**EFFECT OF COW DUNG APPLICATION RATE ON THE GROWTH OF ROSELLE (*Hibiscus sabdarriffa* L.) IN MUBI NORTH LOCAL GOVERNMENT AREA OF ADAMAWA STATE NIGERIA**

# COVER PAGE

**BY**

**YUSUF HUSSEINI**

**(SA/CP/HND/21/002)**

**SEPTEMBER, 2023**

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# TITLE PAGE

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**BEING A PROJECT SUBMITTED TO THE DEPARTMENT OF AGRICULTURAL TECHNOLOGY FEDERAL POLYTECHNIC, MUBI IN PARTIAL FULFILMENT OF THE REQUIRMENTS FOR THE AWARD OF HIGHER NATIONAL DIPLOMA IN CROP PRODUCTION**

**SEPTEMBER, 2023**

# DECLARATION

I hereby declare that this work which is titled “Effect of Application Rate on the Growth of Roselle(*Hibiscus sabdariffa L.*)in Mubi North Local Government Area of Adamawa state”. As a result of research effort and findings and to the best of my knowledge and belief that this work has never been submitted to any institution for the award of any certificate and various sources used has been duly acknowledged by the use of referencing.

…………..…………......................... ……..………….....

YUSUF HUSSEINI Date

# DEDICATION

This project work is dedicated to Allah (SWA) for His protection and strength to carry out this work successfully. And to my lovely father Husseini Suleiman for his support through out my studies. And my elder brother, Shaibu Husseini for his financial assistance and finally to Maryam Mammadi for her assistance to carry out this project work successfully.

# APPROVAL PAGE

This is to certify that this project was carried out by Yusuf Husseini SA/CP/HND/21/002 of the Department of Agricultural Technology, Federal Polytechnic, Mubi, Adamawa State under the supervision of:

…………..…………..... ……..………….....

Mr. Ijabula Simon Date

(Supervisor)

…………..…………..... ……..………….....

Dr. Musa Benjamin Vimtim Date

(Head of Department)

…………..…………..... ……..………….....

External Examiner Date

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# ABSTRACT

*This experiment was conducted at the Department of Agricultural Technology, Federal Polytechnic, Mubi Students Demonstration Farm to determine the effects of different rate of cow-dung application on the growth of roselle in Mubi North Local Government Area, Adamawa State. A Randomised Complete Block Design (RCBD) was used which consist four treatments (20kg, 15kg, 10kg and 0kg) of cow-dung replicated four times. Parameters measured include: germination count, establishment count, plant height and number of leaves. The data collected were analysed using Analysis of Variance (ANOVA). The result of the experiment shows that there were significant differences among the treatments with respect to establishment count, plant height, and number of leaves in treatment A (20kg). it was observed that the treatment A (2okg) had the highest performance. It can be concluded that using cow-dung at the rate of 5 tones/ha is the best.*

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# CHAPTER ONE

# INTRODUCTION

## 1.1 Background of the Study

Roselle (*Hibiscus sabadariffa L.)* belongs to the family of *Malvaceae*. It is native to india and Malaysia where it is commonly cultivated and must have been carried at an early date of afnila (Babajide *et al.,* 2016). It grown mainly in the northern and Sudan savannah and to a limited extent in its southern Guinean and derived savannah zone of Nigeria. Prior to this. (source or reference) the seed contain 17.8-21%non- edible oil) 20% protein, and are sometimes used for animal feed. Roselle is a flexible plant with a number of uses. It is intercropped with the staples such as sorghum and sesame, or planted along filed margins. It requires little care. it leaves, seeds, and capsules and stems are used in traditional medicines (Mohammed, 2012).

Confirmed that is cultivation has been predominantly in the north-east area north-western part of Nigeria Roselle tolerates a warm and humid tropical claimant and is susceptible to damage by frost and fog. Aliyu and Tanimu (2015) Report that in traditional set up, Roselle is cultivated for its leaves, stem, seed and clay they also found out that the read calyx is locally called Sobo, is use as refreshing drink and for medical preparation.

Roselle required a monthly rainfall, ranging from 12.725 4mm for the first three month of growth dry period are described in the last period of growth high rainfall and high humidity during the harvest time can reduce calyx yield.

