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Research Article

Effects of organic tea concentration and application methods on growth and yield of screen-house Cucumber (*Cucumis sativum L.*) in Owo, South-western Nigeria

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Abstract
Organic tea (mixture of Organic Manure Extract and Spent Bleaching Extract) is used as nutrient complements in agriculture and horticulture to increase plant growth and yield. A 2 x 4 factorial experiment was fitted in Completely Randomized Design (CRD) to examined the effect of compost tea [OT-organic tea (extract made from SBE and composted manure extract (OM)] as bio-stimulants at four different concentrations (0, 20, 30, and 40 %) on the growth and fruit yield in cucumber (*Cucumis sativum L.*) under screen-house condition using Foliar and Drip irrigation application methods. Vegetative parameters were studied at 50% flowering stage and yield parameters and yield / plot, at harvest. Organic tea application via folia method enhanced vegetative growth while application via drip irrigation influenced the yield parameters significantly. Plants that received 20% OT showed variability, but were not significantly different from control plants (0%), but plants treated with 30% OT via drip application showed early fruit initiation and improved fruit yield. Application of 30% organic tea via drip method is suggested for cucumber productivity in screen-house in the study area.

Keywords: *Organic tea, Bio-stimulant, Drip irrigation, Folia application, Fruit yield*

Introduction

Cucumber, (*Cucumis sativus L.*) a member of Cucurbitaceae plant family, is cultivated in subtropical and tropical agro-ecologies and has shown adaptation to many environment. It can therefore be assumed as a native to many countries of the world (Ismail *et al*., 2010). Cucumber production is becoming popular due to its high nutritional and medicinal values, as well as being a useful component ingredient in the canteens preparation of salad (Nweke *et al.,* 2013) and good for diabetic patients as it contains low sugar and help in the burning of excess fat in the body (Ayotamuno *et al.,* 2007). These have increased demand both in industries and table consumption of Nigerians. Information on nutrients requirement for optimum growth and yield of cucumber are insufficient. These exposes the farmers to indiscriminate use of inorganic fertilizers thereby damaging the soil and where used, organic manures are applied outside recommended rates with wrong method of application which leads to the production of bad quality fruits (Orluchukwu and Amadi, 2022). It is therefore important to apply the right dose, using appropriate application method in order to increase yield. Organic tea (OT) describes many different preparations made using compost as a starting material and producing a liquid extract or "liquid version" of the original compost (Bess, 2000) or best described it as water extract of compost that is actually brewed and contains soluble nutrients and diversity of microorganism [(bacteria, fungi, protozoa and nematodes), (Ingham, 2002)] with wide variety of

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plant growth-promoting substances such as auxins, cytokinins, and betaines (Khan *et al*, 2009) that can be accommodated by varieties of crop.

Organic manure and spent bleaching earth (SBE) and other degradable materials have been noted to be of good quality organic sources and have been documented to increase plant growth and yield (Aderibigbe and Eleduma, 2016; Aderibigbe *et al*, 2017) thereby substituting for conventional synthetic fertilizer (Dhargalkar and Pereira 2005; Hong et al., 2007; Khan *et al.*, 2009; Zodape *et al.*, 2010) which may be applied as foliar spray, drip irrigation, or in granular/powder form as soil conditioners and manure in agriculture and horticulture (Lingakumar *et al.,* 2004; Thirumaran *et al.*, 2009).

Production of organic tea of good quality depends on the quality of compost, quality of water, the material of the bag, aeration, length of fermentation, environmental conditions, and water compost ratio (Hussain *et al.,* 2021). Therefore, composting with right materials or compost source that can attract large diversity of beneficial organisms will be beneficial to the soil (Ingram and Millner, 2007; Diver, 2002).

Plants depend on soil microorganisms for gathering and incorporating nutrients in their roots and the growth of these microorganisms depend on organic sources. It was reported that compost teas contain substantial quantities of microorganisms added around the plant roots (Robson, 2000; Welke, 2001; Bailey and Lazarovits, 2003; Bonanomi *et al.,* 2010; Noble, 2011), with some microorganism potentials in disease suppression (Hadar and Papadopoulou, 2012; Mehta *et al.,* 2014), farmers and gardeners are becoming more interested in organic tea.

Organic teas are applied to soil or to plant foliage. Organic tea applied to soil via fertigation will move into root zone and affect the rhizosphere, where nutrient present in the tea will be used by plant as well as the organisms in soil, providing the opportunity to derive sufficient nutrient (Sebti, 2005). Organic tea sprayed to leaf will typically alter the set of organisms on foliage through both inoculation of the organisms from the tea and through supply on nutrient that help support survival of leaf colonizing organisms (Ingram and Millner, 2007), thereby influencing the shoot and root system development and also producing macronutrients and micronutrients that can help promote the growth of various vegetables crops (Durand *et al.,* 2003).

In Nigeria, SBE and other organic materials are available and represent a great potential for eventual commercial exploitation (Adeniyi *et al.,* 2021) in organic tea production for sustainable crop production and also to improve negative cropping conditions such as the progressive degradation of ecosystems and the contamination of agricultural lands caused by synthetic fertilizers, while using appropriate discharge method. The aim of this study was to examine the effect of organic tea (OT) at different concentration and the best application method on the growth and yield of cucumber (*Cucumis sativum* L.) plants in the study area.

