



## Weeds Control in Cassava Plants Development

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### Abstract

*The purpose of this study is to determine what kinds of weeds may interfere with the development of cassava and how to manage the presence of weeds that interfere with the growth of cassava. Cassava has significant economic and social potential as a future food component, raw material for a variety of businesses, and animal feed, among other applications. Weeds have the ability to multiply quickly via seed. Annual weeds are the most common kind of weed discovered in cassava because they develop extremely quickly and generate seeds in a short period of time. Weed management is often accomplished by mechanical techniques, such as pulling, submerging, or other similar methods. Uprooting should be done before the seeds of this plant begin to spread, and additional methods of management should include herbicide spraying.*

## Introduction

In the Philippines, cassava is one kind of food plant that has been recognized and produced for many years by farmers all across the island. Cassava has significant economic and social potential as a future food component, raw material for a variety of businesses, and animal feed, among other applications (Howeler, 2008). It has been recognized and grown by people all throughout the globe for thousands of years under many names such as cassava or cassava root. Researchers and agricultural professionals discovered that cassava plants are native to the tropical American continent, based on the findings of their searches.

Cassava is the third most important basic food in Indonesia, after rice and maize. Indonesian cassava plants have expanded across the country, covering all regions (Widodo, 2018). In order to demonstrate the potential of cassava as an important food element in the globe, consider the fact that every year, 300 million tons of sweet potatoes are produced in the world, with a third of the world's population in tropical nations relying on them for nutrition. Aside from that, around 45 percent of the world's total sweet potato crop is directly eaten by growers as a source of calories in a number of nations. It is now being researched as an agro-industrial commodity, with applications in the production of tapioca flour products, the fermentation sector, and a variety of culinary businesses. Japan and the United States are two countries that have the potential to be markets for tapioca flour. Every year, around 1 million tons of flour products are imported into the nation. Low production and revenue are two of the most common issues faced by cassava farmers. The presence of weeds is one of the factors that contribute to poor production.

In the plant world, weeds are plants that are unwelcome by people because they may interfere with the development of the primary plant. The presence of weeds in a plant growing environment has a significant impact on plant growth and development because weeds and plants will fight for growth elements such as light, water, nutrients, and growing space, which will negatively impact plant development.

The pace at which cassava output declines as a result of weeds varies depending on the kind, nature, and number of weeds that grow in an agricultural region at any one time. The sorts of weeds that grow and the density of those weeds are determined by the type of soil and climate, particularly the amount of rainfall. As a result, the prevalence of weeds varies significantly from one location to the next. A weed may be split into three types: weed weeds, grass weeds, and broadleaf weeds. Weed weeds are the most common kind. Due to the above, it is vital to understand which weeds might interfere with the development of cassava and how to regulate their presence.

### **Yam Plants**

It is the third most important food component after rice and maize (*Manihot esculenta* Crantz). Cassava tubers provide carbohydrates (including starch), which are utilized in a variety of applications including food, feed, and raw materials for a variety of industries (Balagopalan, 2002; Tonukari et al., 2015). Because cassava starch may compete with other starches in the manufacture of a variety of sectors, the demand for cassava is increasing as a result of food insecurity and industrial starch demands.

Cassava is a herbaceous plant that originated in North and South American countries. Euphorbiaceae is a family of plants that includes this two-piece specimen. Both the vegetative and generative portions of the cassava plant are present. Plant parts that are vegetative in nature include the roots, stems, and leaves of the cassava plant, while plant parts that are generative in nature include the flowers and fruit (Nassar, 1999). In order to successfully produce cassava, it is necessary to have access to sunshine for around 10 hours each day. Shade is not required for the survival of cassava plantations. For the development of cassava plants, temperatures between 18 C and 35 C are optimal for growth. A temperature of 10 degrees Celsius is the bare minimum, while 25 degrees Celsius is the recommended temperature. Humidity levels between 60 and 65 percent relative humidity are optimal for cassava plants. It needs 750–1,000 mm of rain each year to grow cassava at its best. Cassava plants may be grown at elevations ranging from 0 to 1,500 meters above sea level, depending on the variety.

A tall stalk of cassava leaves grows from the base of the stem. Cassava leaves are greenish in color, and the leaf bones are complex with fingers that have elliptical leaflets with a pointy tip. Cassava leaves are edible. Young leaves have a yellowish green or bluish green tint to them. Green, red, yellow, or a mix of the three colors on the petiole are the most common colors.