Roselle has different vernacular name which include roselle, sorrel reduce sorrel, sour- sour lemon bush and indicant sorrel (Morton, 2013). Stassen 2015 report that. Roselle is now considered one of the competitive beverages in the world with increasing public concern about the safety colorants.

Nature pigment are assuming greater prominence and roselle could be good source of natural food colorant (Babajide *et al* 2016).

In Nigeria it production are mainly in the Guinea savannah, and sudan savannah zone of the country where the red calyx genotypes are prevalent and the green calyx types is mainly found in the southern and western part of country (Adegbejo, 2017)

Nationality, the calyx are reporter by F. A. O. (2017) to have significant quantities of vitamin A, C and phosphorus, iron calcium, but how in proton. The young leaves are also known to be rich in digestible protein and the oil content of roselle seed many vary from 25 to 30 and that is has similar properties with cotton seed oil.

## 1.2 Problem of the Study

The prevailing production practice for roselle are basically traditionally. This has attracted less attention from the roselle produces in Mubi due to high price of fertilizer and other agricultural input. Improving the productivity of roselle can be enhance with adoption of management practices that would be of great assistance to the subsistence farmers who form the bulk of produces within the zone.

## 1.3 Objective of the Study

The objective of this study is to determine

(i.) effect of cow dung application rate on growth of roselle, and

(ii.) optimum level of cow dung for the production of roselle in Mubi Adamawa State.

## 1.4 Justification of the Study

This study is to identify the effect of different level of cow dung application rate on the growth of roselle in Mubi North Area. There is need for greater productivity.

## 1.5 Scope of the Study

This study will be cantered on the cow- dung application rate on the growth of roselle in Mubi North L.G. A, Adamawa State. in order to recommend to the best application rate in

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Origin and Distribution of Roselle

Roselle (*Hibiscus Sabdariffa l*.) is a native to the world tropics probably in the area indices, Hibiscus Sabdariffa is extensively cultivated in tropical Africa, Asia, Australia and Central America (Sehipers, 2018). It is cultivated for its fibear and edible calyx (Facciola, 2015). Roselle has been cultivated in Asia for over 300 years but now cultivated in many countries of the world (Tindal, 2011). Morton (2017) reported that Roselle calyx where being shipped to Germany, France, spread in the savannah region of Nigeria where it is cultivated. Doughari and Alabi (2018) reported that Roselle also known as Jamaican sorrel is probably a native of west Africa, cultivated throughout in India and part of Asia for centuries.

## 2.2 Botanical Description

Roselle is an annual shrub which belongs to the family Malvacea, which grows up to 2 meters high with pale green leaves of various lengths, ranging from 5-12cm, the flowers are yellowish with dark red pigmentation at the centre. The fruit is about 2.5cm in brown seed. Roselle is an upright branched annual plant reaching a height of 1-2.5 depending on the varieties are many-branched, bushy, and generally 1-2m tall. Stems may be green or red, depending on the seed source. Roselle has a strong taproot. The young plants have leaves that are unlobed, but as the plant grows the later-developing leaves are shallowly to deeply plamate, 3-or 5- parted (sometimes suffused with pink or red) and a dark red eye (Porter, 2017).

The leaves of roselle is tender and succulent which are added to (Babatunde, 2016). Two varieties are known and are recognized:

1. *Hibiscus Sabdariffa* variety attissi unbranched part 3.05- 4.9 meter high spring and inedible calyces, grow for the purpose of fibers.
2. *Hibiscus Sebdariffa* is a busy branched shrub with red or green stem as yellow or red inflated edible calyces.

*Hibiscus Sabdariffa* belong to the kingdom – plantea, division main plyta, class magnopsida, or dear Malvaceae family Malvaceae, genus high spacies Sabdariffa.

## 2.3 Economic Importance

Roselle is a multi-medicinal vegetable, which is embedded with number nutritional potentials medicinal and ornamental properties in terms of neutral values, roselle had been found to be a good source of protein (Moharmmed, 2013). Gibbon and Pain (2017) reported that, the red calyxes surrounding fruit are used to brew non-alocholic drink and also coloring reagent for jells beverages and food. The leaves of roselle are eaten as vegetable while the are used as feed mainly for fish and domestic animals (Muktar, 2022).

