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DIVERSITY OF WEEDS SPECIES AROUND MANGO TREE (*Mangifera indica* L.) ON CRITICAL LAND IN JOMBANG REGENCY

***Ma'rifatul Khomsah[1)], Zulfikar [2)]**
[1] Agroecotechnology studi program, Faculty of Agriculture.
[2] Informatic Science studi program, Faculty of Information Technology,
University of KH. A. Wahab Hasbullah, Jln. Garuda No. 09 Tambakberas Jombang, Indonesia
*email: marifatulkh13@gmail.com

ABSTRACT

Weeds are unwanted wild plants because they can interfere with the main crop cultivation. This study aims to identify and analyze the diversity of weed vegetation that grows around mango trees. This study uses the quadratic method with diagonal observation points and direct exploration techniques. Observation parameters include the type of weed and its population. Then the results of the observations were analyzed using the formula of Important Value Index (INP), Summed Dominance Ratio (SDR), Diversity Index (H'), Index of Similarity (IS), and Dominance Index (C). After doing the research, it was found 24 species of weeds consisting of broadleaf weeds, teki grass and grasses. The highest SDR value in Tondowulan Village was Cynodon dactylon L. at 13.82%, while in Darurejo Village it was Oplismenus hirtellus (L.) P. Beauv by 26.53%. Weed diversity was classified as moderate because the weed diversity index value in Darurejo Village was 1.92 %, while in Tondowulan Village, it was 2.31 %. The two research locations did not have the same weed composition because the similarity value was only 33.33%. No weed species dominates the mango garden because the index value of the weed dominance in Tondowulan and Darurejo Villages in the order of the 3rd largest is less than one.

Keywords: Diversity Index (H'), Dominance Index (C), Similarity Index (IS), Summed Dominance Ratio (SDR), Weeds.

INTRODUCTION

It was recorded that the mango harvested area in Plandaan District, Jombang Regency, especially in 2015 was 21,750 ha with a productivity of 85.00 kg/tree capable of producing 18,487 quintals, then decreased by 16% from the previous year (BPS, 2020). It is suspected that mango productivity has decreased due to weed factors. In farning weeds are unwanted plants because they grow out of place and negatively influence on the process of plant growth and development. However, the role of weeds as plants also requires a decent means of life. Losses caused by weeds are equivalent to losses caused by pests and diseases in agriculture such as reducing the crop yield's quality and quantity so that control techniques are needed (Paiman, 2020).

The decline in mango's productivity coupeled with infertile land conditions resulted in a decrease in biodiversity. Loss of biodiversity is synonymous with environmental damage, which can be characterized by land's usage that is not managed correctly resulting in decreased agricultural and food productivity (Anggraini, 2018).

Althought basically the nature of weeds is detrimental, their growth can be controlled by the manager (humans) appropriately or well. It is necessary to have a diversity of flora, to keep the natural ecosystem in balance,

one of which is weeds. Because this biodiversity has a huge role in nature, namely as a balancer for an ecosystem, significant damage will occur if the ecosystem is not balanced (Siboro, 2019).

Plants and weeds are both plants, and both require the same needs, such as the need for water, light, heat energy (temperature), and CO^2 for growth and development. If the two grow close together, the roots overlap each other, the canopy has the potential to shade each other and the leaves are denser, there will be competition between organisms to obtain sufficient growth conditions. When the availability of these facilities is not sufficient, at the same time they are in need, there will be a struggle (competition). Competitors who tend to attack will generally win (Paiman, 2020).

According to Budirokhman, (2014) research result that the weeds that dominate mango fields are teki grass (*Cyperus rotundus*), jajagoan (*Echinochoa colona*), *purslane grass*. To minimize competition with mangoes, weeding was carried out 4 times, namely in January, February, March, April and May 2014 by spraying herbicides.

Regarding the benefits of biodiversity on environmental sustainability, the management of mango gardens in the community is very much needed. Based on the site survey result, mango gardens in Tondowulan and Darurejo villages look lush because they are not cared for, so many weeds grow wild in these locations. In addition, some people in the two villages let the weeds live without knowing the impact on the mango trees that are being cultivated. Based on these problems, the researchers wanted to conduct research on the identification of weeds around mango trees in Tondowulan Village and Darurejo Village, Plandaan District, Jombang Regency in order to determine the control strategy so that the resulting product is abundant as expected. This study aims to identify weed vegetation that grows around mango trees and analyze its diversity.

