

Identification of Weeds in Cassava Fields (*Manihot Esculenta Crantz*) in Glugur Rimbun, Sampecita Village, Kutalimbaru District

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Abstract. The cassava cultivation agricultural sector in North Sumatra is vulnerable to attacks by plant pests, resulting in a decrease in production. One of the pests that are directly related to cassava cultivation is weeds with all their types, impacts, and biology. Therefore, identification measures are needed. This research aims to identify weed diversity by knowing the weed species and dominant weed species. Research on identifying weeds in cassava (*Manihot esculenta Crantz*) in Glugur Rimbun, Sampecita Village, Kutalimbaru District, Deli Serdang Regency aims to determine the types of weeds, density, dominance index, and species diversity index. This research was conducted from June to August 2023 using qualitative and quantitative methods. Weed sampling used a random quadrat method, 50 samples with a plot size of 2 m x 2 m. The results of the analysis of weed vegetation on cassava cultivation land in Glugur Rimbun showed that there were 10 types of weeds from 5 families, namely the types of weeds included in the broad-leaf weed group, there were 5 species, namely *Asystasia gangeticum*, *Amaranthus spinosus*, *Ageratum conyzoides*, *Chromolaena odorata*, *Mimosa pudica*. Other types of weeds that were found were grass weeds, namely *Axonopus compressus*, *Eleusin indica*, *Ottochloa nodosa*, *Cynodon dactylon*, *Paspalum conjugatum*. The types of weeds that dominate the Glugur Rimbun cassava fields are *Eleusin indica* (SDR 20.88%), *Cynodon dactylon* (SDR 17.96%), *Asystasia gangeticum* (SDR 14.06%), *Ottochloa nodosa* (SDR 13.90%).

Keywords: Identification, Types, Weeds, Cassava

INTRODUCTION

Cassava (*Manihot esculenta Crantz.*) is a food crop that is easy to cultivate, has low production input, and is widely cultivated on marginal land. This plant has high economic value because it is a source of substitute food for rice and can be used as animal feed, raw material for the tapioca starch industry, and bioethanol (Sundari, 2010). Indonesia ranks third as the largest cassava production center in the world with a contribution value of 9.26% in 2010-2014 where average production reached 23.90 million tons (Ministry of Agriculture, 2016). In 2020, cassava production in North Sumatra Province was 1.086 million tons (BPS North Sumatra, 2022) and will increase to 1.088 million tons in 2022.

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Along with developments in technology and the times, food needs are very difficult to meet because land area is decreasing. In Indonesia, the cassava harvest area in 2019 was 1,184,696 ha, while in 2020 it decreased to 1,065,752 ha (BPS, 2020).

Food plants are foods high in carbohydrates that are consumed by the majority of the world's population over a long period. One food plant that contains high carbohydrates is cassava (*Manihot esculenta Crantz.*). Initially, cassava was found growing wild in forests, in their gardens and even growing in random places. The types of cassava cultivated in Indonesia are *Manihot esculenta Crantz* (cassava), *Manihot utilisima* (cassava), *Manihot edulis* (cassava) and *Manihot aipi* (manioc), *Manihot glaziovii* (rubber cassava) (Zuraida, 2010).

In cultivation techniques, one of the factors that influences cassava production is plant maintenance and weed control. Weeds are defined as plants that are undesirable and have a negative influence so their presence is undesirable to humans. Although weeds do not cause death to cassava plants, they will produce unsatisfactory results due to competition for nutrients, sunlight, and limited growing space (Sembodo). 2010). The presence of weeds in food crops can cause losses due to competition. Yield reduction can reach 50% if weed management receives less attention (Sari and Rahayu, 2013). Therefore, the presence of weeds needs to be suppressed so that they do not disturb the main crops. Subsequent developments were in line with increasing market demand, causing land for cassava cultivation to increase, then several types of cassava were widely cultivated in Indonesia. The spread of cassava plants extends to all provinces in Indonesia. This is indicated as a cause of failure in the harvest.

