BINDURA UNIVERSITY OF SCIENCE EDUCATION

DEPARTMENT OF CROP SCIENCE

EFFECTS OF POULTRY MANURE APPLICATION RATES ON GROWTH AND YIELD OF CUCUMBER VARIETIES.

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A DESSETATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE BACHELOR OF SCIENCE HONOURS DEGREE IN CROP SCIENCE.

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DEDICATION

I dedicate this work with love and gratitude to my caring parents who are responsible for all my academic requirements.

DECLARATION

I Tinashe Mutata declares that this research project is a result of my original work and has not been presented somewhere for any degree or any institute. All other supplementary sources of information have been acknowledged by means of references.

CERTIFICATION OF THE DISSERTATION

Bindura University of Science Education

Department of Crop Science

The undersigned certify that they have read and recommend to the Bindura University to accept a dissertation entitled: Effects Of Poultry Manure Application Rates On Growth And Yield Of Cucumber Varieties.

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In partial fulfilment of the requirements for the Bachelor of Science Honors Degree in Agriculture.

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ABSTRACT

Cucumbers are very important, since it contain high nutritional, medicinal as well as health beneficial values. Information on optimum poultry manure rates is very important in the correction of soil nutrient deficiencies for cucumber production. A field trial to study the effect of poultry manure rates (0, 10, 20, 30t/ ha) on the growth and yield of cucumber (Cucumis sativus L.) varieties (Pointset and Ashley) was conducted at Morioto Farm, Matepatepa Bindura, Mashonaland Central. The experiment was carried out in randomized complete block design (RCBD) with three replications. It was a 2 x 4 factor experiment, the first was poultry manure rates and the second factor was varieties. Both factors showed significant variations in growth and yield parameters. The parameters measured were vine length, number of leaves per plant, number of fruits at 30 and 60 days and weight of each fruit. Significantly maximum vine length at 30 days was (87cm) and (193cm) at 60 days, numbers of leaves plant per plant at 30 days (46) and (83) at 60 days, number of fruits per plant at 30 days (4) and at 60 days (14), fruit weight (200 g) were obtained in plants supplied with poultry manure at a rate of 30 t/ha. The research data collected was subjected to Analysis of Varience (ANOVA) using Gen STAT software. The treatment-variety interactions were not significantly different in all parameters except on number of leaves. Pointset performed best in all parameters. The poultry manure rate of 30t/ha to Pointset variety induced high growth and yield. Pointset can be commercially cultivated with the application of poultry manure rate of 30t/ha for high growth and yield in Matepatepa, Bindura.

Key words: Poultry manure, cucumber, growth and yield

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF AGRONYMS AND ABBREVIATIONS

t/ha………………………………… tones per hectare
ANOVA…………………………… Analysis of Variances
LSD…………………………………Least Significance Difference
P<0.05……………………………… Probability less than 5%
FAOSTAT………………………… Food and Agricultural Organization Statistics

CHAPTER ONE

1.0 Introduction

1.1 Background

Since more than 3,000 years ago, people have been cultivating the annual crop cucumber (Cucumis sativus), which belongs to the Cucurbitaceae family (Okonmah, 2011). It is a well-liked crop for backyard gardens and is the fourth-most-cultivated vegetable globally (Okonmah, 2011). The crop was first cultivated in southern Asia, but numerous varieties have since been created and are now farmed all over the world. The plant has huge leaves that cover its fruits in a canopy. These leaves are typically cylindrical, elongated, and have tapering ends; they can be up to 60 cm long and 10 cm wide. There are fruits that people adore and consume in salads as culinary veggies.

95% of a cucumber is water, which aids in the body's detoxification. According to Vimala (1999), it is a good source of potassium, pantothenic acid, magnesium, phosphorus, copper, and manganese. It also contains vitamins A, C, K, and B6. In addition to helping with weight reduction and digestion, cucumbers are utilized as a source of silicon to treat skin rashes, sunburn, and high blood pressure. The ideal conditions for cucumber plants include optimal sun exposure, a temperature range of 20 to 25 °C, and low humidity. Extremely low and extremely high temperatures have a significant impact on the production.

The naturally low concentration of critical minerals in the soil for crop growth and development has an impact on cucumber production in the tropics (Jitendra, 2013). By using fertilizers, these nutrients can be added to the soil. According to Ayoola &

Adediran (2006), organic manure reduces the cost of inorganic fertilizer for crops and is a sustainable supply of nutrients. In locations with considerable rainfall, using manure two weeks before planting crops can assist boost nutrient availability.

One of the quickest and simplest methods for improving the production of cucumbers per unit area was discovered to be the application of poultry manure (Nweke et al., 2014; Nweke and Nsoanya, 2015). Due to its high levels of nitrogen, phosphorous, potassium, and several micronutrients, poultry manure is an excellent organic fertilizer (Mohammed et al., 2010).

Poultry manure, unlike mineral fertilizer, contributes organic matter to the soil, enhancing its structure, nutrient retention, aeration, ability to hold moisture, and water infiltration (Deksissa et al., 2008). In comparison to other organic manure sources, poultry dung more quickly provides phosphorus to plants, claim (Garg and Bahla, 2008). It has vital nutrient components that have been associated to high photosynthetic activity and encourage the growth of roots and vegetables (John et al., 2004).

1.2 Problem statement

In Zimbabwe, soil infertility has become a major problem that affects cucumber production. High levels of nitrogen, phosphorous, and potassium can be found in poultry manure, which is an organic fertilizer. It is also affordable and cheaper than inorganic fertilizers. Small-holder farmers do not know the correct application rate of poultry manure in cucumber, yet this fertilizer has potential to use by small holder farmers to increases cucumber production.

1.3 Justification

The demand for cucumbers has increased due to their high nutritional and medicinal value. It has been used as a source of silicon to cure skin irritants and sunburn, help with weight reduction and digestion, reduce cholesterol, as well as control blood pressure (Duke, 1997). Farmers in Matepatepa does not have information on poultry manure application rates. This information will help small-holder farmers to adopt the use of poultry manure and increase cucumber production.

1.4 Objectives

1.4.1 Main objective

To assess productivity of cucumber using poultry manure.