RESEARCH METHODS

This research uses descriptive qualitative and quantitative research by conducting direct exploration around the mango tree. This research was carried out in a mango orchard of the Gadung variety on critical land in Plandaan District, Jombang Regency in February-April 2021. The tools used in this study were a meter, camera, and scissors. Meanwhile the materials used in this study were mango tree weeds, label paper, frames of 0.5 x 0.5 m^2 raffia rope, wooden pegs, plastic, and observation sheets. The sampling technique in this study is the quadratic method. The sample point is taken diagonally. Sampling in Plandaan District is located in Tondowulan and Darurejo Villages. Each of the research sites made 3 square plots with a size of 10 x 10 m^2 in which each plot contained 5 sub-plots measuring 0.5 x 0.5 m^2 so that in total there were 30 samples.

The research procedures that must be carried out include: Preparing the location of the mango garden, preparing the necessary tools and materials when collecting data in the field, making 3 plots covering an area of 10 x 10 m^2 for each research location in Tondowulan and Darurejo villages, then dividing into 5 subplots with frame size 0.5 x 0.5 m^2 made of raffia rope, observing each plot , and counting and identifying, put it in a plastic bag and label it, take photos as documentation of each weed species. This data collection is only done 1-time observation. The parameters observed were the type of weed and the population of each weed species. Observational data that has been obtained were analyzed using the formula of *Important Value Index* (IVI), *Summed Dominance Ratio* (SDR), *Index of Similarity* (IS) or community similarity (C), Simpson's Dominance Index (C), and the Shannon-Wiener Diversity Index (H').

According to Istikana et al., (2019) that the Importance Value Index is obtained

from the calculation of the Dumbois-Muller and Ellenberg formula as follows:

a. Important Value Index (IVI)

$$\text{Density} = \frac{\text{Number of individuals}}{\text{Total plot area}}$$

$$\text{Relative Density} = \frac{\text{Density of a type}}{\text{The total density of all species}} \times 100\%$$

$$\text{Frequency} = \frac{\text{Number of plots in individual places}}{\text{Total number of plots}}$$

$$\text{Relative Frequency} = \frac{\text{Frequency of a type}}{\text{The total frequency of all species}} \times 100\%$$

IVI = Relative Density + Relative Frequency

b. Summed Dominance Ratio (SDR)

$$SDR = \frac{RD + RF}{2}$$

(Tustiyani et al., 2019)

c. Index of Similarity (IS) or Similarity Community (C)

$$C = \frac{2w}{a+b} \times 100\%$$

Annotation:

C : Community coefficient
w : The total of the two lowest quantities for the species from each community
a : The sum total of all the quantities in the community to one
b : The sum total of all the quantities in the community to two

Community similarity criteria value:

C >/= 75 % :The weed community is uniform
C < 75 % : The weed community is not uniform

(Subrata, B.A.G & Setiawan, 2018)

d. Simpson's Dominance Index (C)

$$C = \sum_{n-i}^{n} \left(\frac{ni}{N}\right)^2$$

Annotation:

C : Dominance index
ni : The significance value of the nth species
N : Total significance of all species

Value of dominance criteria:

C = 0 : There is no dominant species
C = 1 : There is a dominant species

(Saitama et al., 2016)

e. Shannon-Wiener Diversity Index (H')

$$H' = -\sum_{n=1}^{n} \left(\frac{ni}{N}\right)\left(\ln\frac{ni}{N}\right)$$

Annotation:

H' : Shannon-Wiener Diversity Index
ni : The number of significant values of a type
N : The number of significant values of all types
Ln : Natural logarithm

Diversity criteria value:

H' < 1 : Low diversity
H' = 1-3.32: Medium diversity
H' > 3.32: High diversity

(Saitama et al., 2016)

RESULT AND DISCUSSION

a. Weed Identification

After the observations were made, 24 weed species in total grew around the mango tree in Tondowulan and Darurejo Villages, Plandaan District, Jombang Regency.

The types and numbers of weeds found can be seen in the table below:

Table 1. Weeds of mango garden in Tondowulan Village

Local name	Family	Species	∑
Desmodi-um *	Fabaceae	*Desmodium triflorum* (L.) DC.	95
Putri malu *	Fabaceae	*Mimosa pudica* L.	90
Meniran *	Phyllanthace-ae	*Phyllanthus niruri* L.	11
Pegagan *	Mackinlayace-ae	*Centella asiatica* (L.) Urb.	145
Patikan Kebo *	Euphorbiace-ae	*Euphorbia hirta* L.	1
Bandotan *	Asteraceae	*Ageratum conyzoides* L.	66
Kremah *	Amaranthace-	*Alternanthera*	67

	ae	*sessilis*	
Brobos *	Fabaceae	*Alysicarpus vaginalis* (L.) DC.	7
Ratu padang rumput *	Rosaceae	*Filipendula ulmaria* (L.) Maxim.	67
Teki-ladang **	Cyperaceae	*Cyperus rotundus* L.	126
Jukut-pendul **	Cyperaceae	*Kyllinga brevifolia* (Rottb.) Hassk.	32
Rumput-pahit ***	Poaceae	*Axonopus compressus* (Swartz.) Beauv.	118
Rumput grintingan ***	Poaceae	*Cynodon dactylon* L.	172
Rumput-gajah ***	Poaceae	*Pennisetum purpureum* Schaum	8

