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WEED FLORA OF CASSAVA IN FACULTY OF SCIENCE EDUCATION NAGONGERA CAMPUS GARDENS, TORORO DISTRICT EASTERN UGANDA

By

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Declaration

I Namasoko Jerald declares that the information in this report is my original work unless where reference has been cited. The work has never been submitted to any other institution for any award or publication.

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Approval

This work has been supervised and approved by;

Associate Professor Edward Andama.

Signature.....date.....22/10/2024

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Dedication

I dedicate this project to my parents Mr. Gibogi Albert and Mrs. Wanyenze Beatrice, for their financial support and whenever there was need to make the research possible and making me reach where I am now.

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Abstract

In Uganda as in other parts of Africa, the state of weeds in particular farming system is determined by the number of weeds present in the soil. Weeds act as secondary host for harmful insects and illnesses and hinder harvesting operations; by studying the weed flora present in cassava gardens farmers can identify the most problematic weed species and develop effective strategies to control them..Information on weeds of cassava in Nagongera is limited. The objective of this study was to establish the status of weed flora in selected cassava growing gardens and determine the population of both broad-leaved weed species and grass weed species. This study was conducted in April 2024 in Nagongera gardens in the faculty of science and Education, Nagongera sub county Tororo district Eastern Uganda. Weed densities were estimated from twelve quadrant samples taken systematically along diagonal transects, in 5 fields. Grass weed species were the most frequent averaging 55.01% of the entire weed species. four weed species predominated i.e. Commelina benghalensis, black jack, spear grass and couch grass. Data showing the relative frequencies of weeds was be analyzed using Genstat 14th Edition statistical package. Significant means were separated using least significant difference (Fisher's LSD) at 5% probability level. This should form the basis for selection of feasible and safe options for control of cassava weeds. Different management weed practices should be applied in order to control different weeds existing in cassava fields. 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.

CHAPTER 1 INTRODUCTION

1.1 Background

In Uganda, as in other parts of Africa and world, weeds are a major crop pest that multiply annually on every farm. For annual or perennial weed species that reproduce only by seed, weed seeds are an essential part of their life cycle(Mohler, Liebman, & Staver, 2001) . The state of weeds in a particular farming system is determined by the type and number of weed seeds present in the soil bank (Restuccia, Lombardo, & Mauromicale, 2019). When it comes to scarce resources like water, nutrients, and sunshine, weeds compete with farmed food crops(Patterson, 1995) (Oudhia, 2004). Additionally, weed infestations exacerbate existing health issues, act as a secondary host for harmful insects and illnesses, and hinder harvesting operations. Weeds increase the cost of production, reduce the market value of crops; and increase the risk of fire in perennial crops, plantation and forest reserves (Asbjornsen et al., 2014). Weeds grow more vigorously and regenerate more quickly because of the heat and high light intensity (Anwar et al., 2021). High humidity and high temperature that are characteristic of sub-Saharan Africa, favour rapid and excessive weed growth(Bàrberi, 2019). African soils contain 100 to 300 million buried weed seeds per hectare, of which a fraction germinate and emerge each year. Over 286 species of common weeds have been identified in crop fields in some West African countries (Rodenburg, Demont, Zwart, & Bastiaans, 2016).

1.2 Problem Statement

The nature of crop, cultural practices and cropping pattern/system, soil type, moisture availability, location and season have been reported to cause variation in the abundance or distribution of weed species that are found in a cropped field(Adesina, Akinyemiju, & Ola, 2012) . However, not much of these studies have been done in Nagongera. Since the importance of studying the weed flora in cassava gardens has been reported to facilitate formulation of an appropriate management strategy (Andersson, 2014), a clear knowledge about the existence of different weed flora under different cropping systems is therefore needed to gain a better understanding in postulating appropriate weed management strategy for Ugandan farmers and most importantly Tororo rural dwellers with not less than 80% of the rural populations engaging in crop production.

1.3 Objectives

To identify the major weeds in cassava fields

To determine the abundance and distribution of existing weed flora in cassava fields

To determine the population of both broad leaved and grass weed species

1.4 Hypothesis

$H_{0;}$ There is no significant difference between the broad leaved weeds and grass weeds

H_a; There is a significant difference between the abundance and distribution of weed flora cassava gardens.