1.4.2 Specific objectives

1. Effects of application rates of poultry manure on leaf number and vine length of cucumber.
2. Effects of poultry manure application rates on number of fruits and fruit weight of cucumber.
3. Effects of variety on growth and yield components of cucumber.

1.5 Hypothesis

H0: Poultry manure has no effect on vine length and number of leaves of cucumber.
H1: Poultry manure has an effect on vine length and number of leaves of cucumber.

H0: Poultry manure has no effect on number of fruits and fruit weight of cucumber.

H1: Poultry manure has an effect on number of fruits and fruit weight of cucumber.

H0: Variety has no effect on cucumber yield.
H1: Variety has an effect on cucumber yield.

CHAPTER TWO

2.0 Literature Review

2.1 Origin and plant characteristics.

Since more than 3,000 years ago, people have been cultivating the annual crop cucumber (Cucumis sativus), which belongs to the Cucurbitaceae family (Okonmah, 2011). It is a common crop for backyard gardens and is the fourth-most-cultivated vegetable globally (Okonmah, 2011). The crop was first cultivated in southern Asia, but numerous varieties have since been created and are now cultivated all over the world.

Typically, the cucumber plant grows as a vine with broad leaves and vines that curl. More than five or six main stems may be present, from which the tendrils spread out. The plant has huge leaves that cover its fruits in a canopy. These leaves are typically cylindrical, elongated, and have tapering ends; they can be up to 60 cm long and 10 cm wide. Cucumber plants may develop vines that are up to five meters long. The are fruits that people adore and consume in salads as culinary veggies.

About 95% of a cucumber is water, which aids in the body's detoxification. It is a good source of potassium, pantothenic acids, magnesium, phosphorus, copper, and manganese in addition to vitamins A, C, K, and B6 (Vimala, 1999). Cucumber aids with weight loss and digestion, lowers cholesterol, and regulates blood pressure in addition to being utilized as a source of silicon for the treatment of skin irritations and sunburn (Duke, 1997).

Cucumber is often grown in greenhouses all year long due to its excellent yields and economic value. Cucumber plants can have compact, indeterminate, or determinate growth habits. Compared to plants with indeterminate and determinate growth habits, plants with compact growth habits have shorter internodes.

The ideal sun light, low humidity, and a somewhat warm environment are needed for cucumber plants. Both extremely low and extremely high temperatures have a significant impact on its production. The ideal range for germination is between 25 and 28 degrees Celsius, while the ideal range for growth is between 25 and 30 degrees Celsius, with the nighttime minimum being 18 degrees Celsius. From the seedling stage until maturity, this crop demands a large amount of soil nutrients, and it is quite susceptible to environments with excess water or waterlogging (Nweke et al., 2014).

Cucumber plants require moderately warm temperatures, less humidity, and optimal sun exposure. Production is strongly influenced by very low and very high temperatures. The optimum germination temperature is 25-28°C, the night temperature is not lower than 20°C, and the optimum growth temperature is 25-30°C, the night temperature is not lower than 18°C. This crop requires large amounts of soil nutrients from seedling to maturity and is very sensitive to excess water or waterlogging (Nweke et al., 2014).

2.2 Cucumber production in Zimbabwe.

Growing of cucumbers has become one of the fastest growing agricultural businesses in Zimbabwe in recent years. The vitality and short growth cycle of cucumbers make it attractive. In Zimbabwe, English cucumbers are produced all year round in an open and protected environment (greenhouses and nets). Traditionally, greenhouses have been dominated by tomatoes, but the late production of cucumbers changed that story with ever-increasing consumption and demand. The demand for cucumber in Zimbabwe has increased due to its nutritional and medicinal values.

Cucumber cultivation can improve agricultural production, economic empowerment and food security, in line with National Development Strategy 1. When it comes to vegetable cultivation, cucumber cultivation is one of the most profitable niches in Zimbabwe. According to FAOSTAT, Zimbabwe produced 240 tons of cucumbers in 2017, 2018 and 2019. The cucumber market is so large that customers can range from individuals to wholesalers and retailers. Open markets like Mbare Musika offer a good market for cucumbers.

2.3 Soil requirements of cucumber

A variety of well-drained soils are suitable for growing cucumbers. Cucumbers must be grown in well-drained, fertile soil with good soil structure and high porosity. Cucumber yields are higher and fruit-bearing takes longer on heavier soils like loam or clay. When growing cucumbers, high porosity and frequent watering are crucial. The soils on which cucumbers are produced must have a medium to high nutrient concentration to give high yields. Dry soils result in bitter, deformed fruit that customers frequently reject, which lowers farmer incomes. (2007) Jannick et al. It is advised to apply copious amounts of compost and organic waste. An ideal pH for cucumbers is between 5.5 and 6.5. It is quite sensitive to excessive moisture or humid conditions (Nweke et al., 2014).

2.4 Climatic requirements of cucumber.

A warm climate is necessary for the growth of cucumber, with the ideal temperature being around 30°C. The optimal nighttime temperature is between 18 and 20 °C, and 15 °C is the lowest temperature at which it can develop. (Khurana and Singh, 2001) claim that plant growth stops at temperatures below 10°C and that all plants die at 0°C. Delay planting seeds and transplanting until the soil temperature is at least 16°C in late May or early June. To get the best yields, the crop needs a lot of light. The growth of downy mildew is facilitated by high relative humidity. Cucumbers are frost-sensitive and only thrive in warm climates.

2.5 Importance of cucumber

Cucumbers are particularly significant economically because they have excellent nutritional, pharmacological, and health-promoting benefits. A good source of potassium, magnesium, and dietary fiber is cucumbers. As a result of these nutrients' ability to lower blood pressure, the risk of heart disease is decreased. Cucumber juice proved effective in lowering blood pressure in elderly hypertensive patients when consumed regularly. It lowers sodium intake while raising potassium intake, which could aid in lowering blood pressure. According to Chakraborty and Rayalu (2002), cucumber regulates hydration, maintains blood pressure and sugar levels, softens the skin, aids in digestion, decreases fat, and aids in weight loss.

cucumber has a cooling effect of on our stomachs. Cucumbers consist of soluble fiber that aids in slowing down digestion. Additionally, the high water content of cucumbers maintains our bowel motions regular, reduces constipation, and softens our stools (Chakraborty and Rayalu, 2021). Cucumbers contain a lot of water, which might help us stay hydrated. Cucumbers contain vitamin K, which promotes blood clotting and keeps our bones strong, as well as vitamin A, which is beneficial for vision, the immune system, and reproduction.