Even though weeds do not cause death to cassava plants, they will produce unsatisfactory results due to competition for nutrients, sunlight, and limited growing space. Analytically, the presence of weeds can be seen by knowing the density, dominance index, and species diversity index. These three analyses are techniques for determining the condition of a type/species in a location/region. For example, the condition or presence of weeds in cassava planting locations/areas are distributed evenly/dominantly and vice versa. The density of a species shows the number of individuals of the species in a certain unit area, so the density value is an illustration of the number of that species at the research location. Dominance indicates the existence of

a certain type that dominates a location/cassava growing area. Species diversity is the number of species in an area/location which refers to the number of species and the number of individuals of each species as well as a characteristic at the community level (Sukarman and Maryani, 2019).

An assessment of the types of weeds in cassava plants can be done by identifying them based on the morphology of the weeds themselves to know how to control them. Based on the description above, the author is interested in conducting a research entitled Identification of Weeds in Cassava Land (*Manihot esculenta Crantz*) in Glugur Rimbun, Sampe Cita Village, Kutalimbaru District, Deli Serdang Regency.

RESEARCH METHOD(S)

This research will be carried out in the Glugur Rimbun cassava land, Sampecita Village, Kutalimbaru District, Deli Serdang Regency with a height of +/- 20 meters above sea level from June 2023 to August 2023.

The stages of this research include: (1) Determining the research location by surveying the cassava land. (2) The quadratic method with a plot size of 2 m x 2m is used to collect weed samples. Plot selection was carried out randomly by throwing square plots into the cassava cultivation land 10 times so that there were 10 sample plots. The weeds are then removed and then placed in a plastic bag and marked with a plot number. (3) Data analysis is carried out to determine the type and dominance of weeds. The type of weed is known by identifying weeds which aims to determine the type of weed in the cassava cultivation land, which is done by observing the morphology of the weed visually and determining the species based on the weed determination book, (4) counting the number of weed populations, then recording them, (5) washing the weed samples using water, then drying them and putting them in an envelope, (6) drying the weed samples using an oven at a temperature of 85o C for 48 hours then weighing the weeds, (7) analyzing weed vegetation to determine the density and level of dominance of a weed (Lawalata, J. J., & Silak, H. (2022).

Identification of the type of weed is carried out by morphological characteristics and their effects on plants. The observation data is filled in in the observation results table. The observation data obtained was processed using the species diversity index formula, density formula, and weed dominance index found on the Glugur Rimbun land in

Sampecita Village, Kutalimbaru District. Write here the procedure/technique of your research study.

Statistical Analysis

Data obtained in the field were analyzed for vegetation by measuring the density and level of weed dominance which was done by analyzing several parameters, namely relative density, relative frequency, and relative dominance which were incorporated into the Standard Dominance Ratio/Summed Dominance Ratio (SDR) with the formula (Palijama et al. 2012): to obtain a constant dry weight as follows:

1. Absolute density (KM) = number of individuals of a type of weed

2. Relative density (KR) = $\frac{\text{Absolute density of a type}}{\text{The total density of all types}} \times 100\%$

3. Absolute frequency (FM) = number of sample plots containing a type

4. Relative frequency (FR) = $\frac{\text{Absolute frequency of a type}}{\text{Absolute frequency of all types}} \times 100\%$

5. Absolute Dominance (DM) = Dry weight of each type of weed

6. Relative Dominance relatives (DR) = $\frac{\text{Absolute dominance of a type}}{\text{Total Dominance of all types}} \times 100\%$

7. Standard Dominance Ratio/ Summed Dominance Ratio (SDR)

$$= \frac{KR+FR+DR}{3}$$

FINDINGS AND DUSCUSSION

The results of weed vegetation analysis on cassava cultivation land in Glugur Rimbun, Sampecita Village, Kutalimbaru District, show that there are 10 types of weeds from 5 families.

