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Article

Response of cucumber cultivars to organomineral fertilizer rate in rainforest savannah

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Abstract: Organomineral fertilizer is used to improve and ameliorate the supply of nutrients in soils. Right and adequate application of fertilizers are determinants of its nutrient supply efficiency, which in turn enhances the vegetative growth and yield of cucumber. Field experiments were conducted at the Research Farm of the Federal University of Agriculture, Abeokuta, Nigeria, to assess the effects of variety and rate of organomineral fertilizer on cucumber growth and yield. Trials were conducted from June to August 2019 and repeated from September to November 2019. The cultivars were Poinsett, Greengo, and Monalisa. The rates of organomineral fertilizer were 0, 2.5, or 5.0 tons. ha^{-1}. The treatments were replicated three times. Cucumber vegetative characters, yield, and yield components were studied. 'Greengo' produced the most leaves, followed by 'Monalisa'; 'Poinsett' produced the least. Application of 5.0 tons. ha^{-1} organomineral fertilizer produced the longest vines and fruits. 'Greengo' had the earliest days to 50% flowering, followed by 'Monalisa'; 'Poinsett' had the most days to 50% flowering. Plants treated with an application of 5.0 tons. ha^{-1} organomineral fertilizer attained 50% flowering in 29 days, but in 30 days with an application of 2.5 tons. ha^{-1} organomineral fertilizer; the control treatment attained 50% flowering in 33 days. Application of 5.0 tons. ha^{-1} organomineral fertilizer produced the longest fruits, thicker fruit diameter, and highest fruit yield compared with 2.5 and 0 tons. ha^{-1} of organomineral fertilizer treatments. The Greengo variety with application of 5.0 tons. ha^{-1} of organomineral fertilizer is recommended for optimum growth and yield in south western Nigeria.

Keywords: *Cucumis sativus*; season; variety; organic fertilizer; planting; growth; yield

1. Introduction

Cucumber (*Cucumis sativus* L.) is one of Nigeria's most valuable exotic vegetables [1]. It is the world's fourth most farmed vegetable and is often regarded as one of the healthiest foods available [2]. It is an annual vegetable crop belonging to the Cucurbitaceae family, which has 90 genera and 750 species [3]. It ranks fourth in Asia in terms of economic importance, behind tomatoes, cabbage, and onion [4,5]. It grows on a creeping vine with enormous leaves that form a canopy over the cylindrical fruits. After maize, sugar beet, cassava, tomatoes, watermelons, sweet potatoes, and dry onions, it is the eighth most widely produced vegetable crop on the planet [6]. It is grown in practically all of Nigeria's agro-ecological zones, from the coastal to the savanna zones. Due to moderate rainfall, Nigeria's savanna zone has the highest potential for production [6]. However, research has shown that it can flourish in some sections of South Nigeria where rainfall is moderate [7,8]. The rapid increase in global production has been observed to deplete natural resources and jeopardize the viability of farming systems in many regions of the world, particularly in arid and semi-arid countries [9].

Cropping intensification with improper management and the use of chemical fertilizers affect the environment by reducing the soil organic matter content, increasing soil erosion, and reducing soil fertility [10]. Agricultural intensification, which includes the use of high-yielding modern cultivars and agrochemicals such as chemical fertilizers, is harmful to the ecosystem and environment [9].

Organic fertilizers are becoming more popular as a way to combat chemical fertilizer pollution of the air and soil environment, as well as a progressive loss of soil fertility. The use of synthetic fertilizers on a regular basis may lead to a decline in soil health. The bulk of nitrogen fertilizers seep into the root zone, causing diseases in both plants and people [11,12]. Organic amendments such as compost, manure, and cover crops supply plant nutrients while also enhancing soil quality through chemical, physical, and biological activities (electrical conductivity, soil pH, and soil organic carbon [13,14]. Improved soil quality enhances crop yield while also aiding in the mitigation of climate change through carbon sequestration [13]. Organic supplements are essential for long-term soil fertility management and crop production, but they can also contribute to increased greenhouse gas emissions. Understanding the effects of organic soil amendments on gaseous emissions is critical for decreasing agriculture's net carbon footprint [13]. There has been insufficient information available to farmers in Nigeria about the fertilizer requirements of hybrid and open pollinated cucumber varieties. In order to grow cucumbers, farmers typically follow the blanket advice. Cucumber varieties with great yields are constantly being released for farmers to employ. It is important to investigate the quantity of nutrition required. With on-going cultivation, changes in soil fertility need a re-evaluation of fertilizer use. Most researchers and farmers formulate their own organomineral fertilizers by hand. This could result in nutritional deficiencies.