Diabetes can be effectively managed with the help of cucumbers. It contains inhibitors and regulators that assist reduce blood sugar and prevent blood glucose levels from rising too high. Cucurbitacin, an important hormone in the metabolism of hepatic glycogen, and insulin release are both controlled by cucumbers. Additionally, it ensures the proper operation of our heart, lungs, and kidneys. When consumed regularly, cucumber reduces kidney diseases and regulates the body's hypertension (Duke, 2000).

In addition, cucumbers can improve skin quality and increase beauty. When cucumber juice is applied to the skin, it becomes supple and beautiful. Cucumbers' ascorbic acid and caffeic acid, according to Okonmah (2011), serve to lessen skin inflammation and swelling. Its juice is frequently suggested as a source of silicon to enhance the overall healthy and appearance of the skin.

Magnesium, potassium, and vitamin K are all present in cucumbers and are essential for the cardiovascular system's smooth operation. Magnesium and potassium both help to reduce blood pressure. A variety of vitamin A, B vitamins, and antioxidants are also present in cucumbers. It contains almost all the vitamins the body require each day and is utilized as a source of silicon to heal sunburn and skin irritants (Duke, 1997). Free radicals are removed from the body with the aid of antioxidants. Cucumber and other foods contain lignans, which reduce the risk of heart disease and some types of cancer.

2.6 Effects of poultry manure on cucumber growth

According to Nweke and Nsoanya (2015), applying manure is the quickest and simplest technique to increase cucumber yield. According to Ayoola and Adediran (2006), organic manure is a renewable energy source that lowers the cost of inorganic fertilizer for crops. Application of manure may improve soil quality and increase nitrogen levels. Manures can also act as a key supply of soil nutrients and an additional energy reserve for soil microorganisms (Ye et al., 2019).

By enhancing the soil's texture, color, mineral availability to plants, capacity to retain water, and ability to use organic manure, organic manure restores infertile soil. It improves clay soil drainage and extends water retention in sandy soil. According to Enujeke (2013), applying poultry manure to soil improves both its chemical and physical characteristics. Cucumber yield is increased by fertile soil. According to Ewulo et al. (2008), poultry manure applied at 10–50 t/ha has a good effect on the physical characteristics of soil, such as soil temperature and water holding capacity. When applied, it is a good depository of both major and minor mineral elements suitable for enhancing soil fertility.

Poultry manure raises the soil's organic matter content, which releases plant nutrients in a form that is usable by plants. Poultry manure helps a soil hold more water, improves drainage, and releases organic acids that assist breakdown soil nutrients so that the crops can use them (Deakissa et al. 2008). This enhances crop growth. According to Agbede et al. (2008), adding 10 to 50 t ha1 of poultry manure enhances the soil's physical characteristics by decreasing soil temperature and bulk density and raising total porosity. According to John et al. (2004), poultry contains vital nutrients that are linked to high photosynthetic activity, which encourages cucumber growth and root development.

Following the application of chicken manure, Dauda et al. (2005) and Nweke et al. (2014) noted an increase in cucumber growth. The greater availability and release of nutrients by poultry manure during the developing period of the cucumber plant may be the primary cause of the increased growth he observed. According to Belay et al. (2001), organic manure activates soil microbial biomass and releases nutrients gradually and continuously.

The use of organic manures has been resurrected globally due to the demand for sustainable energy sources and decreased crop fertilization costs (Ayoola and Adeniran, 2006). Ojeniyi, 2000; Maritus and Vleic, 2001) argue that increasing the usage of organic materials will improve both the environment and public health.

2.7 Constrains of cucumber production

Despite the cucumber's growing importance, poor yields are produced and its production is severely limited by a lack of funding, environmental factors, plant disease and pest infestations, highly perishable fruit, and a lack of production skills. In order to protect the crop from bad weather conditions and manage pests and diseases, cucumber is typically produced in greenhouses (Umeh and Onovo, 2015).

To attain the structure required to make a profit, commercial cucumber farming needs appropriate capital (Wilcox et al., 2015). The required capital is used for things like building regular greenhouses, irrigation systems, hiring staff, buying fertilizer, and building suitable storage structures. Cucumber production is hampered by a shortage of money for fertilizer purchases.

Farmers in Zimbabwe are unaware of the cucumber's agronomic properties. They lack sufficient knowledge about plant irrigation, fertilizing, and illnesses that lower production. The low literacy rate of the cucumber growers may have an impact on their decision-making about inputs and their readiness to accept newer technologies. On-farm training for extension personnel in agronomic production packages is recommended. Farmers who receive technical and commercial education are better equipped to farm wisely, precisely, and profitably, which increases yield, productivity, and farm income (Adinya 2001; Idoing et al. 2006).

Because of its perishable nature, cucumber production is limited. Cucumber fruit is typically best appreciated when it is still young and dark green; after it turns pale green or yellow, there is typically a decline in price, leading to an oversupply on the market. Perishable goods like cucumber, which cannot be stored for more than a week after harvest, make this issue more serious (Tatilogu, 1997). In order to increase the marketability of fruits and vegetables and address the issue of low pricing farmers experience due to the perishable nature of fruits and vegetables, the government should create cold storage facilities.

CHAPTER THREE

3.0 Methodology and Approach

3.1 Study Area

The experiment was conducted in Mashonaland central province, Bindura, Matepateta at Morioto farm. The site is located under Agro-ecological region 2b, with a yearly precipitation of 550-900mm and has a temperature range of 15-30°C. The area lies between latitude 16° 56 59' 99'' S and longitude 31° 19 60 00 E. It is characterized by sandy loamy soil with a pH of 6.5.