Table 1. Types of Weeds and Number of Individual Weeds Found in the Cassava Fields of Glugur Rimbun, Sampecita Village, Kutalimbaru District

No	Type of weed	Genus	Family	Local Name	Number of Individuals
1	<i>Asystasia Gangeticum</i>	Asystasia	Acanthaceae	Ara Sunsang	34
2	<i>Amaranthus Spinousus</i>	Amaranthus	Amaranthaceae	Bayam Duri	21
3	<i>Ageratum Conyzoides</i>	Ageratum	Asteraceae	Badotan	5

4	<i>Axonopus Compressus</i>	Axonopus	Poaceae	Rumput Paitan	28
5	<i>Chromolaena Odorata</i>	Chromolaena	Asteraceae	Kirinyuh	7
6	<i>Mimosa Pudica</i>	Mimosa	Fabaceae	Putri Malui	12
7	<i>Eleusin Indica</i>	Eleusine	Poaceae	Rumput Belulang	54
8	<i>Ottochloa Nodosa</i>	Ottochloa	Poaceae	Rumput Kawatan	38
9	<i>Cynodon Dactilon</i>	Cynodon	Poaceae	Rumput Grinting	46
10	<i>Paspalum Conjugatum</i>	Paspalum	Poaceae	Jukut Pait	19
Summary					264

Based on Table 1, there are 5 species of weeds included in the broad-leaf weed class, namely *Asystasia gangeticum*, *Amaranthus spinosus*, *Ageratum conyzoides*, *Chromolaena odorata*, *Mimosa pudica*. Other types of weeds that were found were grass weeds, namely *Axonopus compressus*, *Eleusin indica*, *Ottochloa nodosa*, *Cynodon dactilon*, *Paspalum conjugatum*.

The results of research by Putra and Jeclin (2019) on cassava fields in Nitakloang Village, Nita District, Sikka Regency show differences in plant types, namely *Ageratum conyzoides*, and *Alternanthera sessilis*, *Phyllanthus urinaria*. Research by Bayyina et. al., (2013) on cassava land in Taman Sari Village, Karang Lewas District, Banyumas Regency found several weed species, namely *Ageratum conyzoides*, *Alternanthera sessilis*, *Amaranthus spinosus*, *Physalis angulata L.*, *Phyllanthus urinaria*, *Eleusin indica* and *Ottochloa nodosa*.

The results of the quantitative analysis of weeds are presented in Table 2, which is shown by the SDR value which describes the level of density and dominance of weeds in a cultivation area (Anggraini, 2019). The higher the SDR value, the higher the level of weed dominance on the land. Based on the results of research on cassava cultivation land in Glugur Rimbun, Sampecita Village, Kutalimbaru District, Deli Serdang Regency, it shows that the total SDR value of group weeds in a planting area (Perdana et.al, 2013).

Table 2. Results of Quantitative Analysis of Weed Vegetation on Cassava Cultivation Land in Glugur Rimbun Land, Sampecita Village, Kutalimbaru District

No	Type of weed	KM	KR (%)	FM	FR (%)	DM	DR	SDR (%)
1	<i>Asystasia gangeticum</i>	34	12.88	12	16.44	24.23	12.85	14.06
2	<i>Amaranthus spinosus</i>	21	7.95	8	10.96	15.29	8.11	9.01
3	<i>Ageratum conyzoides</i>	5	1.89	2	2.74	0.22	0.12	1.58
4	<i>Axonopus compressus</i>	28	10.61	9	12.33	11.24	5.96	9.63
5	<i>Chromolaena odorata</i>	7	2.65	3	4.11	0.32	0.17	2.31
6	<i>Mimosa pudica</i>	12	4.55	4	5.48	3.25	1.72	3.92
7	<i>Eleusin indica</i>	54	20.45	9	12.33	56.26	29.85	20.88
8	<i>Ottochloa nodosa</i>	38	14.39	10	13.70	25.65	13.61	13.90
9	<i>Cynodon dactilon</i>	46	17.42	12	16.44	37.75	20.03	17.96
10	<i>Paspalum conjugatum</i>	19	7.20	4	5.48	14.29	7.58	6.75
	Jumlah	264	100.00	73	100	188.5	100.00	100.00