Source: Data processed, 2021
Note: * : broad leaves,** : Teki, *** : Grass

The table above, shows that in Tondowulan Village, there are 14 types of weeds consisting of 9 broadleaf weeds, 2 types of teki and 3 types of grasses, teki grass and grasses are composed of only one family, while broadleaf weeds are composed of various families, including Fabaceae, Phyllanthaceae, Mackinlayaceae, Euphorbiaceae, Asteraceae, Amaranthaceae, and Rosaceae.

In this location, 172 Grintingan grass plants were found. The weed belongs to the *Poaceae* family which grows more than the others. In contrast to *Euphorbia hirta* L. or *Patikan Kebo*, only 1 plant was found during observation. Although the number of puzzle weeds was small, *Cyperus rotundus* L. weeds were found in quite large numbers, namely 126 plants and *Kyllinnga brevifolia* (Rottb.) Hassk as many as 32 plants. This finding shows that the environmental conditions for the growth of mango plants are very good for the growth of this type of weed, so it is of particular concern that the growth of this weed can be suppressed by applying the correct mango tree cropping pattern.

According to Dahang (2018) the characteristics of grintingan weeds includedhaving strong roots with lateral stem variations to form new plant candidates (stolons), living in clumps with a height of 0.5-1 m, usually thick and smooth leaves with a length of 5-15 cm and a width of 0.5 -1 cm, green, elongated narrow shape, brown flowers like fingers.

The results of this study are the same as the research by Utami et al., (2020) that the dominant family found in coffee plantations is the Poaceae group. Weeds from the Poaceae group are known as weeds that are easy to grow and can produce lots of seeds so that they can adapt to both wet and dry land. On the other hand, environmental factors supported will also greatly affect the abundance and dominance of weed species. In the dry season, weed seeds that are not drought tolerant will not grow and experience dormancy, butweed seeds will grow very quickly once there is water in the rainy season, and will dominate the land.

The weeds that have been identified in Darurejo Village, Plandaan District, Jombang Regency are presented in the table below:

Table 2. Weeds in the mango garden of Darurejo Village

Local name	Family	Spesies	∑
Tapak liman *	Asteraceae	*Elephantopus scaber* L.	31
Jotang kuda *	Asteraceae	*Synedrella nodiflora* (L.) Gaertn.	34
Sembukan *	Rubiaceae	*Paederia foetida* L.	13
Mangsian *	Phyllanthace-ae	*Phyllanthus reticulatus* Poir	19
Gelang biasa *	Portulacace-ae	*Portulaca oleracea* L.	3
Galing-galing *	Vitaceae	*Cayratia trifolia* L.	6
Desmodi-um *	Fabaceae	*Desmodium triflorum* (L.) DC.	4
Iles-iles *	Araceae	*Amorphophallus muelleri* Blume	1
Sirih cina *	Piperaceae	*Peperomia pellucid* (L.) Kunth.	1
Jarong *	Amaranthace-ae	*Achyranthes aspera* L.	90
Jukut pendul **	Cyperace-ae	*Kyllinga brevifolia* (Rottb.) Hassk.	71
Rumput keranjang ***	Poaceae	*Oplismenus hirtellus* (L.) P. Beauv.	189
Rumput pahit ***	Poaceae	*Axonopus compressus* (Swartz.) Beauv.	116

Rumput grintingan ***	Poaceae	*Cynodon dactylon* L.	4

Source: Data processed, 2021
Note: * : broad leaves,** : Teki, *** : Grass

Based on the table above, in Darurejo Village there are 14 types of weeds consisting of 10 broadleaf weeds, 1 type of teki and 3 types of grass. Teki weeds and grasses are composed of only one family, as in Tondowulan Village, However, it is different from broad-leaved weeds composed of various families including Asteraceae, Rubiaceae, Phyllanthaceae, Portulacaceae, Vitaceae, Fabaceae, Araceae, Fabaceae, Piperaceae, and Amaranthaceae.

In general, in Darurejo Village there are many Poaceae weeds of *Oplismenus hirtellus* (L.) P. Beauvas many as 189 plants and *Axonopus compressus* (Swartz.) Beauv as many as 116 plants, while *Cynodon dactylon* L. found only a few species, namely 4 plants. However, the least found is the weed *Amorphophallus muelleri* Blume. and *Peperomia pellucid* (L.) Kunth one plant each. When compared to Tondowulan Village, the puzzle weed in Darurejo Village has less value because it only consists of one Cyperaceae's family and one species of *Kylingga brevifolia* (Rottb.) Hassk. i.e 71 plants.