3.2 Experimental design

The experiment was laid out in a randomized complete block design with 8 treatment combinations replicated 3 times. It was two-by-four factor experiment with the first factor, poultry manure rates at 4 levels 0t/ha, 10t/ha, 20t/ha and 30t/ha.

The other factor was variety. This gives a total of 24 experimental plots.

3.3 Experimental procedure

Land was ploughed two times using a disk harrow. A rake was used to obtain fine tilth to reduce risk of poor germination. The cleared land was demarcated into 24 plots, measuring 3 × 2 m with alleys between plots. Dried poultry manure from the was collected from a poultry farm in Matepateta. It was applied to the plots at 10, 20 and 30 t/ha and mixed into the soil two weeks before planting. Cucumber seeds were sown at 1 m × 1 m in-row and interrow spacing putting two seeds per hole and was later thinned to one per stand 2 weeks after emergence. Watering was done using bucket system in supplement of rainfall. Weeding was done manually by hand pulling and also by the use of a hoes till harvesting. Pesticides and fungicides were applied at two weeks intervals. Mancozeb was applied at a rate of 20grams per 16l knapsack. Other pesticides used were chlorothalonil and imidaclopid.

3.4 Data collection

Data on growth parameters were collected after 30 days and after 60 days. During the experiment, leaf number, vine length, fruit number and fruit weight were recorded. Leaf number was determined by counting leaves and vine length was measured with a flexible tape. The number of fruits per plant was counted and recorded and the weight of the fruits determined with a balance scale.

3.5 Data Analysis

The collected research data was subjected to analysis of variance (ANOVA) using Gen STAT software. Treatment means were separated by least significant difference (LSD) at the 5% significance level.

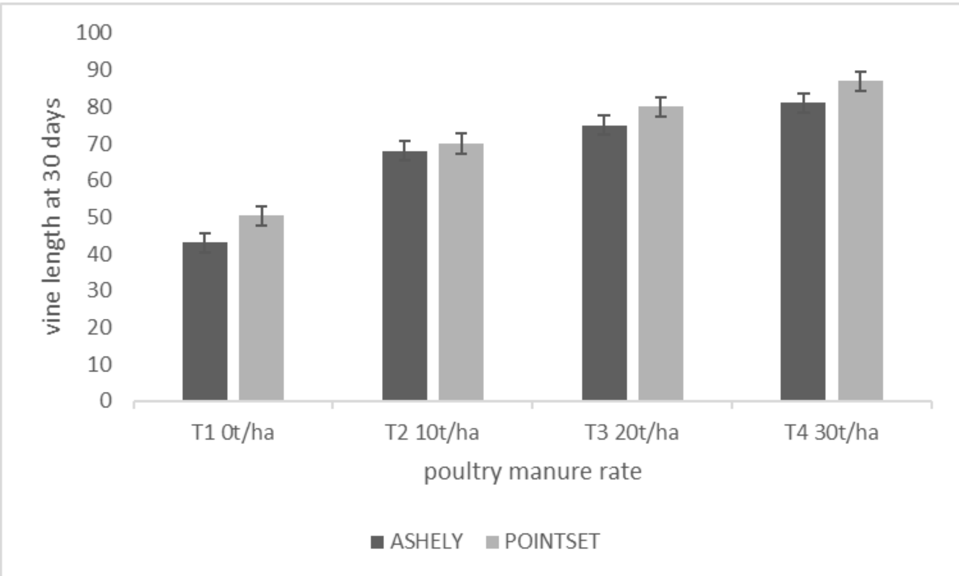
CHAPTER FOUR

4.1 RESULTS

The aim of the study was to determine the vine length, number of leaves, fruit weight and number of cucumber fruits from different amounts of poultry manure.

The results of the experiment are as follows:

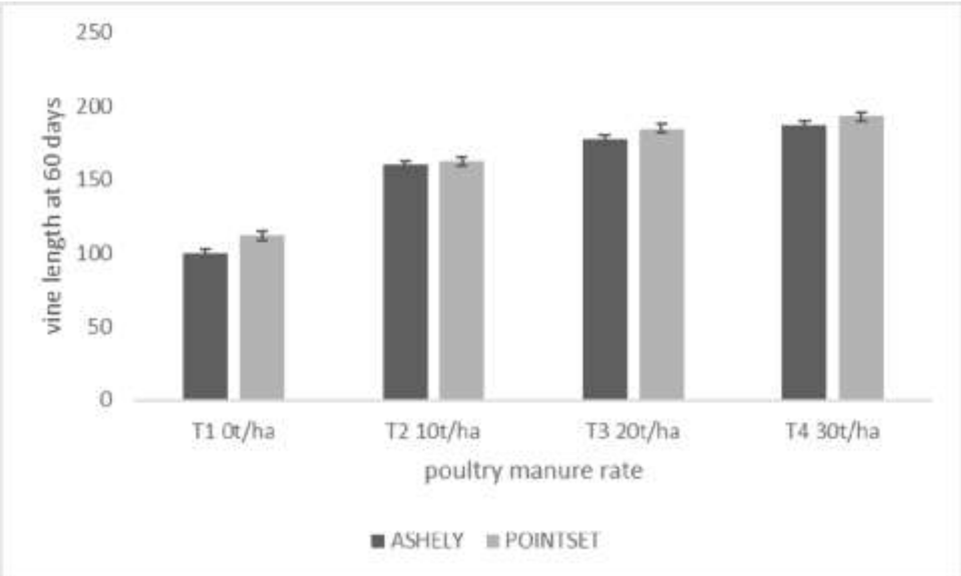
Figure 4.1 showing vine length of cucumber varieties at 30 days as affect by poultry manure.