In carrying out vegetation analysis, it is necessary to calculate the Standard Dominance Ratio (SDR), a parameter that shows what species are dominant in an area. Based on the results of research on cassava cultivation land in Glugur Rimbun, Sampecita Village, Kutalimbaru District, it shows that the total SDR value of grass class weeds is 69.12%, while the total SDR value of broadleaf weeds is 30.88%. The types of weeds with the highest SDR values are *Eleusin indica* (SDR 20.88%), *Cynodon dactilon* (SDR 17.96%), *Asystasia gangeticum* (SDR 14.06%), *Ottochloa nodosa* (SDR 13.90%), and *Axonopus compressus* (SDR 9.63%), *Paspalum conjugatum* (SDR 6.75%). From these results it can be seen that the weeds that dominate the cassava cultivation land in Glugur Rimbun, Sampecita Village, Kutalimbaru District are *Eleusin indica*, *Cynodon dactilon*, *Asystasia gangeticum*, *Ottochloa nodosa*.

Discussion

The various types of weeds in planting areas are caused by differences in region, climate, plant management such as soil processing, fertilization, water management, as well as morphology and characteristics of the main plants which can influence microclimate such as sunlight under the canopy so that the types of weeds that grow are also different (Tustiyani et al., 2019). Other factors such as weed seed deposits in the soil

(Kamaluddin et al., 2022), planting distance or plant density, and plant age (Perdana et al., 2013) also influence the types of weeds that grow in a planting area. The deposit factor of weed seeds in the soil greatly influences the type of weed that grows

Weeds are an important factor that can influence agricultural production and productivity. Weeds are strong competitors for plants in utilizing growth resources such as nutrients, water, and light. According to Moenandir (1988); Fendri Ahmad (2010) in Molama (2014), competition will be even tighter if the amount of materials being competed for is not sufficient to be used together. Description of each weed found in cassava fields in Glugur Rimbun, Sampecita Village, Kutalimbaru District with SRD values between 1.58 – 20.88 as shown below:

Bone Grass (*Eleusine Indica*)

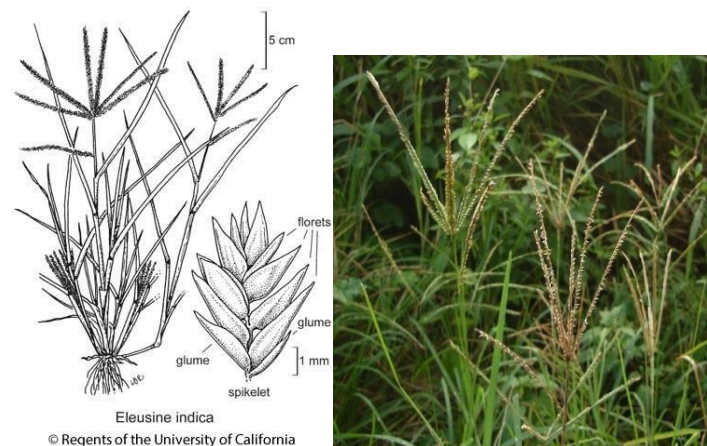


Figure 1. *Eleusine Indica*

Eleusine indica belongs to the Poaceae family, namely the grass family. This grass has other names: carulang, jampang, suket lulangan grass. Bululang grass is an annual grass with ribbon leaves, forming dense clumps that are slightly wide and low. The roots are not deep but are dense and strong and anchor the soil so it is difficult to remove them. Reproduce mainly by seeds (Nasution, 1984). This weed can produce up to 140,000 seeds each season (Lee and Ngim, 2000).