Typically, spherical in form with a diameter of 2.5-4 cm, the stems of cassavas are segmented and lengthy, and they are made of woody segments. It may grow to a height of 1-4 meters at its maximum. According on how old the stems are, their color may range from green to white to gray to green-grey to brown-grey. The color of the stems varies depending on how old the stems are. Pith on the stem is white and soft, and the stem's structure is soft and flexible, similar to that of cork.

Several secondary roots form at the base of the stem and grow in a sideways direction. Roots that support the plant's upright growth and help in nutrient absorption are called "supporting roots." A root system that grows and produces tubers. According to the kind of cassava that was planted, the tuber of cassava is an expanded and elongated tree root that has an average diameter of 2-3 cm and a length ranging from 50-80 cm. Each leaf has a smooth underside that lacks hairs. Adventitious roots grow into cassava tubers as a result of secondary expansion. Cassava's inside is white or yellowish in color. No matter how long they are kept in the refrigerator, cassava tubers can't be stored. In the axillary branches of cassava plants, flowers develop. For the most part, female flowers are the first to blossom and develop. One flower

(monoecious) and the mechanism of cross-pollination are present in the cassava plant. If a female flower is not fertilized for 24 hours, the blossom will wither and fall off the stem.

## **Weeds**

In the plant world, weeds are plants that are unwelcome by people because they may interfere with the development of the primary plant. The presence of weeds in a plant growing environment has a significant impact on the growth and development of plants because weeds and plants will fight for growth elements such as light, water, nutrients, and growing space, which will negatively impact plant growth and development. According to the kind and quantity of weeds present, as well as the time of year in which the weed disturbance occurs, yield losses due to weed disturbances might vary from 20 percent to 80 percent.

Specific weeds are connected with or often occur in close proximity to certain horticultural crops. Weeds that are constantly present and flourish in horticulture crops are referred to as horticultural weeds in everyday speech, even if the presence of a particular weed species is not always guaranteed for horticultural plants (Falck, 2010). Many kinds of weeds found in annual and perennial horticulture crops are divided into three sorts of weeds: grass weeds, puzzle weeds, and broadleaf weeds. The grass weed is the most common form of weed found in annual and perennial crops. Puzzle weeds, such as (*Cyperus rotundus*), soft broadleaf weeds, and grass weeds are often encountered in horticultural crops that are more than a year old (vegetables, ornamental plants). When it comes to annual horticulture crops, weeds such as broadleaf (soft or woody), grass class weeds, and puzzleweeds may be found in plenty (fruit plants).

There are a variety of methods for controlling weeds in horticulture crops. Manual/mechanical weed management is the most common and feasible method of weed control since the land is relatively small but requires a high level of labor intensity (Duary et al., 2015; Daramola et al., 2020). After multiple rounds of prepping the soil for planting, somewhat extensive land cultivation, particularly in horticulture, may be used to reduce the presence of weed species on a year-round basis. On the other hand, rigorous land management may also lead to an increase in the occurrence of nutsedges. The acts of growing horticulture crops, such as the preparation of planting medium, the establishment of plant spacing, fertilization, irrigation, and other practices, all contribute to the control of weeds in horticultural crops, either directly or indirectly.

Weed management may be accomplished manually or mechanically by pulling or cutting (Cloutier et al., 2007). Using basic equipment or by hand, it is possible to pluck soft weeds that are categorized as annual or shallow rooted. In the case of weeds like *Ageratum conyzoides*, *Cleome rutidosperma* and others, weeding may be accomplished by pulling. When it comes to fruit growing on dry ground, clearing is still the most straightforward and practical way. Height of the cut might be evaluated depending on the individual's abilities and the circumstances. Tripe high is achieved by keeping the weeds at a height of 20-30 cm. Low tripe, in addition to being carried out close or on the ground surface, is also understood to refer to the shallow stripping of a portion of the ground surface in the sense of low tripe. Hoes, cords, machetes, and semi-mechanics are some of the tools that are often employed in the field. The period for pruning is determined by the age of the plant being pruned. Plants grow and develop more quickly while they are young because the area between them is still open, allowing for weed growth and development. Weed management is thus required more often when the plants are young than when the plants are older.

Forks, hoes, and machetes are among the implements used. Weeds such as *Melastoma malabthricum*, *Chromolaena odorata*, *Clibadium surinamense*, *Themeda gigantea*, *Imperata cylindrica*, and *Sida rhombifolia*, among others, are a problem. Many weeds, such as *Mikania micrantha*, *Commelina nudiflora*, and *Richardia brasiliensis*, have creeping growth forms that need removal. These weeds include *Mikania micrantha*, *Commelina nudiflora*, and *Richardia brasiliensis*. Weeds that have been uprooted, trimmed, or pulled are then gathered in one location and either utilized as litter or mulch, or they may be burnt, depending on the situation. Fire should be kept at a safe distance from plants and the surrounding environment, and it should be closely watched.