According to the data obtained during the study, in general the two locations of mango gardens were dominated by broadleaf weeds, in this case because the distance between the mango trees was too close, resulting in the weeds getting full shade so that weeds could overgrow until there was competition with mango trees. Grasses are more tolerant of a shaded environment, often grasses are dominated by the Graminae family (Sulaiman, 2020).

Accrording to Ramlan et al., (2019) broadleaf weeds can dominate rubber plantation areas with an annual life cycle. Broadleaf weeds have the ability to absorb more nutrients, water and light than grass weeds, teki grass ferns.

This opinion is supported by Hayata & Febrina (2019) due to plant spacing that is too close it will affect the efficiency of light use, grabbing water and nutrients from each other so that it will affect plant production. Therefore, it is important to set the spacing with a certain density to provide space for each plant to grow well.

According to Perianto et al., (2016) generally broadleaf weeds include in the category of Dicotyledoneae and Pteridophyta with the characteristics of a mesh-shaped leaf bone. This weed often grows at the end of the cultivation period to get sunlight throughout its life.

b. Abundance of Weeds around the Mango Tree

Basically, both locations have weed species that are equally dominated by grass weeds. The absolute abundance data of weeds in Tondowulan and Darurejo Villages, Plandaan Distric can be seen in the graphic image (Appendix 1). The relative abundance of weeds in Tondowulan and Darurejo Villages, Plandaan District, is presented in the graphic image (Appendix 2).

Most commonly found in Tondowulan Village is *Cynodon dactylon* L. in total, 172 plants found in all plots. In the 1st plot there were 63 plants, but in the 2nd and 3rd plots there were 70 plants, while in Darurejo Village there were many *Oplismenus hirtellus* (L.) P. Beauv totally, 189 plants can be found in all plots as well. In the 1st plot there are 58 plants, but in the 2nd plot there are 67 plants, and in the 3rd plot there are 64 plants.

Between Tondowulan and Darurejo, the weeds that had an even distribution were *Cynodon dactylon* L. and *Oplismenus hirtellus* (L.) P. Beauv. When compared in general, the weed *Axonopus compressus* (Swartz.) Beauvwas superior to *Cynodon dactylon* (L.), *Oplismenus hirtellus* (L.) P. Beauv and *Pennisetum purpureum* Schaum because these weeds can be found in Tondowulan and Darurejo villages in large numbers, around 118 individuals and 116 individuals. The findings conform to the research result by Utami et al., (2020) that

weeds that are abundant in coffee plantations are weeds *Axonopus compressus* (Swartz.) Beauv. This opinion is strengthened by the research result by Suhartono & Winara (2018) that found weeds dominant in agroforestry Jati-jalawure, namely *Axonopus compressus* (P. Beauv) from the family Poaceae.

For the total percentage of weed species from plot 1 to plot 3, *Axonopus compressus* (Swartz.) Beauv was 39.59%, *Cynodon dactylon* L. was 57.71%, while *Pennisetum purpureum* Schaum was 2.68%. It means that *Axonopus compressus* (Swartz.) Beauv has the highest value than other species in Tondowulan Village. However, overall the weed species percentage in Darurejo Village from plot 1 to plot 3 is *Oplismenus hirtellus* (L.) P. Beauv. of 61.16%, *Axonopus compressus* (Swartz.) Beauv. by 37.54%, *Cynodon dactylon* L. by 1.29%. It means *Oplismenus hirtellus* (L.) P. Beauv. has the highest percentage value than other species in Darurejo Village.

The abundance of species greatly affects the growth and development of organisms in an ecosystem. In line with the opinion of Aprilah et al., (2019) that habitat diversity, quality and interconnection of habitats in a landscape generally affect the abundance of predatory insects.

c. *Summed Dominance Ratio* (SDR)

To determine the weeds that dominate the mango garden, it can be seen from the *Index Important Value* (IVI) and *Summed Dominance Ratio* (SDR) value of a weed species.

The data analysis result obtained in the calculation of the Summed Domination Ratio of Weeds in Tondowulan Village can be seen in table 3.