Spiny grass is terrestrial, tufted, upright, herbaceous, and has roots at the nodes. The stem of this plant is flat and hairless. The roots of grass are included in the fibrous roots. The leaves of this plant are green and more than 2 cm long. Bisexual flowers, arranged together at the terminal part or usually called panicles, are green with invisible petals. Spine grass lives well in warm and wet areas. Spine grass grows well in open areas.

This plant is often found in rice fields, gardens, roadsides and on footpaths. Spine grass reproduces naturally using.

Crocodile Grass (*Ottochloa Nodosa*)

This plant belongs to the Poaceae family, namely the grass family. Synonyms: *Panicum nodosum* Kunth *Panicum arnottianum* (Nees ex Steud.) *Panicum aequabile* Domin *Panicum multinode* J. Presl.

O. nodosa is an annual grass weed, spreads with runner growth and has long segments, roots emerge from these segments, shoots also grow up to 30-120 cm, while the leaves are linear-lanceolate, long pointed. These weeds become competitors for plants in terms of uptake of nutrients, water and space. This weed grows spreading and intertwining to form sheets. The stem of this weed has segments and nodes, each node is capable of producing new roots and shoots and producing flowers. This weed produces small seeds so they are easily carried by the wind and spread.

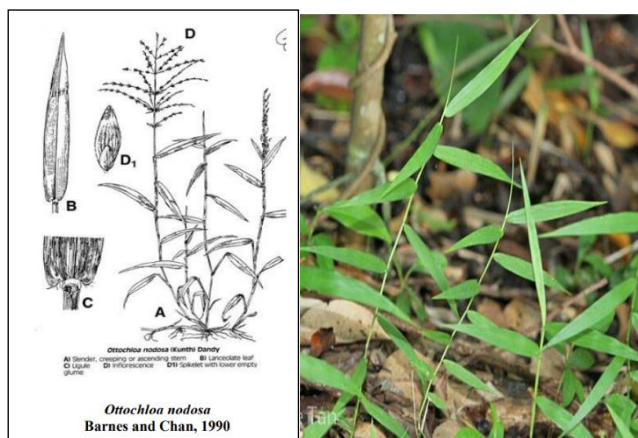


Figure 2. *Ottochloa Nodosa*

Paitan grass (*Axonopus compressus*)

A. compressus reproduces vegetatively and generatively. Spreads using stolons and seeds. Seed weight ± 0.1 mg; length 2.4-3.3 mm; width 0.9-1 mm; thickness 0.3-0.4 mm. Seed distribution can occur due to gravity which causes the seeds of this plant to fall directly to the ground. From the results of observations that have been made, the seeds of this plant can spread with the help of the wind, when the seeds of this plant are dry. It is also possible that seeds that fall to the ground will be washed away with the water when it rains.



Figure 3. *Axonopus Compressus*

Babadotan (*Ageratum conyzoides*)

Babadotan grass is a terrestrial, annual, upright plant, 10-120 cm high, with straight stems, not in clumps, not spreading, and green in color. The single leaf is ovate; pointed tip 3-4 cm long; width 1-2 cm; jagged edges and green. The bell-shaped flowers are white or purple (Syam et.al., 2013).

The seeds of this plant have a seed length ranging from 1.9-2.1 mm; a width of 0.1-0.4 mm; 0.1mm thick. The shape of the seeds of this plant is like brown needles, small and light, and has hairs that can help it to be carried by the wind, so the spread of this plant can be aided by the wind or what is called anemochory. This plant flowers all year round and can produce up to 40,000 seeds per plant (Mannetje, et al., 1992). This species is widespread in humid highlands. The *Ageratum conyzoides* plant is a weed that occurs throughout the world, both in tropical and subtropical areas.



Figure 4. *Ageratum Conyzoides*

Grinting Grass (*Cynodon dactylon* L.)