The effect of poultry manure and variety at 30 days showed a significant difference ($p<.001$) and ($p <0.002$) on vine length where as their interactions had no significant difference. Treatment 4 with poultry manure rate of 30t/ha showed the highest vine length of 87 cm, followed by the application rate of 20t/ha having a vine length of

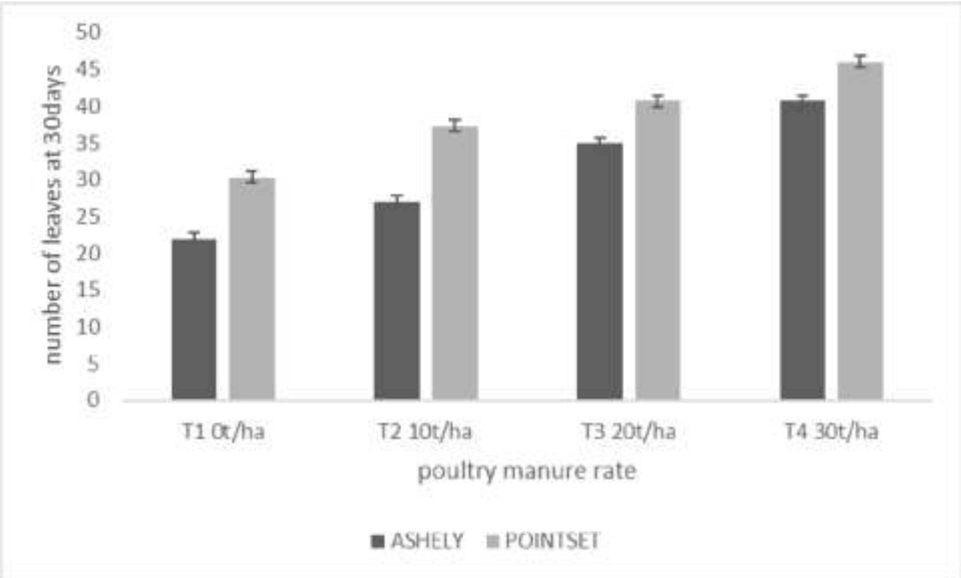
80cm. Treatment 1 which was the control had the lowest vine length. Pointset had the highest vine length.

Figure 4.2 showing vine length of cucumber at 60 days as affected by poultry manure.



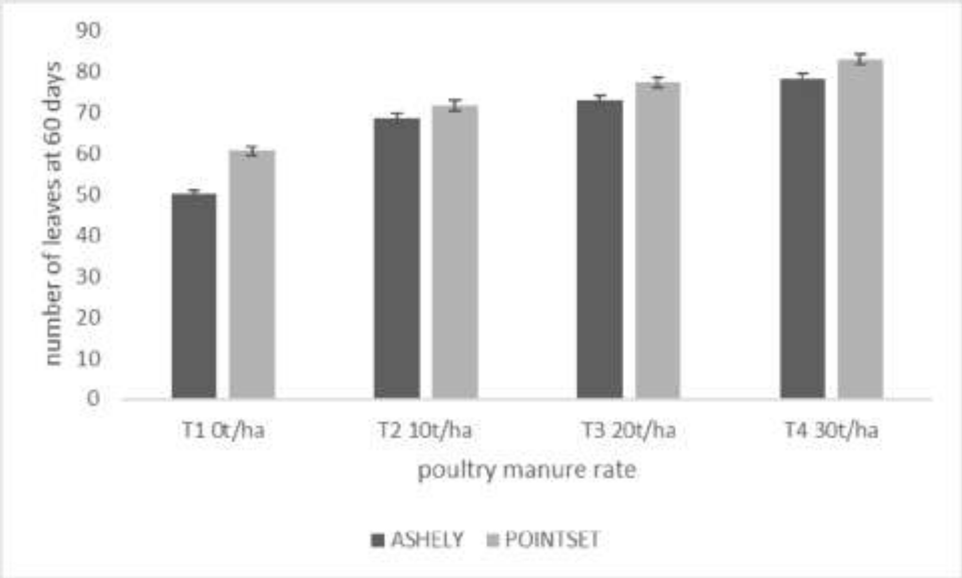
There was a significant difference on the effect of poultry manure ($p<.001$) and variety ($p<.001$) on vine length at 60 days. The highest vine length was 193cm and it was recorded from plants with poultry manure rate of 30t/ha and the lowest vine length was recorded from treatment 1 which was the control. Among the two varieties, Pointset had the highest vine length.

Figure 4.3 showing number of leaves of cucumber varieties at 30 days as affected by poultry manure.



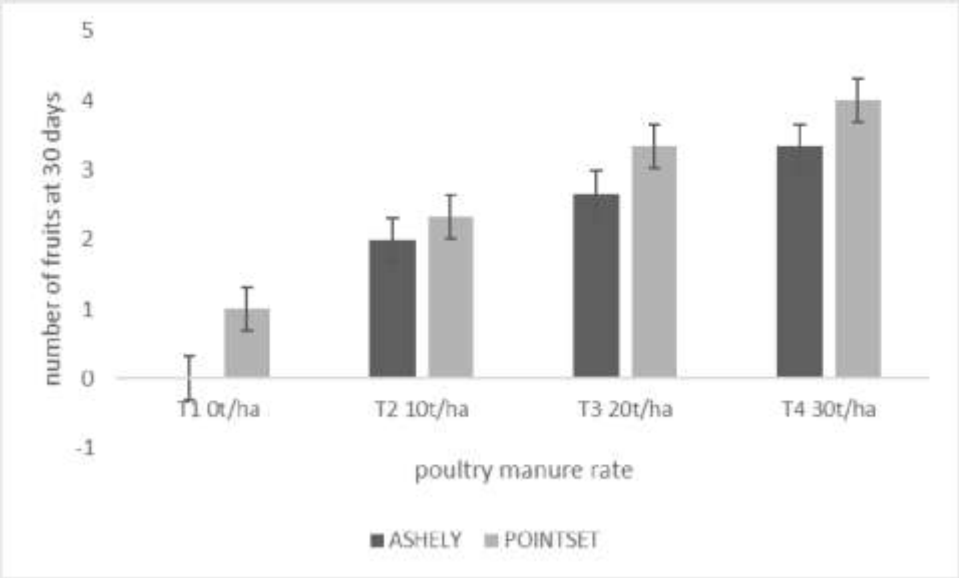
The number of leaves was significantly affected by poultry manure as well as variety with a significant difference of ($p<.001$). Plants with a poultry manure rate of 30t/ha was had highest number of leaves and the lowest number of leaves was obtained from plant with a rate of 0t/ha. Treatment to variety also showed a significant difference on number of leaves at 30 days. Pointset had higher number of leaves than Ashley.