Some enterprises in Nigeria, like Ogun and Oyo States Governments, have recently begun industrial manufacturing of organomineral fertilizers. This justifies the use of Alesinloye Organomineral fertilizer from Oyo State in this experiment, coupled with the fact that it has not been thoroughly studied on diverse crops like cucumber. Additional research into the best rate of treatment is still required. The purpose of this research was to determine the organomineral fertilizer rate for optimum cucumber growth and yield.

2. Materials and methods

The experiment was conducted at the Teaching and Research Farm of the Directorate of University Farms (DUFARMS), Federal University of Agriculture, Abeokuta, in the forest savanna -transition agro ecological zone (latitude 7°15′N and longitude 3°25′E; altitude 144 m above the sea level) between June and August 2019 and repeated from September to November 2019. The rainfall distribution pattern for Abeokuta is bimodal, having the first mode between June and July which is followed by an August break with a resumption of rains in September to November. Annual rainfall ranges from 1145 to 1270 mm. The experiment was conducted in the planting season of 2019. Agro-meteorological data (rainfall distribution, total rainfall, temperature pattern) were collected from the agro-meteorological station of the Federal University of Agriculture, Abeokuta (FUNAAB). Pre-planting soil samples were collected using an Auger to soil depth of about 15 cm and was analyzed to determine soil physico-chemical properties.

Soil pH was measured using pH in soil–water suspension 1:5 using pH meter [15]; Organic carbon was assessed by Walkley-Black procedure using dichromate as oxidizing agent as described in Nelson and Sommers [16]; soil organic matter was estimated by multiplying percentage organic carbon by Broadbent's factor of 1.72 [17]. Total nitrogen was evaluated by the khjedal digestion method; soil available phosphorus was evaluated by Bray's P1 test using 0.03 NH_4F in 0.02 NHCl as extractant and measuring the extracted phosphorus colorimetrically at 660 nm by molybdenum blue method [18]. Exchangeable bases were determined with normal ammonium acetate buffer at pH 7. Sodium and potassium in the extracts were determined by flame photometry. Calcium and magnesium were determined by atomic adsorption spectrophotometry. Exchangeable acidity was determined by titration of 1M KCL extraction against 0.05 M NaOH to pink end point using phenolphthalein as indicator [19]. Soil particle size distribution was determined with a hydrometer [20], using sodium hexa-metaphosphate as dispersing agent.

2.1. Land preparation

For planting, the seeds were placed on the flat after plowing twice and harrowing once.

2.2. Experimental design and treatments

The experiment was set up in a split plot factorial arrangement with three replications using a randomized complete block design (RCBD) with plot size of 3 m by 3 m. The treatment consisted of a main plot with three cucumber varieties (Pointsett, Greengo, and Monalisa) and a sub plot with three rates of organominerial fertilizer (0, 2.5, and 5 tons/ha). The crop was planted at a spacing of 75 cm by 50 cm.

2.3. Cultural practices

Soil samples were taken randomly at the experimental location at depths of 20 cm and analyzed to determine soil physical and chemical properties. After a week, the seedlings were thinned to one plant per stand. At one week after sowing, seeds that did not germinate were supplied. Organominerial fertilizer was applied using the side placement method 2 weeks after planting (WAP). At 3 and 6 weeks after planting, weeding was done manually with a hoe.

2.4. Source of seeds

The seeds were obtained from a seed marketer (Agbeloba office) and Ministry of Agriculture, Asero, Abeokuta.

2.5. Source of fertilizer

The organomineral fertilizer was obtained from Alesinloye Fertilizer Company, Alesinloye, Ibadan, Oyo State.

2.6. Date of planting and sowing

Planting was done on 24th of June 2019 and 5th September 2019.

2.7. Cucumber varieties

The three cultivars of cucumber used were:

1) Poinsett—Is an open pollinated plant. Poinsett cucumber seeds produce plants that grow dark green, white-spined, and straight cucumbers. They are disease-tolerant. It is monoecious.
2) Greengo—Greengo F1 hybrid cucumber seeds are produced by East-West Seeds brand. This hybrid cucumber variety has a very high yield as compared to open pollinated varieties and other hybrid cucumber varieties. It is gynoecious. It matures within 40–45 days. The fruits produced by Greengo F1 cucumber seeds are deep green in colour. This variety is resistant to cucumber mosaic virus disease and powdery mildew disease.
3) Monalisa—Monalisa F1 hybrid cucumber seeds are produced by East - West Seeds brand. These hybrid cucumber seeds are high yielding and tolerant to some pests and diseases. It is monoecious. It is hardy and resistant to diseases like cucumber mosaic virus disease and powdery mildew disease. It is deep green in colour, uniform and cylindrical.