Table 3. The order of the 5 largest *Summed Dominance Ratio* (SDR) of weeds in Tondowulan Village

Local name	Family	Species	SDR
Rumput grintingan	Poaceae	*Cynodon dactylon* L.	13.82
Pegagan	Mackinlayaceae	*Centella asiatica* (L.) Urb.	13.79
Putri malu	Fabaceae	*Mimosa pudica* L.	11.06
Rumput pahit	Poaceae	*Axonopus compressus* (Swartz.) Beauv.	10.48
Teki ladang	Cyperaceae	*Cyperus rotundus* L.	10.22

Source: Data processed, 2021

Based on the table above, the highest SDR value obtained in Darurejo Village is basket grass weed as much as 26.53%, then followed by bitter grass at 18.05%, Jarong 12.14%, Jukut Pendul 11.98%, and Jotang Kuda 9.54%. While the data on the *Summed Dominance Ratio* of weeds in Darurejo Village, Plandaan District, Jombang Regency, the 3rd largest order is presented in Table 4.

Table 4. The order of the 5 largest *Summed Dominance Ratio* (SDR) of weeds in Darurejo Village

Local name	Family	Species	SDR
Rumput keranjang	Poaceae	*Oplismenus hirtellus* (L.) P. Beauv.	26.53
Rumput pahit	Poaceae	*Axonopus compressus* (Swartz.) Beauv.	18.05
Jarong	Amaranthaceae	*Achyranthes aspera* L.	12.14
Jukut pendul	Cyperaceae	*Kyllinga brevifolia* (Rottb.) Hassk.	11.98
Jotang kuda	Asteraceae	*Synedrella nodiflora* (L.) Gaertn.	9.54

Source: Data processed, 2021

To obtain the weeds highest SDR value in Tondowulan Village, Grintingan was 13.82 %, then Pegagan was 13.79 %, Putri malu 10.48 %, Bitter grass10.48 %, and lastly was Teki ladang 10.22%. The two research locations consisted of various ethnic groups/families.

Grass weeds can dominate the mango garden area, presumably because the land condition in Plandaan District is classified as marginal land. This type of

weed likes areas that are difficult to water, and the place is open and wide (Tustiyani et al., 2019). So that in these environmental conditions, this grass can grow quickly and spread around the mango tree.

Before choosing a control technique, it should be adjusted to the existing environmental conditions. Weed control techniques can be done through prevention, mechanics, technical culture, biology, and chemistry (Paiman, 2020).

d. Diversity Index (H')

If the type of weed species is very varied, diversity level is high. The results of data analysis using the Shannon Wiener formula obtained in the Diversity Index calculation can be seen in table 5.

Table 5. The total value of the weed diversity index

Location	H'
Tondowulan	2.31
Darurejo	1.92

Source: Data processed, 2021

Based on the table above, it can be seen that Darurejo Village has a weed diversity index value of 1.92 , while in Tondowulan Village it is 2.31. So it can be interpreted that both values are included in the medium diversity category because the diversity value ranges from 1<H'<3. It is because the two locations have different altitude values, making it possible to influence the diversity of weed species grown around mango trees. Before carrying out weed control techniques, it is necessary to know what weeds grow around cultivated plants so that the control is precise, efficient as desired.

Basically, annual plants or plantations have a moderate diversity level, such as the mango tree, for example. In this case, according to the research results of Sugiarti et al., (2020), the weed species diversity found in tangerine orchards is moderate with a diversity value of 2,467. There is also a similarity with Istikana et al., (2019) research that the diversity of weed species found in cocoa plantations is moderate with a diversity value of 2,53.

The diversity index and the evenness index are two different organisms. The diversity index (H') is used to describe a systematic community structure and can facilitate the process of analyzing information related to the type and number of organisms (Amalia et al., 2018). In contrast to the evenness of species, which is used to measure the evenness of the abundance of a species in a community with one another to achieve a certain balance (Nahlunnisa et al., 2016).

e. Index of Similarity (IS)

Each location usually has a different composition of weeds, either a little or a lot. So it is necessary to compare from one location to another. The results of data analysis obtained in calculating the Community/IS Similarity Index (*Index of Similarity*) can be seen in (Appendix 3).

Based on the table (Appendix 3) at the two research sites, only 4 weeds' types were found, namely bitter grass, Grintingan, Jukut Pendul and Desmodium. The number of species in Darurejo Village sequentially is 116 bitter grass plants, 4 grintingan plants, 71 jukut pendul plants, and 4 desmodium plants. In Tondowulan Village, there are 118 bitter grass plants, 172 grintingan plants, 32 jukut pendul plants, and 95 desmodium plants with a similarity value of 33.33%. It means that the two locations do not have a high population similarity because the similarity value is relatively small. Of course this is inseparable from the influence of environmental factors such as the difference in altitude between Tondowulan (3.04 m dpl) and Darurejo (6.05 m dpl). Differences in altitude influence the diversity of species, structure, and composition of understorey vegetation (weeds), soil conditions, temperature, sunlight's intensity and water. The effect that often occurs is during the photosynthesis process which is used as a limiting factor to suppress the

growth of undergrowth (weeds) (Shabirin et al., 2020).