### **Weeds on yam plants**

Weeds are plants whose growth is not desired in cassava plantations because they are detrimental (as a competitor plant) in obtaining nutrients, light or growing space. The negative impact of uncontrolled weeds is that they can inhibit growth and reduce tuber production. Weed disturbance in the first three months of growth can reduce cassava yield by 75%. The size of the decrease in cassava production due to the presence of weeds is very dependent on the type, nature and population of the weeds that grow. While the type of weed that grows and the level of density depends on the type of soil and climate, especially rainfall. Therefore, the presence of weeds varies greatly from one area to another.

Weeds that are often found in cassava plantations are annual weeds that have very fast growth and can produce seeds in a short time so it is quite difficult to control because some time after tillage and enough water, weed seeds will grow quickly.

### **The Main Type of Weed that Often Disturbs the Cultivation of Yam**

#### ***Eleusina Indica L***

Skeleton grass is another term for this herb that is often used. This plant is a member of the grass family with strong fibrous roots and a crown that is typically near to the ground, like a plate. Height may exceed 80 cm, with ribbon-shaped leaves that sit alternately on the stem. Petals are smooth, broad, flat or folded, and range in width from 3-8 mm. Flowers in the form of an umbrella, light green or white in color, with 2-12 spikes that are upright to slightly horizontal in position.

Weeds have the ability to multiply quickly via seed. It is believed that each plant may generate between 50,000 and 135,000 seeds every season. In Indonesia, it has expanded to such an extent that it has become a potentially dangerous weed. In the lowlands, up to an elevation of 1,600 m above sea level (asl), in an open but not too dry or in a little sheltered location, this species of weed flourishes on irrigated land, although it may also grow on thick soil. Along the road. Weed control is accomplished with the use of pre-planting herbicides derived from urea products one week before to the planting of cassava, or through mechanical techniques, such as weeding before the weeds produce seeds.

#### ***Imperata cylindrical***

*Imperata cylindrical* is a weed that grows on dry terrain and has a high level of competitiveness. This plant, which has a year-round life cycle, can thrive in a variety of environments ranging from damp to dry, and it reproduces by seeds and lateral shoots. *Imperata cylindrical* is a weed that is drought resistant and has the ability to limit seed germination and early development in cultivated plants. It is found in tropical and subtropical areas. These weeds are able to thrive well under drought circumstances during the first month of cultivation, and they may significantly reduce the growth of the primary crop.

*Imperata cylindrica* is a form of weed that is very harmful to plantation crops because of the effects it has on the plants. It must be totally removed from the environment. These weeds must be handled in a timely manner in order for seasonal crop farming to provide the best results possible.

### ***Cynodon dactylon***

Grazing with underground rhizomes piercing the soil to a depth of 1 m or more, and there is even literature reporting it penetrating the soil to a depth of 2 m, it is an annual plant with stolon, and grazing with subterranean rhizomes. glabrous or hairy on the top surface of the lamina, which is tapered and waxy grayish-white on the underside. The midrib is long, smooth, hairy, or glabrous; the ligules are readily apparent as rings of white hairs around the circumference of the midrib. Flowers are arranged in bunches on the stem. The seeds are round and range in color from yellow to crimson. Temperatures over 24 degrees Celsius are ideal for the growth of the habitat. This particular kind of grass is drought resistant. It grows best in well-drained soil, although it can withstand floods for an extended period of time. Although it is tolerant of a broad range of soil pH, its ideal pH is more than 5.5. It is also tolerant of poor soil fertility, although it is not tolerant of shade. *Cynodo dactilon* is able to resist harsh environmental circumstances better than other species of grass because its seeds are tiny and it spreads swiftly, unlike other types of grass. It has the ability to live on barren soil and during dry seasons, and as a result, it has become an extremely damaging weed on agricultural and plantation land. As in the case of cassava growing land. Herbicides are used to control the weeds, and they may also be pulled out by hand.

### ***Cyperus rotundus* L. (Rotundus)**

This weed, which may be found in the highlands, is a vertically erect plant with tubers arranged in chains on the rhizome and can grow up to 0.7 m in height. Conditions ranging from dry to humid are suitable for growth. Has a rather high level of competitiveness. The life cycle of this plant is continuous throughout the year, with the tubers undergoing apical hibernation during the winter. This weed, which may be found growing at elevations of up to 1800 meters, thrives in full sun and is sensitive to shade. Sugar is one of the most harmful since tubers may live for many years without being harvested.

