliography	On		