2.8. Data collection

Data were taken at 3, 4, 5 and 6 weeks after planting. Five (5) plants were sampled from each net plot (2 × 2 m) to assess the following parameters:

2.8.1. Vine length (cm)

Five plants were selected randomly from each plot and tagged. Vine length was measured from the ground level to the tip of sample plants at 3–5 WAS.

2.8.2. Number of leaves

The number of leaves per plant was counted visually.

2.8.3. Days to first and 50 per cent flowering

Number of days taken from sowing to appearance of first flower among 50% of total plant population in each treatment was taken.

2.8.4. Fruit length (cm)

Five fruits from three sample plants in each plot were randomly selected at each picking and their length was measured between the two ends using a ruler.

2.8.5. Fruit girth (cm)

Fruits from three sample plants in each plot was randomly selected at each picking for recording the fruit girth. The fruit girth was measured with the use of a vernier caliper.

2.8.6. Fruit yield per hectare t.ha^{-1})

The fruits harvested from each plot were weighed at every harvest and the cumulative per plot was extrapolated per hectare.

2.9. Data analysis

Genstat 12th Edition was used to analyze the data collected using analysis of variance (GLM ANOVA). At 5% probability level, significant means were separated using Least Significant Difference (LSD).

3. Results

Between June and July, total rainfall was around 373.2 mm in the early season, and 406.3 mm between September and October in the late season (**Figure 1**). In July, the average monthly temperature declined from 27.1 ℃ to 26.2 ℃. In June, the mean monthly relative humidity was 83.1%, while in July, it was 87.4% (**Figure 1**). There were 1.8% clay, 74.50% sand, and 23.7% silt in the soil. The soil was made mostly of loamy sand. In pre-soil analysis, organic matter content (0.53%), total N (0.18%) [21], 18.64 mg kg^{-1} phosphorus [22] and 0.29 mg kg^{-1} potassium [23] were all below the recommendations for soils in south-western Nigeria [24]. In the post-cropping soil analysis, all of the parameters were significantly higher. The pH of the soil was 6.3; Ca—0.20 mg kg^{-1}; Mg—0.26 mg kg^{-1}; Na—0.25 mg kg^{-1} (**Table 1**). The organo-mineral fertilizer contained 950 mg kg^{-1} Nitrogen, 4.89 mg kg^{-1} Phosphorus, 9.12 coml kg^{-1} Potassium, 6.71 coml kg^{-1} Magnesium, 5.18 coml kg^{-1} Calcium, 0.61 coml kg^{-1} Sodium, 7.4 pH, 29.20 mg kg^{-1} organic carbon, and 50.30 mg kg^{-1} organic matter (**Table 2**). The organomineral fertilizer was applied at 2.5 tons ha^{-1} to supply 23.75 kg N but to supply 47.5 kg N with 5.0 tons ha^{-1} (**Table 2**).

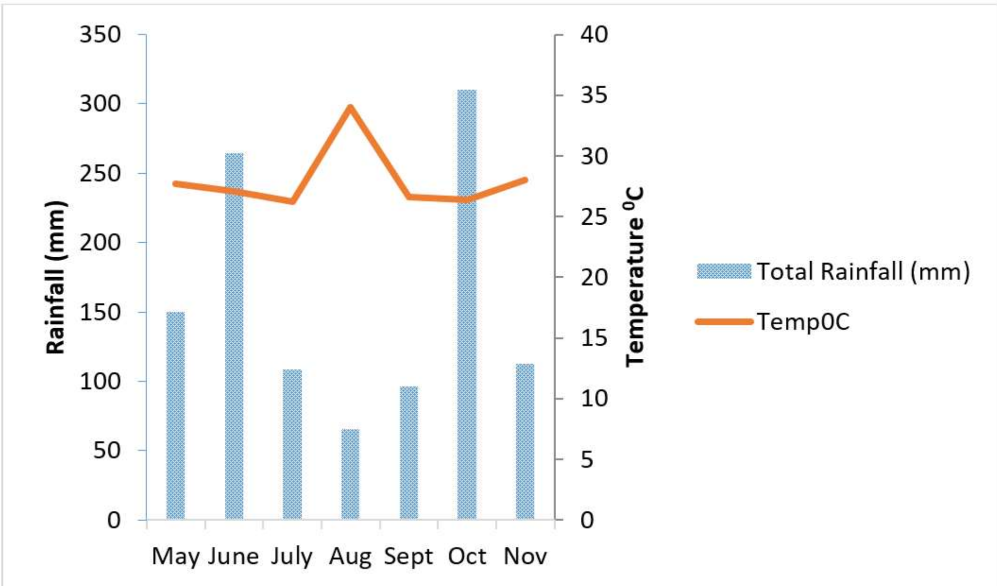

Figure 1. Monthly rainfall and mean temperature during the period of experiment.