1.5 Significance of the study.

Weeds and crops fight for the same resources, including sunlight, nutrients, and water. Farmers can improve crop output and quality by managing weeds more effectively by developing an understanding of the weed flora in a particular agricultural area. Weeds can negatively affect native plant species by outcompeting them for resources or changing the dynamics of the ecosystem. Ecologists can identify invasive species and create conservation strategies to preserve native biodiversity by researching the flora of weeds; Control of Pests and illnesses; Weeds can act as hosts for pests and illnesses that harm crops and natural ecosystems alike. Researchers can develop more efficient pest control techniques by better understanding the relationships between weeds, pests, and illnesses through the study of weed flora. (Brown, L., & Elliman, T. (2020). Environmental Impact: Weeds can have detrimental effects on soil health, water quality, and overall ecosystem balance. Studying weed flora allows scientists to assess the environmental impact of different weed species and implement measures to mitigate their negative effects.

Herbicide Resistance: Continuous study of weed flora is essential to monitor and detect cases of herbicide resistance in weeds. Understanding the mechanisms behind herbicide resistance can help researchers develop new herbicides or alternative weed control methods.

Phytosanitary Measures: Weed flora studies are crucial for implementing Phytosanitary measures to prevent the introduction and spread of invasive weed species that can have devastating effects on agriculture and natural habitats.

1.5 Justification

Competitive pressure, weeds compete with cassava plants for essential resources such as water, nutrients, and sunlight. They can significantly reduce the growth and yield of cassava if not properly managed. By studying the weed flora present in cassava gardens, farmers can identify the most problematic weed species and develop effective strategies to control them; Pest and Disease Hosts: Weeds can serve as hosts for pests and diseases that can affect cassava plants. By studying the weed flora, farmers can identify potential reservoirs of pests and diseases and take preventive measures to reduce their impact on the cassava crop; Impact on Soil Health: Certain weed species can have detrimental effects on soil health by altering its pH, nutrient content, and microbial activity.; Herbicide Resistance: Continuous use of herbicides to control weeds in cassava gardens can lead to the development of herbicide-resistant weed populations. Studying the weed flora helps in monitoring herbicide resistance levels and devising integrated weed management strategies to prevent or manage resistance issues effectively (Brown, L., & Elliman, T. (2020)).

CHAPTER 2 LITERATURE REVIEW

In the plant world, weeds are plants that are unwelcome by people because they may interfere with the development of the primary plant(Harlan & deWet, 1965). 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 on 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(Rana & Rana, 2016). 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 (Mabey, 2010)

Weeds compete with cultivated food crops for limited resources such as water, nutrients and light(Kaur, Kaur, & Chauhan, 2018) . Weeds infestation also encourage disease problems, serve as alternate host for deleterious insects and diseases, slow down harvesting operation, increase the cost of production, reduce the market value of crops and increase the risk of fire in perennial crops, plantation and forest reserves(Nambiar, 2021) . As in most plants, weed seeds is very vital in the life cycle of annual or perennial weed species that reproduces through seed alone(Mohler et al., 2001) . Thus the quality and quantity of weed seeds in the soil bank determines the weed situation in a given farm land. Weed seed bank has been described as the reservoir of viable weed seeds that are present on the soil surface and scattered in the soil profile (Hossain & Begum, 2015). Furthermore, it can also be defined as the place where weed seeds remain until germination. Weed seed banks are actually the sole source of future weed populations.

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(Asbjornsen et al., 2014). The grass weed is the most common form of weed found in annual and perennial crops. Puzzle weeds, such as (Cyprus 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 puzzle weeds may be found in plenty (fruit plants)(Harlan & deWet, 1965). 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 (Friday Ekeleme et al., 2021). 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 nut sedges. 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(Anwar et al., 2021). 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, Cleomerutidosperma* and others, weeding may be accomplished by pulling The nature of crop, cultural practices and cropping pattern/system, soil type, moisture availability, location and season have been reported to cause variation in the abundance or distribution of weed species that are found in a cropped field(Amponsah, 2017). However, not much of these studies have been done in Nigeria. Since the importance of studying the weed dynamics in a cropping system has been reported to facilitate formulation of an appropriate management strategy(Andersson, 2014) , a clear knowledge about the existence of weed seed bank and different weed flora under different cropping systems is therefore needed to gain a better understanding in postulating appropriate weed management strategy for African farmers and most importantly Nigerian rural dwellers with not less than 80% of the rural populations engaging in crop production(A Melifonwu et al., 2000).