f. Weed Domination Index

Data on weed dominance in Tondowulan Village, Plandaan District, Jombang Regency, the 3rd largest can be seen in Table 7 below:

Table 7. The order of the 3 largest weed dominance indexes in Tondowulan Village

No	Family	Species	C
1.	Poaceae	*Cynodon dactylon* L.	0.0289
2.	Mackinlayaceae	*Centella asiatica* (L.) Urb.	0.0196
3.	Cyperaceae	*Cyperus rotundus* L.	0.0169

Source: Data processed, 2021

Table 7 shows that the largest weed dominance index is indicated by the Poaceae family species, which is 0.0289. This means that the dominant weed in Tondowulan Village is *Cynodon dactylon* (L.).

Meanwhile the data on the dominance of weeds in Darurejo Village, Plandaan District, Jombang Regency, the third largest is presented in Table 8.

Table 8. The order of the 3 largest weed dominance indexes in Darurejo Village

No	Family	Species	C
1.	Poaceae	*Oplismenus hirtellus* (L.) P. Beauv.	0.1024
2.	Poaceae	*Axonopus compressus* (Swartz.) Beauv.	0.0400
3.	Amaranthaceae	*Achyranthes aspera L.*	0.0225

Source: Data processed, 2021

Table 8 shows that the largest weed dominance index is shown by the family Poaceae, species *Oplismenus hirtellus* (L.) P. Beauv. , which is 0.1024. So that the dominant type of weed in Darurejo Village is *Oplismenus hirtellus* (L.) P. Beauv. because it is supported by an environment that is quite good for the growth of grass-type weeds. This is the same as the *Cynodon dactylon* L. species in Tondowulan Village.

There are similarities in the research of Utami et al., (2020) that the dominant family found in coffee plantations is the Poaceae group. Weeds of the Poaceae group are known as weeds that are easy to grow and can produce lots of seeds so that they can adapt to wet or dry land. On the other hand, it is supported by environmental factors, it will also greatly affect the abundance and dominance of weed species. In the dry season, weed seeds that are not resistant to drought will not grow and experience dormancy, but as soon as there is water during the rainy season, the weed seeds will grow very quickly and dominate the land.

Based on the table above, it can be seen that the value of the weed dominance index in Tondowulan Village and Darurejo Village is in the 3rd largest order, the value is relatively small, less than one. It means thatany weed species did not the mango gardenbecause the population of weed species is relatively uniform between one another, moreover, it is followed by marginal soil factors that are less supportive in Plandaan District. Of course, this opinion is supported by Simangunsong et al., (2018) that the factors that cause the land to be dominated by weeds are the presence of a microclimate, supportive soil fertility, and control techniques carried out in plantations.

Good garden management techniques will suppress weed growth so that certain weeds do not dominate it in favorable geographical conditions for weed growth. Previously it is necessary to identify what species dominate the mango garden. Recognizing the weed's characteristics when controlling, what needs to be considered is starting from the competition process because the competitive ability of each species has its own differences (Hasiholan, 2019).

CONCLUSION

24 types of weeds were found around mango trees in Tondowulan and Darurejo Villages, Plandaan District, Jombang

Regency. The weeds consist of broadleaf weeds, sedges, and grasses. The highest SDR value obtained in Tondowulan Village was grintingan grass (*Cynodon dactylon* L.) of 13.82, while in Darurejo Village, it was basket grass (*Oplismenus hirtellus* (L.) P. Beauv.) of 26.53. The index value of weed diversity in Darurejo Village is 1.92%, while in Tondowulan Village it is 2.31%. Both values are included in the medium diversity category. The similarity value of weed composition in Tondowulan and Darurejo villages was 33.33% so that the two research locations did not have the same weed composition. Any weeds did not dominate mango garden because the index value of the weed dominance in Tondowulan and Darurejo villages in the order of the three largest was less than one.