Source: Department of Agro-meteorological and Water Management, Federal University of Agriculture, Abeokuta, Nigeria.

Table 1. Pre- and post- planting chemical and physical soil analysis.

Soil property	Pre-planting soil analysis	Post-planting soil analysis
Clay (%)	1.8	1.8
Sand (%)	74.50	75.6
Silt (%)	23.7	23.8
Textural class	**Sandy loam**	**Sand**
pH	6.2	6.4
N (%)	0.178	0.235
Organic carbon (%)	0.532	0.688
Organic matter (%)	0.917	1.243
P mg kg^{-1}	18.64	27.34
Na mg kg^{-1}	0.245	0.32
K mg kg^{-1}	0.29	0.40
Ca mg kg^{-1}	0.20	0.29
Mg mg kg^{-1}	0.26	0.40

Table 2. Nutrient content of the organomineral fertilizer.

Nutrient	Value
N mg kg^{-1}	950
P (mg kg^{-1})	4.87
K coml. kg^{-1}	9.12
Mg coml. kg^{-1}	6.71
Ca coml. kg^{-1}	5.18
Na coml. Kg^{-1}	0.61
Acidity (meg kg^{-1})	0.34
Ogranic carbon mg kg^{-1}	2920
Organic matter (%)	5.03
pH	7.4
Mn (mg kg^{-1})	3.14
Zn (mg kg^{-1})	1.86
Fe (mg kg^{-1})	4.15
Cu (mg kg^{-1})	2.89

In early season, the length of cucumber vines was significantly affected by variety and organomineral fertilizer rate, but not by interaction (**Table 3**). In early season, the Greengo cucumber variety had longer vine length (78.40 cm) than Poinsett variety (48.30 cm) but was not significant different from Monalisa variety (77.80 cm). Application of 5.0 tons. ha^{-1} (83.30 and 68.50 cm) had longer vine than 2.5 tons ha^{-1} in both early and late seasons. Plants that were not fertilized had shorter vines of (49.70 and 48.40 cm) respectively (**Table 3**).

Table 3. Effect of varieties and rate of organomineral fertilizer on cucumber number of leaves and vine length in early and late season of 2019.

	Early season		**Late season**	
	Number of leaves	**Vine length (cm)**	**Number of leaves**	**Vine length (cm)**
Varieties (V)				
Pointsett	14.11	48.30	10.67	47.70
Greengo	19.44	78.40	12.11	62.30
Monalisa	15.89	77.80	11.19	66.3
LSD ($P < 0.05$)	NS	14.08*	NS	NS
Rates of organomineral fertilizer (R)				
0 t ha^{-1}	13.44	49.70	9.96	48.40
2.5 t ha^{-1}	17.33	71.60	11.15	59.30
5.0 t ha^{-1}	18.67	83.30	12.85	68.50
LSD ($P < 0.05$)	3.44*	16.26*	NS	9.09*
V × R	NS	NS	NS	NS

Data analyzed with least square means and means separated with least significant difference, $P \leq 0.05$, NS—non significant, *—significant and **—highly significant level of 5% probability.

In the early season, number of leaves was significantly affected by variety and organomineral fertilizer rate but not by the interaction (**Table 3**). Application of 5.0 t.ha^{-1} had a higher number of leaves (19) than 2.5 t.ha^{-1} (17) in the early season. Unfertilized plants had the least of 13 leaves (**Table 3**). In both the early and late season, number of fruits per plant was significantly affected by variety and organomineral fertilizer rate, but not by interaction (**Table 4**). In both early and late seasons, the Greengo variety produced more fruits per plot (33) than the Monalisa (31) or Poinsett varieties (31). In both early and late seasons, treatment with 5.0 t.ha^{-1} produced more fruits per plant (36) than 2.5 t.ha^{-1} (32) and the control (26) (**Table 4**).

Table 4. Effect of varieties, and rate of organomineral fertilizer on fruit length and fruit girth of cucumber in early and late season of 2019.