Enviroments where cassava is growing tend to be dominated by perennial weed species such as *Digitaria abyssinica* (African couch grass), *Imperata cylindrica* (Spear grass), *Commelina benghalensis* (Wandering Jew*), Panicum maximum* (Guinea grass) and *Ageratum conyzoides* (Goat weed or White weed or Chick weed), predominated the study areas. *(Farms, 2000)*

Weeds are plants growing where they are not wanted. Many different types of weeds (for example, Spear grass, *Imperata cylindrica* , Siam weed and *Chromolaena odorat* occur in cassava farms and cause considerable losses to the farmer. This is because weeds compete with the cassava crop for nutrients, sunlight, and space. Weeds may harbor pests and diseases or physically injure cassava plants and storage roots(James et al., 2000). Weeds may also harbor natural enemies that control pests, so certain weeds can be left on cassava farms, provided they are not many enough to compete with the crop(James et al., 2000). For these reasons close attention should be paid to weed control in the farmer's effort to grow a healthy crop and obtain high yields of cassava(A Melifonwu et al., 2000).

Weeds occurring in cassava farms can be put into three main groups, namely, grasses, sedges, and broadleaf weeds(AA Melifonwu, 1994).

Sedges: Sedges resemble grasses but are always erect and usually have solid and triangular shaped stems(Brown & Elliman, 2020). The common sedges which cause problems in cassava farms are *Mariscus alternifolius* , and purple nut sedge, *Cyperus rotundus(Farms, 2000)*

Grasses: Grasses are usually slender, erect, or creeping plants. Their stems can be oval or cylindrical in shape. The leaves of grasses are much longer than they are broad and are never subdivided into little leaves (leaflets). Grass weeds which are commonly found in cassava farms include spear grass, *Imperata cylindrica*; bermuda grass, *Cynodon dactylon; guinea grass Panicum maximum; and the feathery pennisetum, Pennisetum polystachion(A Melifonwu et al., 2000).*

Broadleaf weeds: Broadleaf weeds are herbs, creepers, climbers, and shrubs whose stems are solid and irregular in shape(Rogers, 2020). Their leaves are broad, expanded, and single or subdivided into leaflets to form compound leaves. Broadleaf weeds which are commonly found in cassava farms include Siam weed, *Chromolaena odorata*; wild poinsettia, *Euphorbia heterophylla*; giant sensitive weed, *Mimosa invisa, Tridax procumbens,*; goat weed, *Ageratum conyzoides*; waterleaf, *Talinum triangulare;* and tropical spiderwort, *Commelina benghalensis(A Melifonwu et al., 2000)*

Cassava is cultivated by small holder farmers who do not have enough information on cultivation practices. It is well known that poor weeding reduces root yield(Droppelmann et al., 2018).

Environments where cassava is growing tend to be dominated by perennial weed species such as *Imperata cylindrica, Chromolaena odorata, Panicum maximum, Cyperus rotundus,* and *Mimosa invisa*, which have been reported to constitute problems in the crop(Quee, 2015)

Weed infestation on cassava farms is a major factor contributing to low crop yield and inflicts untold hardship on smallholder farmers due to numerous hoe weedings during the season requiring family or paid labor(F Ekeleme et al., 2019). Hoe weeding requires 50 to 80% of the total labor budget in production and as many as 200 to 500 hours of labor ha^{-1}, mostly done by women and children, to prevent economic root losses(Amponsah, 2017)

Full-season weed competition from *I. cylindrica* and *Tithonia diversifolia* can cause root yield reduction of 70 - 80% depending on the cropping system (i.e. intercrop, monocrop) and cultivar grown (F Ekeleme et al., 2019)

CHAPTER THREE: METHODS AND METHODOLOGY

3.1. Study area

The was conducted in Nagongera gardens in Nagongera sub county, West Budama county, Tororo district

3.2. Materials

The materials to be used were; tape measure, plastic rope, Global positioning system (GPS), note book, pen, telephone, camera and compass

3.3. Field methods

The research was conducted in Faculty of science education, Nagongera campus gardens. Sampling sites were selected selected randomly. Weed densities were estimated from quadrant of 1mx1m with 5 samples taken randomly and systematically along a diagonal transects in each cassava field.