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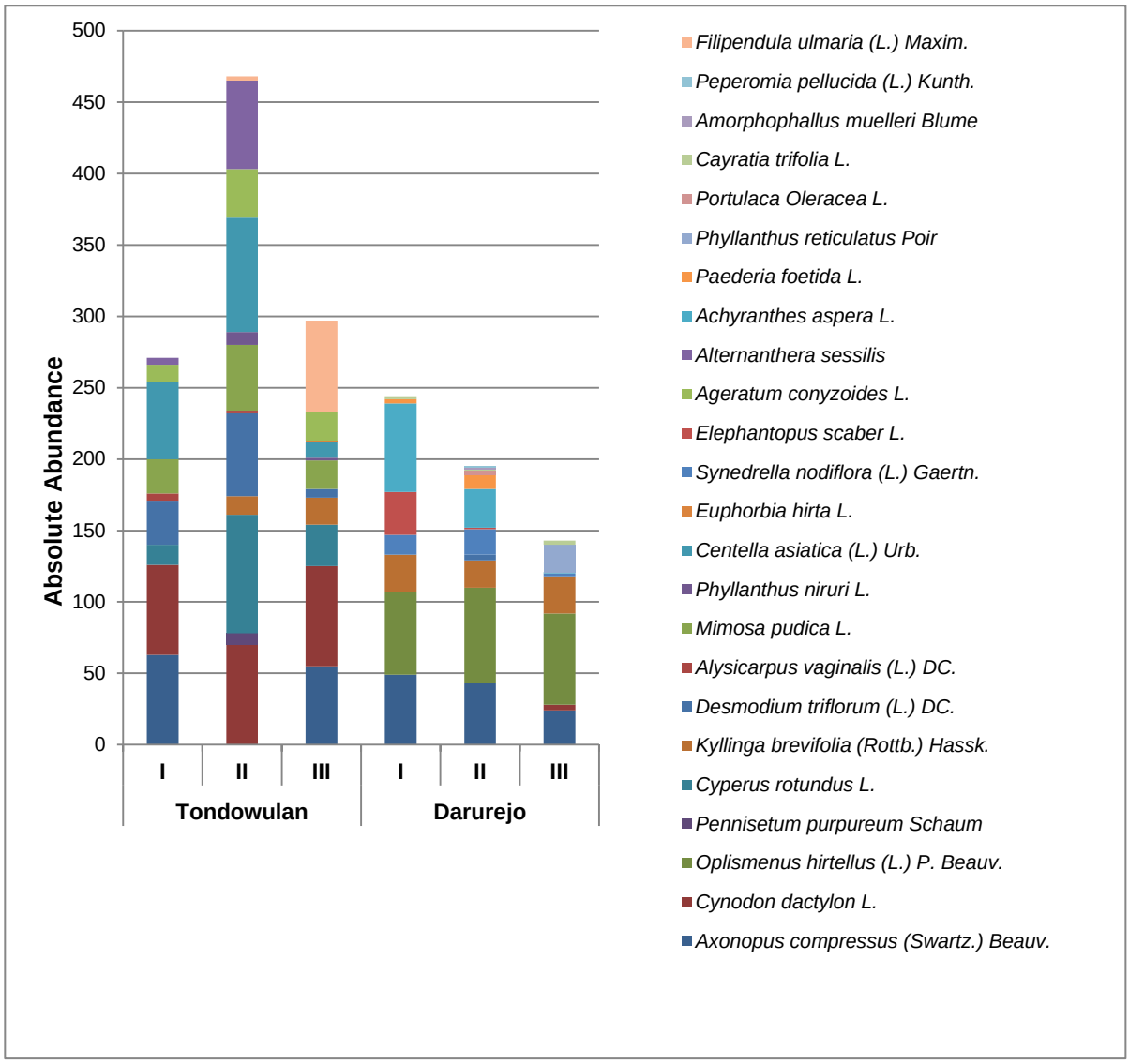
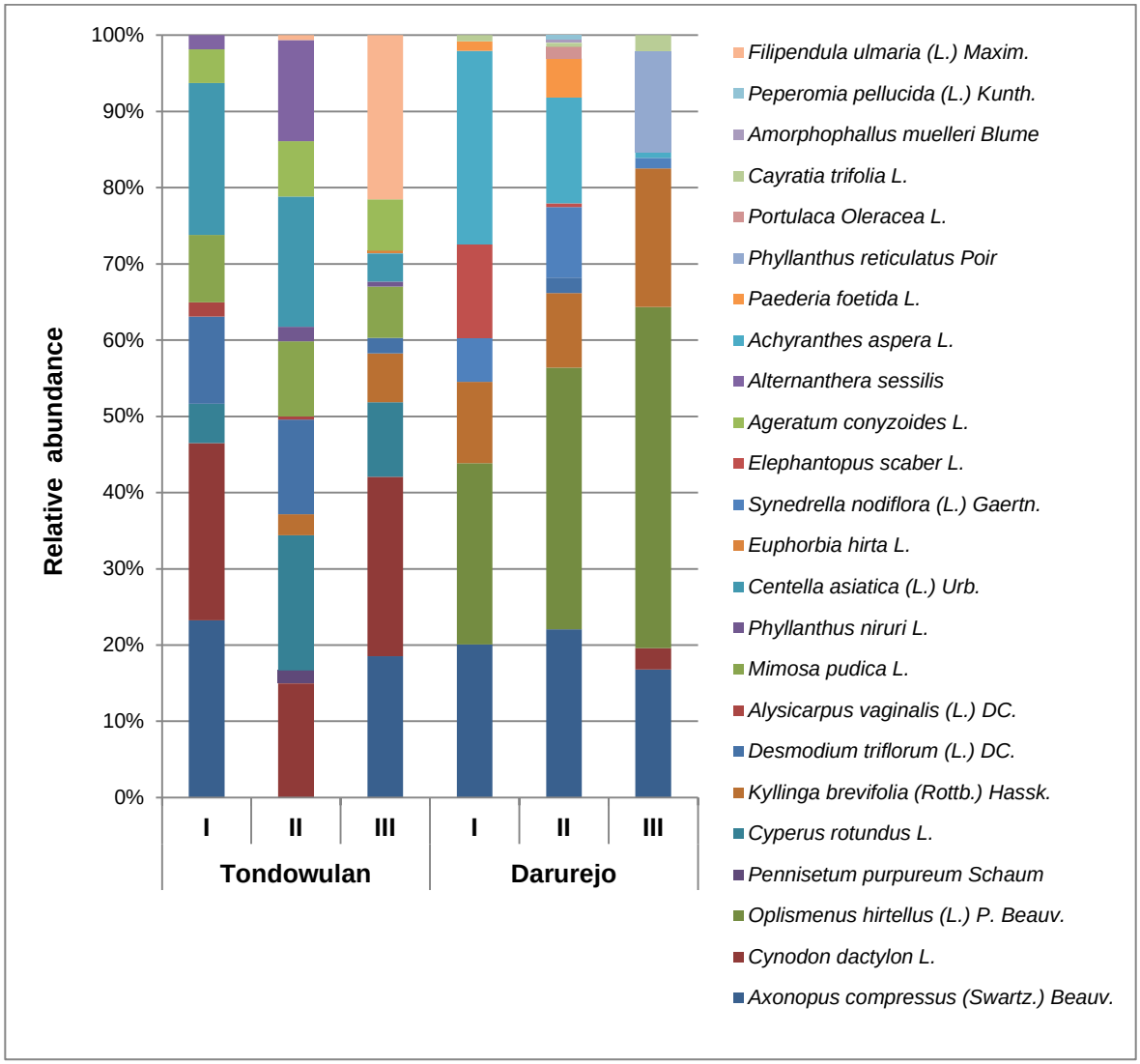
Appendix 1.Graph of absolute abundance of weeds in Tondowulan and Darurejo Villages