## 2.4 Soil and Environmental Requirement

The plant is cultivated on large types of soil ranging from sandy to heavy clay soil how, a well-drained loamy soil with good quality of organic matter is idea for growing the crops, roselle are also draught resistant and tolerant of high temperature. (30 c 35 c) make it a particular suitable crop for hot day climates in tropical and subtropical area (Roman, 2018).

## 2.5 Fertilizer Recommendation

Roselle generally require federalizer to improve growth, performance and yield. Yayock and Lombin (2013) show that nitrogen promote vegetative growth and impact the characteristic green colour to foliage because it is component of chlorophyll which is essential for photosynthesis small and Rhoden (2013) observed as increase in dry matter production of roselle. Application of stable manure on commercial fertilizer are beneficial to the overall performance of roselle.

## 2.6 Cow Dung

Cow dung also known as cow dung, is the waster product of bovine animals species include domestic cattle (cows). Cow dung is basically made up of digest set grass and grain. Cow dung is high in organic material and rice in nutrients. It contain about 3 percent nitrogen , 2 percent phosphorous and I percent potassium (3:2:1- N:P:K) in addition cow manure contain high level ainmonia and potentially dangerous pathogens. For this reason, it usually recommended that it can be aged or composted prior to it use as cow manure fertilizer. Adams (2012), report that the use of cow dung in the garden is a popular practice in many rural areas. This type of manure is not as rich in nitrogen as many other types, however, the high ammoia level can burn plant when the fresh manure is directly applied.

## 2.7 Beneficial Effect of Cow Dung

Cow dung is important in helping to improve the structure of soil (aggregation). Animal manure has been using for centuries as a fertilizer in farming, improving the soil structure so that it hold more nutrient, water and become more fertile. Cow manure it is equally important to soil , cow manure is compose of grasses and grains , containing about 3 percent nitrogen, 2 percent phosphorus and 1 percent potassium. Nitrogen promote soil Micro bite which add to soil fertility. As the soil mixed with the composted manure, nutrients are slowly released. Cow manure in compost increase carbon which is an important energy source that stabilizes nutrients making them available to plant in the soil (Adams, 2012).

## 2.8 Deleterious Effect of Cow Dung

Cow dung however has several disadvantages (other than its unholy smell). Cow dung carry risks of pathogens such as E.coil, consequently some farmer compost cow dung ( for any animal manure for that matter) firs to kill of pathogens as well as to make the nutrients in the manure more available to plant.

Cow dung is applied to an area for future use as sheet compost. Dug nitro garden and allowed age for at least 7 days composted in a conventional common heat. Broadcasting method evenly over plant spade or otherwise work. Into soil, preferable, at least 30 days before planting (Adams, 2012).

# CHAPTER THREE

# MATERIAL AND METHODS

## 3.1 EXPERIMENTAL SITES

The research was conduct at the student demonstration farm of Agricultural Technology Department Federal Polytechnic Mubi.

Mubi is one of promotion town in Adamawa north Senterd Nigerian. Record point out the fact that Mubi town come into existence in 18 th century and was founded by the Fulani Jihad broke out that Mubi on more remained a part of jurisdiction of Sultan of Mandara, Mubi is located on the western bank of the river yadzeram. The river flows north in lake chad to the Mandara mountains situated to the east of the city Mubi. Mubi was formally a part of northern Cameroons. However, the citizen of the city vote that the Mubi region should be part of the independent federation of Nigeria in 2000 (Ngwaboso & Ugangu, 2013).

Mubi lies between latitude 92, 60 and 10, 10n and between longitude 13 and , 44E. it is a belt by Mandara mountains ranges to it eastern side Michika local Government Area to Mubi North, Hong Local Government Area to the west (Ngwaboso & Ugangu, 2013). The area has a population estimate of 759,045 at a density of 1605 person per square kilometre and a land Area of 506.40 square kilometre characterized by undulating topography, Mubi has tropical wet and dry climate with dry season lasting between November and march while The wet season Start spans between April and October each year. The mean annual rainfall usually ranges from 700mm to 1050mm (Adebayo, 2014). Abrable crop production and animal rearing constitute one of the primary occupations of the people. Vegetation is basically of Sudan savannah, implying grass and with scattered shrubs and trees among other (Adebayo, 2014; Tewa & Usman, 2016). The most dominant physical features in area. The Madara mountain which initiates run off generation facilitated by the area undulating topography.