12 quadrant samples shall be taken per acre and the area surveyed shall be 5 acres.

A total of 10 fields with field sizes of 0.5 acres were considered in this study.

Total number of weed species were recorded, broad leaved and grass weed were separately counted per quadrat.

Common names of different weeds were obtained from the community and weed album and recorded with their respective numbers.

Data showing the relative frequencies of weeds were analyzed using Genstat 14th Edition statistical package. Significant means were separated using least significant difference (Fisher's LSD) at 5% probability level.

CHAPTER FOUR: RESULTS AND DISCUSSION

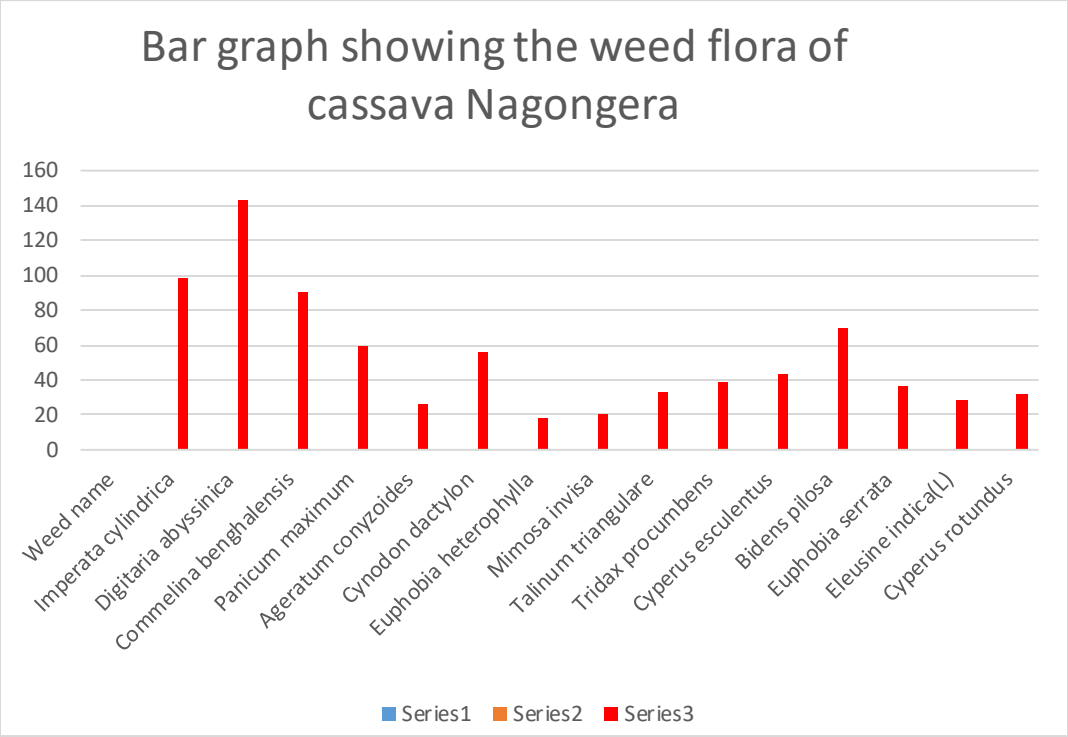

Figure 1: A graph showing a population of different weed species.