Figure 4.4 showing number of leaves of cucumber varieties as affected by poultry manure at 60 days.



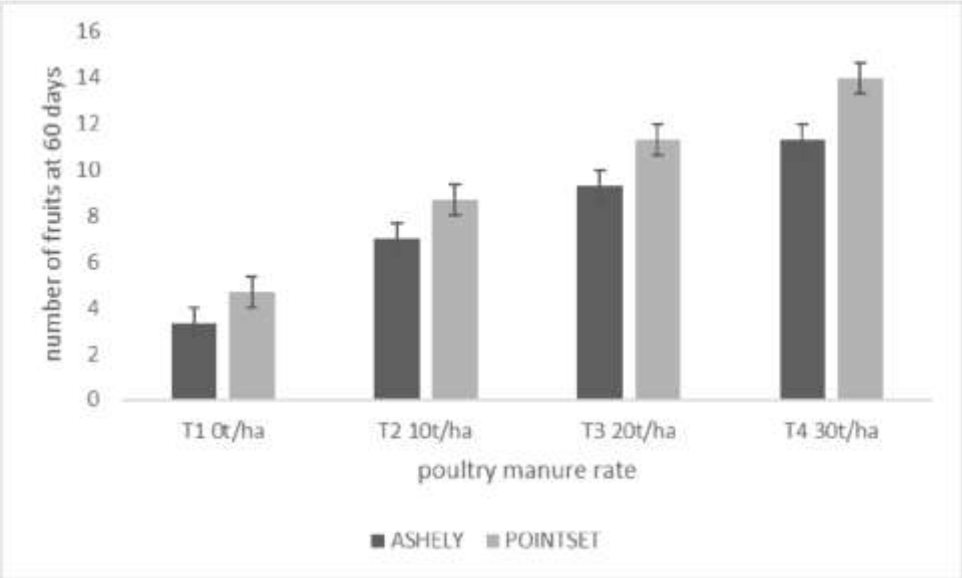
The cucumber varieties and poultry manure rates differed significantly ($p<.001$) for the number of leaves at 60 days. Number of leaves increased as poultry manure rates increases. Least number of leaves was 22 which was recorded from the control and highest number of leaves was 83 which was recorded from plants with poultry manure rate of 30t/ha. Treatment to variety interaction significantly affect the number of leaves.

Figure 4.5 showing number of fruits of cucumber varieties as affected by poultry manure at 30 days.



Poultry manure levels and variety significantly affected the number of fruits ($p<.001$) while their interaction had no significant difference. High poultry manure level improves the number of fruits. At 30 days treatment of 0t/ha had no fruits and poultry manure rate of 30t/ha had 4 fruits.

Figure 4.6 showing number of fruits of cucumber varieties as affected by poultry manure at 60 days.



There was a significant difference (p<.001) between poultry manure and variety on the number of cucumber fruits at 60 days. The number of fruits increased as poultry manure levels increases. The control had the least number of fruits. Pointset showed the highest number of fruits per plant.

Figure 4.7 showing average fruit weight of cucumber varieties as affected by poultry manure.

Fruit weight of cucumber differed significantly with rate of poultry manure rates and variety ($p<.001$). Treatment 4 with poultry manure rate of 30t/ha recorded the heaviest fruit weight (200 grams) whist treatment 1 which was the control had the least fruit weight (115 grams). Pointset showed higher fruit weight than Ashley.

CHAPTER FIVE

5.0 DISCUSSION

5.1 Vine length

On vine length, the effect of poultry manure was significantly different ($p<.001$). The plants with the longest vines had the highest levels of poultry manure, demonstrating that a higher level of poultry manure lengthens cucumber vines. Given that poultry manure has a high water-holding capacity and releases the nutrients in the soil, a high organic matter content in the soil may be the reason of an increase in vine length. This increases the rate at which plant metabolic processes occur, which in turn accelerates growth. These findings were same as those of Adekiya and Ojeniyi, who found that not only is poultry manure a rich source of nutrients, but also aids in making those nutrients already present in the soil accessible to plants. According to John et al. (2004), the addition of poultry manure to the soil increased the availability of vital nutrients to the plants, promoting strong photosynthetic activities for optimal cucumber growth and output. The same findings were made by Agu et al. (2015), who claimed that the use of poultry manure caused the cucumber vines to grow longer. He suggested that it might be due to an improvement in the soil's physicochemical characteristics and nutritional condition.

5.2 Number of leaves

Leaf number was significantly affected by poultry manure, with a significant difference of ($p<.001$). The total number of leaves increases as the amount of poultry manure rises. The high nutrient content of poultry manure, which made the soil more fertile and beneficial for plant growth, may be the reason for the increased number of leaves per plant. Nitrogen, which is crucial for cucumber growth and development, is present in poultry manure. Agbede et al. (2016) and Ewulo et al. (2015) reported similar findings, stating that poultry manure contains a high concentration of nitrogen that is readily available to plants and increases soil porosity. According to Enujeke et al. (2014), poultry manure had a higher concentration of nutrients, which improved the soil's physical quality for plant growth. These findings were also reported by Nweke et al. (2014), who discovered that increasing use of poultry manure resulted in higher plant growth.

5.3 Number of fruits

The use of poultry manure increased the number of fruits, with significant differences between the four treatments. The high quantities of nitrogen, phosphorous, and potassium in poultry manure essential macronutrients needed for plant growth could be responsible for these outcomes. Increased organic matter in the soil, which can help with soil structure, nutrient retention, and water-holding, is another benefit of applying poultry manure. Similar results were reported by Agu et al. (2015), who suggested that the large increase in cucumber fruit production could be related to the addition of poultry manure, which improved the soil's physical characteristics and increased the availability of various nutrients. The increasing number of leaves, which may have improved fruit production as reported by Nweke et al. (2014), may be the cause of the rise in the quantity of fruits.