## 3.2 Land Preparation and Planting

The land area for trail been ploughed, harrowed and level in order to obtain a fine soil tilth. After the land preparation and demarcation of plot, 0kg, 10kg, 15kg, and 20kg of cow dung will be applied on the soil 7 days before sowing by through mixing with soil to achieve homogeneity. Four to six seeds will be sown at 50em x 60em intra row spacing as recommendation by Babatunde (2016). Fourteen days after emergence of the seeds, the seeding will be thinned to two plant per stand.

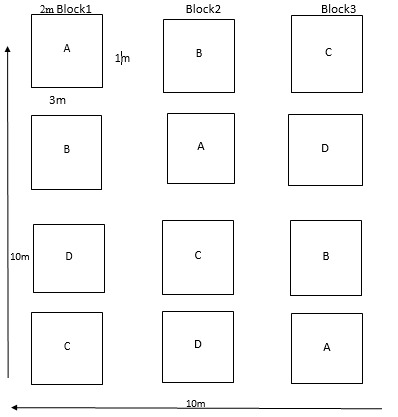
## 3.3 Experimental Design

Four treatment replicated four time has been use in experiment. Chosen experimental design is randomized complete block Design (RCBD) were randomization will be restricted only on block, in which every treatment has be replicated once in a block.

The four treatment are okg , 10, 15, and 20 ( A, B, C , D) Of cow dung incorporate into the soil.

## 3.4 The Plot Size

The experimental plot size was demarcated 2.0m X3.0m with a 12 plots samples each with 3 blocks. These were replicated three time in a R.C.B.D with 1m discard row separating each of them as shown in the picture below.



1m

Keys fig. experimental layout showing Randomization of treatment

A=20kg of cow dung

B=10kg of cow dung

C= 15kg of cow dung

D= 0kg of cow dung (control point)

## 3. 5 Data Sampling Techniques

The data were collected on the following agronomical characteristic of roselle

### 3. 5.1 Germination Count (CM)

This has been by counting the number of plats that germinate at two weeks after sowing.

### 3.5.2 Establishment Counts

This was conducted by counting the total number of plant/ holes in sub-plots at 2 weeks after sowing (2WAS)

### 3.5.3 Plant Height

The height of the 8 plant were selected randomly within each net plant plot and measured at 3/5 at 6 weeks after sowing (6WAS). Meter rule has been used to take an average and the mean height of the plants.

### 3.5.4 Number of Leaves.

This were done by counting number of leafs of 6 plant selected randomly at 4 weeks after sowing (4WAS)

### 3.5.5 Data Analysis

The data collected was subjected to the analysis of variance (ANOVA), at least significant difference (LSD).

# CHAPTER FOUR

# RESULTS AND DISCUSSION

The result of the effect of cow-dung application rate on the growth of Rosella is presented in Table 1.

The result shows that there was significant difference at (P<0.05) in all parameters measured, except for germination count where there was no significant difference at (P<0.05) among the treatments.

As for germination count, the result shows that there was no significant difference at (P<0.05) but treatment ‘A’ had the highest meat. This is because the treatment consists 20kg of cow-dung.

As for establishment count, the results show that there was high significant difference at (P<0.05) and treatment "A" has the highest mean. This is because the treatment consists 20kg of cow-dung.

As for plant height, the result shows that there was significant difference at (P<0.05) and also treatment "A" has the highest mean. This is because the treatment consists of 20kg of cow-dung.

As for number of leaves the result shows that there was significant difference at (P<0.05) and also treatment "A" had the highest mean this is because the treatment consist 20kg.

## 4.1 Results

Table 1: Means showing the effect of different rate of cow-dung application on the growth of roselle.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Treatment** | **Germination count** | **Establishment count** | **Plant height** | **Number of leaves per plant** |
| 20kg | 18.5 | 13a | 28.85775a | 7.41 |
| 15kg | 17.75 | 11b | 28.2135a | 7.25 |
| 10kg | 17.5 | 9.25a | 23.7701ab | 7.69 |
| 0kg | 17.5 | 6b | 22.7612b | 7.41 |
| LSD | - | 1.73 | 4.75 | 3.84 |
| Significance | NS | \*\* | \* | \* |

Mean bearing the same letters are statistically not significant

Key:

\*\* Highly Significant

\* Significant

LSD Lest Significant Difference

NS Not Significant

## 4.2 Discussion

From the vents presented, there was significant difference at 5% level of significance, except in germination shows not significant difference among the four treatment.