Weed control is accomplished by the removal of weeds or the use of herbicides. Cultivation with stale seedbed, flooding to limit development but not kill tubers, planting with an interrow system, and other methods of controlling bias are all effective methods.

### ***Cyperus difformis* L.**

This weed, which grows in clumps and erect in the lowlands, may grow up to 1 m in height and has a physical state similar to that of a grass. Land that is damp to humid may support the growth of this plant. It appears within 7 days and continues to appear regularly throughout the season. It has a somewhat high level of competitiveness and can be grown at elevations of up to 1400 meters. Growing conditions for this weed are ideal in broad sunlight since it germinates best in bright light settings. The mechanical removal of this plant and the use of herbicides are the most effective methods of controlling it. Earlier, constant flooding was used to maintain control over the agriculture.

### ***Fimbristylis dichotoma* L.**

This weed, which can be found in both the highlands and the lowlands, is a mystery weed plant with upright physical circumstances, life behaviors, and flower sizes that vary, and may grow up to 0.7 m high in the highlands and lowlands. It can grow on a variety of soil types, from dry

to moist, and it has a somewhat high competitiveness. The life cycle of this plant is continuous throughout the year. It reproduces by seeds and rhizomes and may reach a height of 2500 meters. Full light is ideal for growing this plant. This weed is a fairly diverse plant that grows better in drier soils than it does in wetter ones. Early inundation, manual weeding, tillage, and pesticide spraying are all used to manage weeds in this situation.

### ***Cleome viscosa L.***

This plant is a member of the broad-leaved weed family, which includes species such as Mamang, Enceng-enceng, Bobowan, and Tembeking, as well as others. Fast growth, growing erect to a height of 1.2 m, with hard stems and numerous branching branches. Compound leaves with 3-5 sections per petiole and a profusion of vivid yellow blooms. A plant's first flowering occurs when it is 3-4 weeks old. The fruit is in the shape of an elongated capsule about 6-10 cm in length. The life cycle might last up to three months in certain cases.

This weed can grow in both paddy fields and dry ground, and it thrives in light soils in particular. In addition to its rapid growth, this weed reproduces swiftly via seeds that are dispersed from broken pods and germinate shortly after being planted.

The most successful method of controlling this weed is to remove it before it flowers and produces seeds, followed by the use of pre-planting herbicides at the time of plowing, which is more effective than direct spraying on weeds that have already established. Paraquat, linuron, chlorthalipyr, and diuron were the herbicides that were utilized.

### ***Borreria alata (Aubl.) DC***

The shrub is upright and 5-75 cm high, with branches that typically branch from the bottom. Badgers and quadrangular stems are two of my favorite things. The leaves are quite thick, simple, entire, oval or oval-shaped in form, measuring 2-7.5x1.4 with short petioles. They are oval or oval-shaped in shape. Small, clustered flowers with bisexual characteristics are found in the axils of the leaves and are bisexual in nature.

In locations with a short dry season, on terrain that receives full sun or partial shade, along roadside embankments, or on steep riverbanks, this plant may be found. It may be found growing from the lowlands up to an elevation of 1600 meters above sea level. Although it prefers sandy soil, it may also thrive in less nutritious soil. Seeds are dispersed by the movement of water, which aids in the process of reproduction. On agricultural land, this plant is often the most prevalent weed.

This weed management is accomplished manually by plucking and burying the weeds firmly in the soil, and if required, the weeds are treated with the herbicides glyphosate and paraquat at intervals of 5 weeks.

### ***Physalis angulata L.***

*Physalis angulata*, which includes broadleaf weeds, grows erect to 1 m tall, with ribbed stems that are sharp-edged and hollow in the center. Each of the leaves has an oval form with a pointed end. Flowers in the armpits with tall stalks, five petals that are three-pointed and tapering, and a five-petal arrangement. The flower crown is shaped like a bell, with five light yellow grooves and dark yellow-brown stains on the inner neck. The flower crown has five grooves and is light yellow in color. Colored yellowish green, the fruit is surrounded by a bulging petal that is spherical with a pointed tip and bulging in the middle. In general, weed ii is less significant in cassava farming due to the fact that its population is constantly low. However, if it grows in close proximity to cassava stems, it will become a competitor due of

its rapid growth rate. Revocation is the most effective method of controlling this plant since the population is small and the weed is readily identified in the crop being controlled.