Cynodon dactylon in Indonesia is known as grinting grass, bermuda grass, suket grinting (Java), kakawatan (Sunda). Grinding grass is a type of grass that has a slightly superior ability to survive compared to other types of grass. This grass can survive on barren land in the dry season even though its leaf growth is minimal.

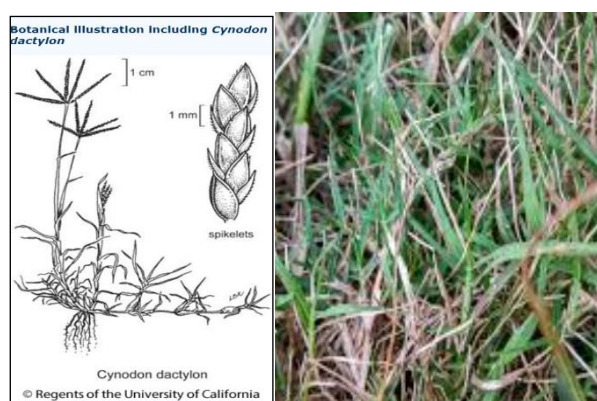


Figure 5. *Cynodon Dactylon*

According to Tjitrosoepomo (2007), *C. dactylon* is in the Poaceae family, a multi-year terna that has stolons, grazes with underground rhizomes penetrating the ground to a depth of 1m, grass spreads with rhizomes, and reeds that flower upright or ascend to 40 cm, long side reeds, which old hollow, annual. Reed segments alternate between long and short, leaves in 2 rows. Leaves are striped, and waxy, and have rough edges, and sharp edges. Flowers upright, like bunches. Double spike inflorescences consist of two to several branches, the spikelets are violet white. The seeds are egg-shaped, yellow to reddish. They reproduce by seeds and stem cuttings.

Kirinyuh (*Chromolaena odorata*)

This species is native to North America, but spread to Asia, Africa, and Australia. *Kirinyuh* is a flowering shrub that comes from the Asteraceae family. *Taxonomically*, *kirinyuh* is related to sunflowers. However, the two have a different appearance, because this species tends to be more invasive and has lots of branches. The growth of the *kirinyuh* plant is quite fast. If not controlled properly, this flora will be difficult to control and can affect the growth of other plants. *Kirinyuh* plants can be propagated through seeds. An adult plant can produce 80,000 seeds, while growth only takes two months.



Figure 6. *Chromolaena Odorata*

Kirinyuh leaves are green or light green, oval. The lower part of the leaves appears wide, with a total length of 6-10 cm. The leaf stalks develop between 1-2 cm long and 3-6 cm wide. Three leaf veins are visible, while the stem is upright, woody, and covered with fine hairs. Apart from that, the *kirinyuh* stem also has a pattern of longitudinal and parallel stripes. It reaches more than 5 meters in height, with opposite branches and compound flowers. The color of the flowers looks brownish white but is capable of producing quite a lot of seeds or shoots.

Jukut Pait Root (*Paspalum Conjugatum*)

Paspalum conjugatum is a grass weed that is classified as an important weed that is found in plantation and food crop fields. Jusfah (1984), said that jukut roots reproduce by seeds and stolons.



Figure 7. *Paspalum Conjugatum*

According to Holm (1977), one individual *P. conjugatum* can produce 1500 seeds and these seeds spread easily, thereby providing greater opportunities for growth and reproduction. This plant spreads via long stolons that root at its nodes to form new growth.

Flowering begins 4 - 5 weeks after seedlings emerge, and the plant continues to flower throughout the year. New shoots develop on each rooted node. This weed has a wide climate tolerance, growing wild in tropical and subtropical areas and spreading widely as a weed outside its range.