The germination count shows that the treatment A (20kg) has the highest germination count, then followed by treatment B (15kg), C (10kg) and treatment D (0kg) which is the control). Though there was no significant difference at 5% level of significance.

The establishment count shows that the treatment A (20kg) has the highest establishment count then followed by treatment B, C and D. Though there was significant difference at 5% level of significance.

The plant height shows that treatment A has the highest plant height then followed by treatment B, C and D.

The number of leaves shows that treatment A has the highest numbers of leaves then followed by treatment B, C and D. Though there was no significant difference at 5% level of significant.

This finding therefore indicated that applying cow-dung at the rate of 5 tons/h enables the roselle to grow faster and be well established than when left to grow naturally.

# CHAPTER FIVE.

# SUMMARY, CONCLUSION AND RECOMMENDATION

## 5.1 Summary

This research work was intended to determine the effect of cow-dung application rate on the growth of roselle (*Hibiscus sabdariffa* L.) in Mubi North Local Government, Area, Adamawa State It was a field experiment laid in a Randomized Complete Block Design (RCBD) with four (4) treatments (20kg 15kg, 10kg, and 0kg) of cow-dung replicated four times. In order to achieve the objectives of this study data were collected four times at 2WAS, 4WAS, 6WAS and 8WAS on different parameters which include germination count, establishment count, plant height, and number of leaves. The data collected was subjected to the Analysis of Variance (ANOVA).

The results of this research show that in all the parameters measured only germination count was found to be not significant whereas all the remaining parameters were significant at (P<0.05). The result further included that establishment count was found to be highly significant.

## 5.2 Conclusion

Based on the result obtained from the experiment, it may be concluded that the application of cow-dung at the rate of 5 tones/ha is the most optimum and cheapest in improving the growth of roselle in Mubi North Local Government Area, Adamawa State.

## 5.3 Recommendations

Cow-dung application at the rate of 5 tones/h is recommended from the research to be cheapest, simplest and optimum rate to apply among others, because it is the rate that gave the best result followed by others. Therefore, farmers could adopt the use of cow-dung as fertilizer at the rate of 5 tones/h in order to obtain best growing ability of roselle.

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# APPENDIX

**APPENDIX I: ANOVA Table for Germination Counts**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **SS** | **MS** | **Calculated f.** | **Table** |
| Rep(r-1) | 3 | 12.69 | 4.23 |  | 5% |
| Trt(t-1) | 3 | 2.69 | 0.90 | 0.19NS | 3.86 |
| Error(r-1)(t-1) | 9 | 43.06 | 4.78 |  |  |

**APPENDIX II: ANOVA Table for Establishment Counts**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **SS** | **MS** | **Calculated f.** | **Table** |
| Rep(r-1) | 3 | 2.2 | 7.33 |  | 5% |
| Trt(t-1) | 3 | 105.69 | 35.23 | 30.05\*\* | 3.86 |
| Error(r-1)(t-1) | 9 | 10.55 | 1.172 |  |  |

**APPENDIX III: ANOVA Table for Plant Height**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **SS** | **MS** | **Calculated f.** | **Table** |
| Rep(r-1) | 3 | 3.056 | 1.018 |  | 5% |
| Trt(t-1) | 3 | 113.964 | 37.988 | 4.29\* | 3.86 |
| Error(r-1)(t-1) | 9 | 7.9624 | 8.847 |  |  |

**APPENDIX IV: ANOVA Table for Number of Leaves**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **SS** | **MS** | **Calculated f.** | **Table** |
| Rep(r-1) | 3 | 2.81725 | 0.939 |  | 5% |
| Trt(t-1) | 3 | 2.3485 | 7.828 | 6.03\* | 3.86 |
| Error(r-1)(t-1) | 9 | 3.8945 | 4.327 |  |  |