Source: Data processed, 2021

Appendix 2.Graph of relative abundance of weeds in Tondowulan and Darurejo Villages



Source: Data processed, 2021

Appendix 3. Results of the analysis of the *Index of Similarity* (IS) or community similarity (C) in Darurejo and Tondowulan villages, Plandaan sub-district, Jombang district.

No	Species	Family	Number of Individual	
			Darurejo	Tondowulan
1	*Axonopus compressus* (Swartz.) Beauv.	Poaceae	116	118
2	*Cynodon dactylon* L.		4	172
3	*Oplismenus hirtellus* (L.) P. Beauv.		189	
4	*Pennisetum purpureum* Schaum			8
5	*Cyperus rotundus* L.	Cyperaceae		126
6	*Kyllinga brevifolia* (Rottb.) Hassk.		71	32
7	*Desmodium triflorum* (L.) DC.	Fabaceae	4	95
8	*Alysicarpus vaginalis* (L.) DC.			7
9	*Mimosa pudica* L.			90
10	*Phyllanthus niruri* L.	Phyllanthaceae		11
11	*Centella asiatica* (L.) Urb.	Mackinlayaceae		145
12	*Euphorbia hirta* L.	Euphorbiaceae		1
13	*Synedrella nodiflora* (L.) Gaertn.	Asteraceae	34	
14	*Elephantopus scaber* L.		31	
15	*Ageratum conyzoides* L.			66
16	*Alternanthera sessilis*	Amaranthaceae		67
17	*Achyranthes aspera* L.		90	
18	*Paederia foetida* L.	Rubiaceae	13	
19	*Phyllanthus reticulatus* Poir	Phyllanthaceae	19	
20	*Portulaca Oleracea* L.	Portulacaceae	3	
21	*Cayratia trifolia* L.	Vitaceae	6	
22	*Amorphophallus muelleri* Blume	Araceae	1	
23	*Peperomia pellucida* (L.) Kunth.	Piperaceae	1	
24	*Filipendula ulmaria* (L.) Maxim.	Rosaceae		67
Total			582	1005
IS Value (%)			33.33	