Israel Grass (*Asystasia Gangeticum*)

Israel grass originates from tropical areas of Malaysia, India, and Africa, but has been introduced to tropical areas in North, Central, and South America, Hawaii, the West Indies, and Australia. Taproot, roots can emerge from branches, there are root hairs, roots brownish white. Stems are rectangular, purplish green in color. *Unifoliate leaves, opposite (opposite), green, ovate, with a pointed tip and rounded or narrowed base, flat leaf margins, with many linear cystoliths on the upper surface, leaf veins pinnate, secondary veins conspicuous.*



Gambar 8. *Asystasia Gangeticum*

The bisexual, *zygomorphic flowers have green, linear-lanceolate petals*, about 5 mm long and hairy on the back. The crown is a funnel-shaped or asymmetrical tube, 5-lobed, white or pale purple, the crown strands are round to oval, the tube is yellow and bulging, hairy on the outer surface. The stamens and pistil are inserted into the flower tube. The fruit capsule is cylindrical, about 2.5 cm long, green when young, and turns light brown and dry and bursts (explosive) when ripe, tightly covered with hair glands. Seeds 2-4, whitish black to brown in color, flat, beaked, irregular edges, smooth surface, dense, ovoid, angular, wrinkled or subtubercular, less than 5 mm in diameter.

Thorn Spinach (*Amaranthus Spinosus*)

Thorn spinach is an annual herb, with erect stems, 30-100 cm high, often with many branches. The stem is reddish, the base is plain, the top is slightly hairy.



Figure 9. *Amaranthus spinosus*

It grows wild in bushes, roadsides and abandoned empty land, from lowlands to 1,400 m above sea level. Single leaf, grows alternately, the color is greenish, the shape is oval, elongated to lanceolate, 1.5-1.6 cm long, 1-3 cm wide, the tip of the leaf is blunt, the base is pointed, the edge is flat, sometimes curved, the veins are prominent, the stem long.

In the leaf axils there are a pair of hard spines that come off easily. The flowers are unisexual, the female flowers are gathered in a tight, ball-shaped tucal in the axil and the male flowers are in the form of spikelets that can branch at the base, found at the tip of the stem which are whitish green. Propagated by seeds.

Shy Princess (*Mimosa Pudica* L.)

Putri Malu is a thorny plant which is classified as a closed seed plant (angiospermae). The shy princess plant has double compound leaves, the number of leaflets per fin consists of 5-26 pairs.



Figure 10. *Mimosa Pudica*

The leaves have an elongated and lancet shape and have a pointed tip and are rounded at the base of the leaf. The edges of the leaves are flat and the top and bottom surfaces are smooth with a leaf length of 6-16 mm and a width of 1-3 mm. Generally, the leaves of *Putri Malu* are green with purple edges.

The distinctive characteristic of the leaves of the *putri malu* plant is the folding response of the leaves when they receive touch stimulation. The stem of this plant has a typical cylindrical shape with a stem diameter of up to 2.5 cm. Apart from that, the stem has rare spines. The stem of this plant has soft, grooved hairs with a longitudinal pattern with a light brown external surface and a gray internal surface. This stem also has skin that is easily separated from the wood. (Hasanah *et al.*, 2021).

CONCLUSION AND RECOMMENDATION

Weed vegetation on cassava cultivation land in Glugur Rimbun, Sampecita Village, Kutalimbaru District shows that there are 10 types of weeds from 5 families. Based on table 1, there are 5 types of weeds included in the broad-leaf weed class, namely *Asystasia gangeticum*, *Amaranthus spinosus*, *Ageratum conyzoides*, *Chromolaena odorata*, *Mimosa pudica*. Other types of weeds that were found were grass weeds, namely *Axonopus compressus*, *Eleusin indica*, *Ottochloa nodosa*, *Cynodon dactylon*, *Paspalum conjugatum*.

The dominant weeds on cassava cultivation land in Glugur Rimbun Village are *Eleusin indica* (SDR 20.88%), *Cynodon dactylon* (SDR 17.96%), *Asystasia gangeticum* (SDR 14.06%), *Ottochloa nodosa* (SDR 13.90%).

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