	Early season			**Late season**		
	Number of fruit/plant	**Fruit length (cm)**	**Fruit girth (cm)**	**No of fruit/plot**	**Fruit length (cm)**	**Fruit girth (cm)**
Varieties (V)						
Pointsett	30.67	16.83	4.98	23.78	14.81	5.14
Greengo	32.78	11.98	3.40	28.00	15.95	4.90
Monalisa	30.89	14.53	4.28	26.11	17.67	4.82
LSD ($P < 0.05$)	0.69*	NS	NS	1.33*	NS	NS
Rates of organomineral fertilizer (R)						
0 t ha^{-1}	26.11	13.19	3.88	16.67	11.39	4.13
2.5 t ha^{-1}	32.22	15.83	6.68	29.00	17.34	5.25
5.0 t ha^{-1}	36.00	14.33	4.10	32.33	19.71	5.47
LSD ($P < 0.05$)	1.27*	NS	NS	1.54*	1.35*	0.27*
V × R	NS	NS	NS	NS	NS	NS

Data analyzed with least square means and means separated with least significant difference, $P \leq 0.05$, NS—non significant, *—significant and **—highly significant level of 5% probability.

In the late season, fruit length and fruit girth was significantly affected by organomineral fertilizer rate (**Table 4**). In the late season, treatment with 5.0 $t.ha^{-1}$ had a longer fruit length (19.71 cm) than 2.5 $t.ha^{-1}$ (17.34 cm). Plants that were not fertilized grew to be shorter fruits (11.39 cm) -**Table 4**. In the late season, application of 5.0 $t.ha^{-1}$ resulted in thicker fruit girths (5.47 cm) than 2.5 $t.ha^{-1}$ (5.25 cm). Plants that were not fertilized were thinner (4.13 cm) (**Table 4**).

In both the early and late seasons, days to 50% flowering was significantly affected by variety and organomineral fertilizer rate but not by interaction (**Figure 2**). In both early and late seasons, the Greengo variety and Monalisa (30 and 23 days) flowered earlier than Poinsett (34 and 29 days) varieties, respectively. In both early and late seasons, plants with application of 5.0 $t.ha^{-1}$ resulted in earlier days to 50% flowering (29 and 23 days) respectively. Plants that were not fertilized flowered later in 34 and 27 days, respectively (**Figure 3**).

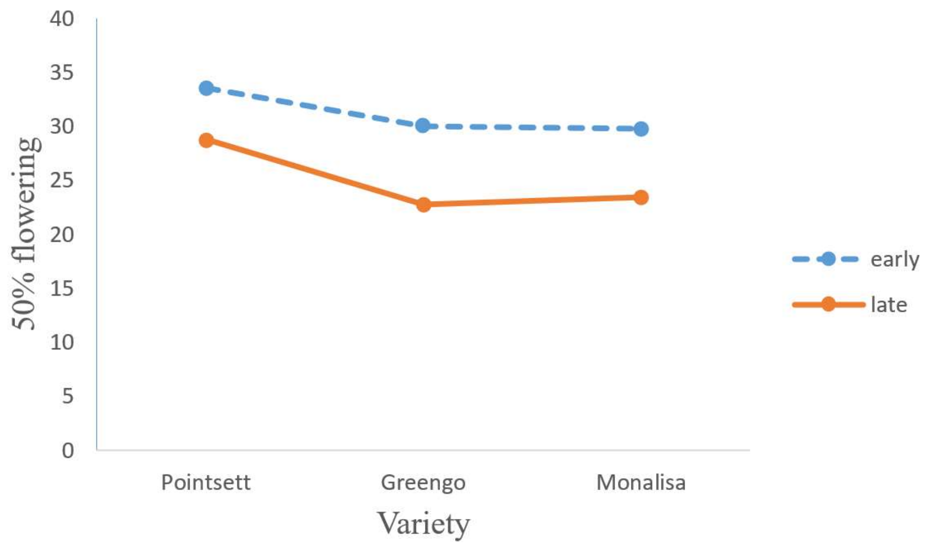

Figure 2. Varietal effect on days to 50% flowering of cucumber in early and late season of 2019.