5.4 Weight of cucumber

The fruit weight of the cucumbers differed significantly with the amount of poultry manure applied. Cucumber weight increased as the rate of poultry manure increased. The high concentration of nutrients in high poultry manure levels, which promote cucumber development and yield, may be the cause of the rise in average fruit weight. Similar findings were made by Dauda et al. (2005), who found that poultry manure's abundance in nitrogen, phosphate, magnesium, and calcium boosted soil fertility, which in turn increased fruit weight. This was also noted by John et al. (2004), who claimed that crop growth and yield were boosted by the use of poultry manure.

According to Dauda et al. (2008), chicken manure makes cucumber fruits heavier. He attributed it to poultry manure's potential to raise soil fertility.

5.5 Varieties

Of the two varieties, Pointset with poultry manure performed best on all growth components. Varieties have a major impact on cucumber growth and yield. Young et al. (2004) made a similar observation and claimed that the genetic makeup of the cultivars was responsible for the variance in plant development.

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CHAPTER SIX

6.1 CONCLUSION

This study reveals the beneficial effects of using poultry manure on the cucumber crop's growth and yield components. Application of 30 t/ha of poultry manure was shown to be the most effective dose for boosting cucumber production and maximum growth. Utilizing poultry manure as an organic fertilizer can reduce environmental pollution and cut costs associated with mineral fertilizers. Pointset emerged as the superior cucumber variety amongst the two in terms of yield and growth in response to the application of poultry manure.

6.2 RECOMMENDATIONS

Farmers are recommended to cultivate Pointset variety with the application rate of poultry manure at 30t/ha for better growth and yield of cucumber.

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APPENDIX

Analysis of variance

Variate: vine_length_30

Source of variation	d.f.	s.s.	m.s.	v.r.	F pr.
Block stratum	2	7.58		3.79	0.36
Block.*Units* stratum					
Variety	1	155.04	155.04	14.76	0.002
Treatnent	3	4774.12	1591.38	151.47	<.001
Variety.Treatnent	3	23.12	7.71	0.73	0.549
Residual	14	147.08		10.51	
Total	23	5106.96			

Information summary

All terms orthogonal, none aliased.

Message: the following units have large residuals.

Block 3 *units* 2 -5.46 s.e. 2.48

Tables of means

Variate: vine_length_30

Grand mean 69.29

Variety	ASHELY	POINTSET
	66.75	71.83

Treatnent	1	2	3	4
	46.67	69.00	77.50	84.00

Variety	Treatnent	1	2	3	4
ASHELY		43.00	68.00	75.00	81.00
POINTSET		50.33	70.00	80.00	87.00

Standard errors of means

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
e.s.e. 0.936 1.323 1.871

Standard errors of differences of means

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
s.e.d. 1.323 1.871 2.647

Least significant differences of means (5% level)

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
l.s.d. 2.838 4.014 5.676

Stratum standard errors and coefficients of variation

Variate: vine_length_30

Stratum	d.f.	s.e.	cv%
Block	2	0.688	1.0
Block.*Units*	14	3.241	4.7

Analysis of variance

Variate: vine_length_at_60

Source of variation	d.f.	s.s.	m.s.	v.r.	F pr.
Block stratum	2	55.75		27.88	1.96
Block.*Units* stratum					
Variety	1	301.04	301.04	21.12	<.001
Treatnent	3	25591.46	8530.49	598.38	<.001
Variety.Treatnent	3	67.79	22.60	1.59	0.237
Residual	14	199.58		14.26	
Total	23	26215.62			

Information summary

All terms orthogonal, none aliased.

Message: the following units have large residuals.

Block 1 *units* 5 8.25 s.e. 2.88

Tables of means

Variate: vine_length_at_60

Grand mean 159.62

Variety	ASHELY	POINTSET
	156.08	163.17

Treatnent	1	2	3	4
	106.00	161.33	181.17	190.00

Variety	Treatnent 1	2	3	4
ASHELY	100.00	160.00	177.33	187.00
POINTSET	112.00	162.67	185.00	193.00

Standard errors of means

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
e.s.e. 1.090 1.541 2.180

Standard errors of differences of means

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
s.e.d. 1.541 2.180 3.083

Least significant differences of means (5% level)

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
l.s.d. 3.306 4.675 6.612

Stratum standard errors and coefficients of variation

Variate: vine_length_at_60

Stratum	d.f.	s.e.	cv%
Block	2	1.867	1.2
Block.*Units*	14	3.776	2.4

Analysis of variance

Variate: no_of_leaves_per_plant_30

Source of variation	d.f.	s.s.	m.s.	v.r.	F pr.
Block stratum	2	42.2500	21.1250	23.82	
Block.*Units* stratum					
Variety	1	330.0417	330.0417	372.13	<.001
Treatnent	3	980.7917	326.9306	368.62	<.001

Variety.Treatnent	3	25.1250	8.3750	9.44	0.001
Residual	14	12.4167	0.8869		
Total	23	1390.6250			

Information summary

All terms orthogonal, none aliased.

Message: the following units have large residuals.

Block 3 *units* 1 -1.46 s.e. 0.72

Tables of means

Variate: no_of_leaves_per_plant_30

Grand mean 34.88

Variety	ASHELY	POINTSET
	31.17	38.58

Treatnent	1	2	3	4
	26.17	32.17	37.83	43.33

Variety	Treatnent	1	2	3	4
ASHELY		22.00	27.00	35.00	40.67
POINTSET		30.33	37.33	40.67	46.00

Standard errors of means

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
e.s.e. 0.272 0.384 0.544

Standard errors of differences of means

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
s.e.d. 0.384 0.544 0.769

Least significant differences of means (5% level)

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
l.s.d. 0.825 1.166 1.649

Stratum standard errors and coefficients of variation

Variate: no_of_leaves_per_plant_30

Stratum	d.f.	s.e.	cv%
Block	2	1.625	4.7
Block.*Units*	14	0.942	2.7

Analysis of variance

Variate: no_of_leaves_per_plant_at_60

Source of variation	d.f.	s.s.	m.s.	v.r.	F pr.
Block stratum	2	110.333	55.167	24.91	
Block.*Units* stratum					
Variety	1	192.667	192.667	87.01	<.001
Treatnent	3	2131.000	710.333	320.80	<.001
Variety.Treatnent	3	52.333	17.444	7.88	0.003
Residual	14	31.000	2.214		
Total	23	2517.333			

Information summary

All terms orthogonal, none aliased.