### ***Ageratum conyzoides L.***

*Ageratum conyzoides* is an erect-trunked plant that may grow to be more than 1 m tall. *Ageratum conyzoides* is a member of the Asteraceae family. Gilig stems that are branching, with one or several complex blooms at the end of each branch. The leaves are alternating or opposite, round or oval in shape to resemble a rhombus with tapering or blunt ends, and the margins of the leaves are jagged. The flowers are small and borne in clusters. Both leaf surfaces have a lot of hair on them.

This weed is widely found in wet agricultural and plantation grounds in the lowlands up to an elevation of 3000 m above sea level, and it is particularly prevalent in the lowlands. Plants bloom throughout the year and are capable of producing up to 40,000 seeds per plant, which are readily disseminated by the wind and water movement that surrounds them. If it is too late to manage this weed, the consequences are quite negative. Weed management is accomplished mechanically by pulling and burning. Uprooting should be completed prior to the formation of seeds and the dispersal of seeds.

### ***Euphorbia hirta L.***

With roots that are white or reddish brown in color, *Euphorbia hirta* is a terrestrial weed that may grow up to 60 cm tall and 60 cm wide. When the stems are chopped, they become berheta. The leaves are simple, paired, oval-shaped with a pointy apex, not grooved or divided, and the petiole is extremely short. The flowers are little and inconspicuous.

Flowers are spherical, located on branches, in the axils of leaves, and range in color from light green to brown in color. This weed exclusively reproduces by seed, with a maximum number of 3000 seeds per plant. It is transmitted either actively by ants or passively by fire. With full or slightly shadowed sunshine and the ability to thrive in a variety of soil types, the greatest percentages of seed germination are achieved. In landfills up to 2000 meters in elevation, *Euphorbia hirta* is a plant that thrives as a weed. Is an invasive sugar that has spread over the world. The most effective method of controlling *Euphorbia hirta* is to pick it out by hand, crossing it, or using a sickle. Other methods of management include the use of herbicides such as glyphosate, atrazine (2.4-3.2 kg/ha), and ametryn (2.4-3.2 kg/ha).

### ***Croton hirtus L.***

Perennial shrubs that grow erect to a height of 90 cm are used for this. The stems are generally branched and covered with stiff hairs, and the leaves are arranged in three circular circles, with 3-5 leaves on the bottom and an oval-rhoboite shape. The leaf edges are serrated and covered with hairy hairs on both surfaces, and the leaves are arranged in three circular circles. Flowers are often seen towards the end of a single-family residence. The female flowers, which are green in color, are found toward the bottom of the plant. The male flowers, which are found in the upper section of the plant, have five calyxes, five white corollas, and ten to eleven white stamens.

The seeds are 2.5-3 mm in length. This weed thrives in the lowlands up to an elevation of 700 meters above sea level, and prefers terrain that receives direct sunlight or is somewhat shielded from it. Dispersed seeds are responsible for its spread. In general, this plant is not very significant since its roots are shallow and it does not produce dense populations very often. Weeds are controlled mechanically by plucking them up and burying them. Uprooting should be done as soon as possible after the weed's seeds have begun to spread.

## Conclusion

Cassava output may be reduced by up to 75% if weeds are disturbed during the first three months of the crop's development. When weeds are present, the extent of the reduction in cassava output caused by their presence is highly reliant on the kind, nature, and number of the weeds that grow. While the kind of weed that grows and the density at which it grows are determined by the type of soil and climate, particularly rainfall, the degree of density is not. The presence of weeds varies dramatically depending on the geographical location. Annual weeds are the most common kind of weed discovered in cassava because they develop extremely quickly and generate seeds in a short period of time. Grasse weeds, mystery weeds, and broadleaf weeds are the three types of weeds that are often seen. *Eleusina indica* L., *Imperata cylindrical*, and *Cynodon dactylon* are examples of grass weeds that may be found in cassava. Puzzle weeds in cassava include *Cyperus rotundus* L., *Cyperus difformis* L., *Fimbristylis dichotoma* L., and *Cyperus difformis* L., among others. As for instances of broadleaf weeds in cassava, the following species are mentioned: *Cleome viscosa* L., *Borreria alata* (Aubl.) DC, *Physalis angulata* L., *Ageratum conyzoides* L., *Euphorbia hirta* L., *Croton hirtus* L., and *Croton hirtus* L. Weed management is often accomplished by mechanical techniques, such as pulling, submerging, or other similar methods. Uprooting should be done before the seeds of this plant begin to spread, and additional methods of management should include herbicide spraying.

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