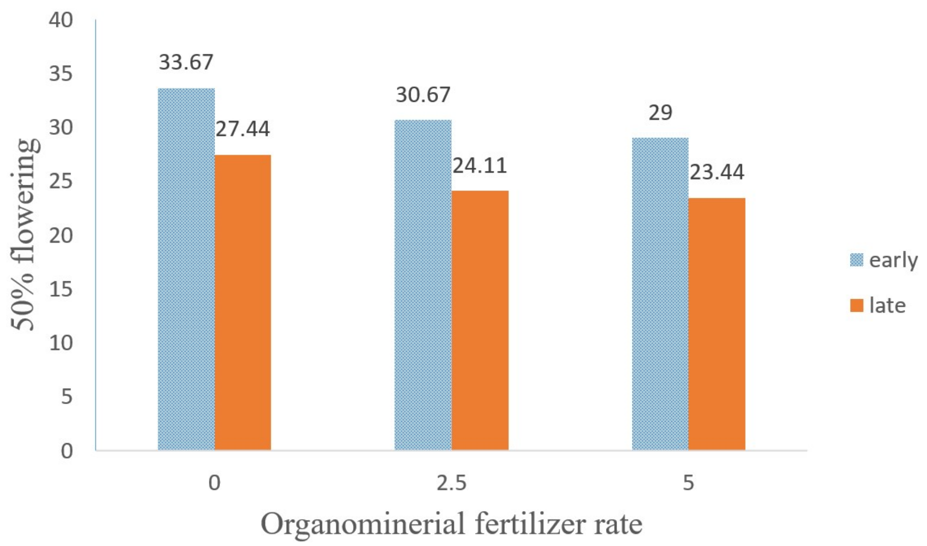

Figure 3. Effect of organominerial fertilizer rate on days to 50% flowering of cucumber in early and late season of 2019.

In both early and late season, variety, organomineral fertilizer rate, and interaction significantly affected days to 50% maturity (**Table 5**). In both early and late seasons, the Greengo and Monalisa variety matured earlier (58 days) than Poinsett varieties (63 days). In both planting seasons, 5.0 t.ha^{-1} treatment produced earlier days to 50 % maturity (57 days) than 2.5 t.ha^{-1} (59 days) Plants that were not fertilized matured late in 64 days (**Table 5**).

Table 5. Effect of varieties and rate of organomineral fertilizer on days to 50% maturity and days to 50% fruiting of cucumber in early and late season of 2019.

	Early		Late	
	Days to 50% maturity	**Days to 50% fruiting**	**Days to 50% Flowering**	**Days to 50% maturity**
Varieties				
Pointsett	62.67	49.89	28.78	58.33
Greengo	58.89	46.33	22.78	51.67
Monalisa	59.11	46.11	23.44	52.78
LSD (P < 0.05)	3.05*	3.15*	2.25*	2.94*
Rates of organominerial fertilizer				
0 t ha^{-1}	64.33	50.67	27.44	58.11
2.5 t ha^{-1}	59.44	46.67	24.11	53.11
5.0 t ha^{-1}	56.89	45.00	23.44	51.56
LSD (P < 0.05)	1.04*	0.82*	0.80**	1.43**
Varieties × Rates of organomineral fertilizer	3.03**	NS	NS	NS

NS—non significant, *—significant and **—highly significant level of 5% probability.

During the early and late season, days to 50% fruiting was significantly affected by variety and organomineral fertilizer rate but not by interaction (**Table 5**). In early season, the Greengo and Monalisa varieties produced fruits earlier (46 days) than Poinsett variety (50 days). In late season, the Greengo variety produced fruits earlier (39 days) than Poinsett variety (45 days) but was not significant different from Monalisa (40 days) In both the early and late seasons, application of 5.0 t.ha^{-1} resulted in earlier days to 50% fruiting (45 days) than application of 2.5 t.ha^{-1} (47 days). Plants without fertilizer fruited late in 51 days (**Table 5**).

In early season, variety, organomineral fertilizer rate, and interaction significantly affected fruit yield (**Figure 4**). The Greengo variety produced higher fruit yield (8.56 t.ha^{-1}) than the Monalisa (6.71 t.ha^{-1}) or Poinsett varieties (6.78 t.ha^{-1}). In both early and late seasons, 5.0 t.ha^{-1} yielded higher (10.30, 11.57 t.ha^{-1}) than 2.5 t.ha^{-1} (7.93, 9.91 t. ha^{-1}) respectively. The unfertilized treatment produced the least fruit yield (**Figure 5**).