Message: the following units have large residuals.

Block 1 *units* 5	2.33	s.e.	1.14
Block 3 *units* 7	-2.42	s.e.	1.14

Tables of means

Variate: no_of_leaves_per_plant_at_60

Grand mean 70.33

Variety	ASHELY	POINTSET
	67.50	73.17

Treatnent	1	2	3	4
	55.33	70.17	75.17	80.67

Variety	Treatnent 1	2	3	4
ASHELY	50.00	68.67	73.00	78.33
POINTSET	60.67	71.67	77.33	83.00

Standard errors of means

Table	Variety	Treatnent	Variety Treatnent
rep.	12	6	3
d.f.	14	14	14
e.s.e.	0.430	0.607	0.859

Standard errors of differences of means

Table	Variety	Treatnent	Variety Treatnent
rep.	12	6	3
d.f.	14	14	14
s.e.d.	0.607	0.859	1.215

Least significant differences of means (5% level)

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
l.s.d. 1.303 1.843 2.606

Stratum standard errors and coefficients of variation

Variate: no_of_leaves_per_plant_at_60

Stratum	d.f.	s.e.	cv%
Block	2	2.626	3.7
Block.*Units*	14	1.488	2.1

Analysis of variance

Variate: no_of_fruits_per_plant_30

Source of variation	d.f.	s.s.	m.s.	v.r.	F pr.
Block stratum	2	0.5833	0.2917		1.96
Block.*Units* stratum					
Variety	1	2.6667	2.6667	17.92	<.001
Treatnent	3	33.6667	11.2222	75.41	<.001
Variety.Treatnent	3	0.3333	0.1111	0.75	0.542
Residual	14	2.0833	0.1488		
Total	23	39.3333			

Information summary

All terms orthogonal, none aliased.

Message: the following units have large residuals.

Block 3 *units* 3 0.625 s.e. 0.295

Tables of means

Variate: no_of_fruits_per_plant_30

Grand mean 2.333

Variety	ASHELY	POINTSET
	2.000	2.667

Treatnent	1	2	3	4
	0.500	2.167	3.000	3.667

Analysis of variance

Variety	Treatnent	1	2	3	4
ASHELY		0.000	2.000	2.667	3.333
POINTSET		1.000	2.333	3.333	4.000

Standard errors of means

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
e.s.e. 0.1114 0.1575 0.2227

Standard errors of differences of means

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
s.e.d. 0.1575 0.2227 0.3150

Least significant differences of means (5% level)

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
l.s.d. 0.3378 0.4777 0.6755

Stratum standard errors and coefficients of variation

Variate: no_of_fruits_per_plant_30

Stratum	d.f.	s.e.	cv%
Block	2	0.1909	8.2
Block.*Units*	14	0.3858	16.5

Variate: no_of_fruits_per_plant_at_60

Source of variation	d.f.	s.s.	m.s.	v.r.	F pr.
Block stratum	2	8.5833	4.2917	6.38	
Block.*Units* stratum					
Variety	1	22.0417	22.0417	32.77	<.001
Treatnent	3	247.4583	82.4861	122.63	<.001
Variety.Treatnent	3	1.4583	0.4861	0.72	0.555
Residual	14	9.4167	0.6726		
Total	23	288.9583			

Information summary

All terms orthogonal, none aliased.

Tables of means

Variate: no_of_fruits_per_plant_at_60

Grand mean 8.71

Variety	ASHELY	POINTSET
	7.75	9.67

Treatnent	1	2	3	4
	4.00	7.83	10.33	12.67

Variety	Treatnent	1	2	3	4
ASHELY		3.33	7.00	9.33	11.33
POINTSET		4.67	8.67	11.33	14.00

Standard errors of means

Table	Variety	Treatnent	Variety Treatnent
rep.	12	6	3
d.f.	14	14	14
e.s.e.	0.237	0.335	0.474

Analysis of variance

Standard errors of differences of means

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
s.e.d. 0.335 0.474 0.670

Least significant differences of means (5% level)

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
l.s.d. 0.718 1.016 1.436

Stratum standard errors and coefficients of variation

Variate: no_of_fruits_per_plant_at_60

Stratum	d.f.	s.e.	cv%
Block	2	0.732	8.4
Block.*Units*	14	0.820	9.4

Variate: weight_of_each_fruit_60

Source of variation	d.f.	s.s.	m.s.	v.r.	F pr.
Block stratum	2	81.750	40.875	8.15	
Block.*Units* stratum					
Variety	1	376.042	376.042	74.94	<.001
Treatnent	3	22059.458	7353.153	1465.40	<.001
Variety.Treatnent	3	29.125	9.708	1.93	0.170
Residual	14	70.250	5.018		

Total 23 22616.625

Information summary

All terms orthogonal, none aliased.

Message: the following units have large residuals.

Block 1 *units* 3 4.25 s.e. 1.71
Block 3 *units* 3 -3.88 s.e. 1.71

Tables of means

Variate: weight_of_each_fruit_60

Grand mean 167.88

Variety	ASHELY	POINTSET
	163.92	171.83

Treatnent	1	2	3	4
	117.50	172.17	185.50	196.33

Variety	Treatnent 1	2	3	4
ASHELY	115.00	168.67	180.00	192.00
POINTSET	120.00	175.67	191.00	200.67

Standard errors of means

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14
e.s.e. 0.647 0.914 1.293

Standard errors of differences of means

Table Variety Treatnent Variety
Treatnent rep. 12 6 3 d.f. 14 14 14

Analysis of variance

s.e.d. 0.914 1.293 1.829

Least significant differences of means (5% level)

Table Variety Treatnent Variety
Treatnent   rep. 12 6 3   d.f. 14 14 14
l.s.d. 1.961 2.774 3.923

Stratum standard errors and coefficients of variation

Variate: weight_of_each_fruit_60

Stratum	d.f.	s.e.	cv%
Block	2	2.260	1.3
Block.*Units*	14	2.240	1.3