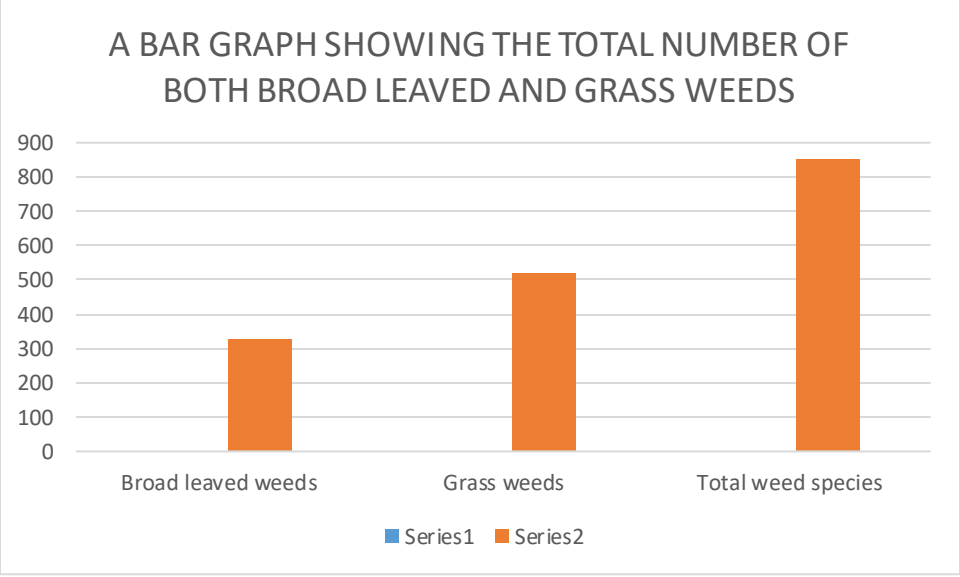

Figure 2: A graph showing the population of grass and broad leaved weeds in comparison with the total number

Discussion

Grass weed species were dominant in the all entire study area averaging 55.01% of the species recorded, the rest 45% were broad-leafed species figure 2. These results could be due to the fact that the land had been uncultivated for some time before the experiment and the grass weed population were released on to the soil without any human interference.

In addition, this could be as a result of cassava architecture and canopy (spreading cassava variety effect which might have provided a more favorable environment to grass weeds than broad-leaved species thus high frequencies of weed grass weeds (Adesina et al 2012)

On the contrary similar studies conducted in south western Nigeria, Onochie (1975) observed that annual weeds especially broad-leaved ones were common in cassava fields.

Four weed species dominated the study area ie spear grass, couch grass, Commelina and black jack.

The population of couch grass was the highest with 17% and it dominated the all cassava gardens because the gardens had stayed for some time before the experiment was conducted and also the leaves of cassava form a canopy that prevents the light

from reaching the other weeds hence their small numbers. Some of the factors that make weeds more successful include the following;

Weeds are more aggressive feeders than crops therefore are able to out compete the crops.

They produce a lot of seeds that ensure their survival always.

Weeds also have a faster rate of growth than normal plants, therefore, they are able to complete their lifecycle within a short time.

Weed seeds undergo dormancy that enables them to germinate at the right time and grow.

They are more resistant to crop pests and diseases than the crops.

Some weeds have perenating organs that can sprout and grow into new plants.

Weeds also have efficiently diverse dispersal mechanism e g the fruits and seeds that can be dispersed by wind, water or animal and self.

Most of the weed plants are not palatable livestock than the crop plants and therefore cannot be grazed upon or destroyed.

Some have protective structures that protect them from being destroyed by animals eg torn apple.

Some weeds produce toxic substances that exclude other plants from growing around them.

Some are resistant to herbicides so cannot die when sprayed.

CHAPTER FIVE: RECOMMENDATION AND CONCLUSION

CONCLUSION

This should form the basis for selection of feasible and safe options for control of cassava weeds 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 *Cyprus 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 and Euphorbia hirta L.*, and Commelina benghalensis

RECOMMENDATION

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.

More research should be conducted in order to find out more information about the weed flora of cassava and the effect of weeds on cassava yields

6.2 APPENDIX

Table 1: showing the population of different weed species

Weed name	population

Imperata cylindrica	98
Digitaria abyssinica	143
Commelina benghalensis	90
Panicum maximum	60
Ageratum conyzoides	26
Cynodon dactylon	56
Euphobia heterophylla	18
Mimosa invisa	21
Talinum triangulare	33
Tridax procumbens	39
Cyperus esculentus	43
Bidens pilosa	70
Euphobia serrata	37
Eleusine indica(L)	29
Cyperus rotundus	32

Table2: Showing the population of grass weeds and broad-leaved weeds in comparison with their total.

Broad leaved weeds		325

Grass weeds		520
Total weed species		850

PHOTOS

Figure 1: showing the demarcation of the first acre of cassava garden

Figure 2 : **showing the demarcation of the second acre of cassava garden**

Figure 3: demarcation of the fourth acre

Figure 4: showing demarcation of the fifth acre

Figure7: Demarcation of the sixth acre of land

Figure 8;**showing the closure of demarcation**

Figure 9: showing counting of weeds in cassava garden

Figure 10; showing the counting of weeds

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