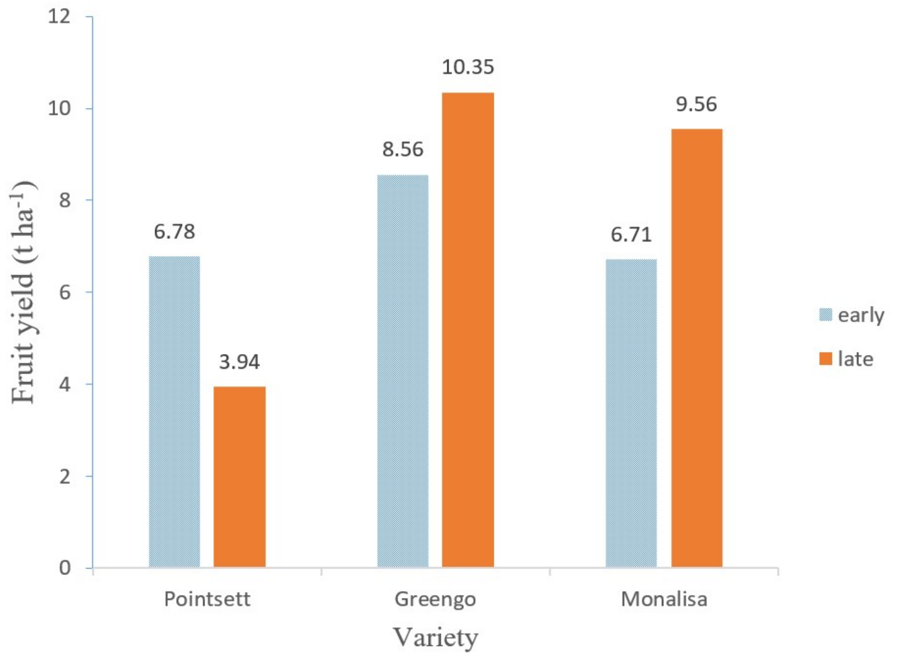

Figure 4. Varietal effect on cucumber yield in early and late season of 2019.

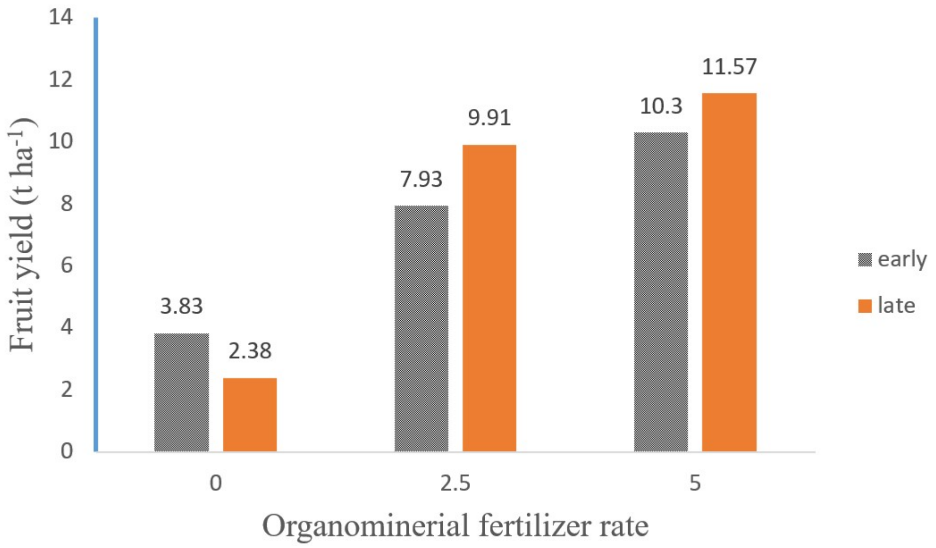

Figure 5. Effect of organomineral fertilizer rate on cucumber yield in early and late season of 2019.

4. Discussion

The variation in cucumber performance between early and late season in 2019 was attributed to differences in total rainfall and rain dispersion over the growing season. Rainfall was a major influence to increase the yield of cucumber. Environmental conditions change the physicochemical properties of soil and plant performance substantially [25]. Cucumber planting took advantage of the rainfall for development and grew faster. The significant increase in vegetative growth of the three varieties of cucumber planted maybe attributed to the substantial rainfall during both season of planting. This aligns with the findings of Omotade and Babalola [26], which revealed that watering the cucumber plants adequately led to increased number of leaves and vine length. Due to the higher rainfall in late season in 2019, plants grew taller and produced more leaves. This was contrary to the findings of Ajibola and Amujoyegbe, [27]. Variation in cucumber vegetative development seen in the study could also be related to the genetic composition of the cucumber varieties planted as well as environmental conditions. This was also opined by John et al. [28] and Ene et al. [29], whose experiment stated that plant growth variation was attributable to cultivar genetics. The addition of organic matter to the soil from the application of organomineral fertilizer could be attributed to the considerable increase in vine length and number of leaves because organic matter has a higher water holding capacity and releases nutrients in the soil. Plant metabolic processes were improved, which resulted in a higher growth rate. These findings support those of Adekiya and Ojeniyi [30], Ewulo et al. [31] and Sarfraz et al. [13], who discovered that poultry manure was not only a rich source of nutrients, but also aided in the availability of those nutrients to plants already present in the soil. Incorporating poultry manure into the soil boosted the availability of vital nutrients to the plants, resulting in higher photosynthetic activity and improved watermelon growth and yield, according to John et al. [28]. When compared to the control, application of organomineral fertilizer increased cucumber vegetative growth as evidenced by the high number of leaves. This was presumably attributable to higher nutrition of the fertilized plants. This was also in line with the research of Ishfaq et al. [25], who reported that at any experimental site, the combine organic and inorganic fertilizer help to increase the odds of fulfilling the need for the most limiting nutrient. Early application of organomineral fertilizer improved vegetative growth because the cucumber plant concentrates assimilate to vegetative structures at an early stage. The nutrient releasing capacity of the organic amendment(s) is usually slow and long-lasting and nutrients become available only after mineralization, thus ensuring continuous supply of nutrients throughout the growing season [25]. Better nutrition at this time will encourage the plant to produce more leaves and other vegetative parts. Fertilizer application boosted cucumber growth and yield components, according to Agba and Enya [32]. The optimal amount of macro and micronutrients available in the organomineral fertilizer used, which is required for the synthesis of photo assimilates, may be attributed to the increased number of cucumber fruits per plot, fruit length, and fruit girth, and the increased amount of photo assimilates produced maximum fruit length and girth. Ishfaq et al. [25] reported that vegetables showed the greatest increase in yield and nutritional quality in response to fertilizer application. Adediran et al. [33] discovered that a high quantity of poultry manure, which is a rich source of nutrients, greatly improved the fruit length. Similar increases in okra stem circumference with increased nitrogen application were previously reported by Akande et al. [34]. The genetic nature of the cucumber varieties planted, as well as climatic factors, were attributed for the variance in days to flowering, maturity, and fruiting. Variations in flowering days of different cultivars were also observed, according to Hamid et al. [35], due to differences in genetic makeup and environmental conditions. The high content of phosphorus and potassium in the Alesinloye organomineral fertilizer used triggered early flowering. Jilani et al. [36] reported that macro nutrient deficiency causes flowering to be delayed. The genetic composition of the varieties used can explain the variance in fruit weight among them. According to Wehner and Guner [37] and Okwuokenye [31], yield characters were a function of the variety used. The Greengo variety may have adapted to the environment more quickly than the Monalisa and Poinsett varieties, resulting in a strong source-sink interaction that resulted in the variety's high yield. This observation is consistent with Ibrahim et al. [38], who concluded that differences in growth rate and yield indices of vegetable crops are typically attributable to their genetic make-up. Proper nutrients stimulate cucumber plant significant growth, which increases the number of fruits, confirming the findings of Waseem et al. [39] for cucumber when 80 kg/ha nitrogen was applied. The late season fruit yield indicates that the use of organomineral fertilizer has improved soil fertility, resulting in a higher yield than in the early season. This is in line with the findings of Eifediyi and Remison [40] and Ishfaq et al. [25] that found that applied fertilizer increased cucumber growth and yield components. Fertilizer application would result in enhanced carbon utilization and subsequent assimilate synthesis [25,40].

5. Conclusion and recommendation

The most effective amount for optimizing all growth and yield parameters was found to be 5.0 tons ha^{-1}. In terms of growth and yield, Greengo was proven to be the best variety. As a result, it is recommended that the Greengo cucumber variety be grown with 5.0 tons ha^{-1} of Alesinloye organomineral fertilizer. It is therefore, recommended that application rate of 5.0 tons ha^{-1} of organomineral fertilizer on cucumber varieties can be cultivated for high yield of cucumber. Higher organomineral rate can still be tested on the crop. More research should be carried out on fruit quality of cucumber with Alesinloye organomineral fertilizer.

Author contributions: AOK—conceptualization, methodology, investigation, project administration, formal analysis, data curation, writing, review and draft preparation, funding acquisition. EAM—conceptualization, methodology, investigation, validation, supervision, writing, review and draft preparation. JAB—conceptualization, methodology, investigation, validation, supervision, project administration. OPS—conceptualization, methodology, investigation, supervision, validation. OOF—methodology, investigation, project administration. All authors have read and agreed to the published version of the manuscript.

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Data availability: The data that support this study will be shared upon reasonable request to the corresponding author.

Conflict of interest: The authors declare no conflicts of interest.

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