Materials and Methods

The experiment was carried out at Rufus Giwa Polytechnic Teaching and Research Farm located at latitude 5^0 12^1N and longitude 5^0 35^1E in guinea savannah transition zone of south western Nigeria. Materials for the preparation of Organic tea (OM + SBE) include poultry droppings, goat dung, pig dung, cassava spent water, Mexican sunflower (Tithonia species) leaves, spent bleaching earth (SBE), plastic containers with lid and thermometers.

Mexican sunflower leaf (Tithonia species) was collected manually within the institution. SBE was obtained from JOF Ideal Family Farm (Vegetable Oil Plant) along Owo-Benin express way. All materials were transported to the screen house where the experiment was carried out. Prior to composting, sun flower leaves were chopped into pieces with cutlass to facilitate easy mixing. The chopped leaves and animal dungs were mixed together using a hand propelled mixer of 10 tons capacity fabricated at the Department of Agriculture and Bioenvironmental Engineering Technology, Rufus Giwa Polytechnic, Owo. The mixing ratio was 1: 1: 1: 5 [10 kg poultry droppings; 10 kg goat dung; 10 kg pig dung; 5 kg Mexican sunflower leaf]. The mixture was composted for four weeks. The compost was later

soaked inside a plastic container filled with 100 liters of grated cassava spent water at room temperature. 80kg of spent bleaching earth (SBE) was soaked inside 100 liters of water inside another plastic container. The contents in the two containers were stirred vigorously to enhance uniform mixture and proper infusion for 2 days before sieving with 0.60cm filter and residue discarded. 5cl of each of the filtrates was subjected to atomic absorption spectrophotometry for mineral analysis of sodium, potassium, calcium and phosphorus following procedures of Ibitoye (2008). The filtrates of the two containers were mixed together at equal ratio (1:1) in order to obtain homogenous OT (OM+SBE extract mixture). The OT (filtrates) was later diluted with water at 20%, 30% and 40% respectively.

Cucumber seed (*Cucumis sativum* L. cv. Ashley) was obtained from Farm-Let Agro supplies, Akure, Ondo state, Nigeria. Two seeds were sown in a plastic container filled with loamy-clay soil collected at a depth of 0 – 5 cm deep. Plants were thinned to one seedling per pot a week after germination. The 2 x 4 factorial experiments were arranged in a Completely Randomized Design (CRD) inside a screen house of $35m^2$. Treatments (two methods of organic tea application (folia spray and drip irrigation) as main treatments (plots) and four levels of OT as sub treatments (plots) at 0%, 20%, 30% and 40% which were randomly allocated to 128 stands with table of random numbers two weeks after germination. Each plot was replicated 4 times (a plot contains 16 pots; 2 x 4 x 16). Folia application was discharge with knapsack sprayer attached with shield to prevent escape to adjacent plots while drip treatment was applied using the gravity drip irrigation with OT delivered to plant via point source emitters of 2 liters/hour discharge rate. The emitters were installed on lateral per row of cucumber spaced 40cm X 40 cm apart. Irrigation buckets were suspended on 1.5m high wooden stakes to provide the required hydraulic heads (1WM1, 2002) at 2, 4 and 6 WAP. Morphological characteristics such as vine length, number of branches, number of leaves/plant, leaf area and stem diameter, were measured at 50% flowering stage while number male and female flowers taken at anthesis. Yield parameters like number of fruit / plant, fruit length / plant, fruit diameter / plant, fruit weight / plant were recorded at DTFI (Days to Fruit Initiation) and harvest. Total fruit yield per plant under each plot was massed and weight determined by a 25kg capacity weighing machine to give yield per plot.

Data analysis: All data were analyzed for significant differences by analysis of variance (ANOVA) at 5% level with mean separation using Duncan Multiple Range System (DMRT). The data analysis was performed with SPSS Statistical Package, version 20.

Results and Discussion

Physicochemical properties of OT, SBE and OM

Results obtained from the nutrient analysis of the organic extracts showed the presence of the macro and micro elements in varying values (Table 1). The colour of SBE extract was greyish black, compost manure extract (OM) was brownish-green and greenish black for the OT (OM+SBE). Percentage Nitrogen, phosphorous, potassium, sulphur, magnesium and calcium were high in OT than separate OM or SBE extracts. OT recorded the highest values in sodium, iron, manganese and zinc (%). However, SBE had a characteristic high value of 60% silicon. The pH values for OT (6.90) and OM (6.88) were slightly acidic and acidic for SBE (5.80). The value of EC varies from 1.74 (SBE), 0.89 (OT) and 0.76 (OM)

Effect of method of application, Organic tea (OT), level of application and their interaction on the vegetative growth of cucumber at 50% flowering stage: In the experiment, both foliar spray and drip irrigation of OT showed a significant improvement ($p \leq 0.05$) on the vegetative growth of cucumber plants Number of leaf was significantly increased under folia method (49.96) than drip application method (43.72). The value of 1.12cm obtained for stem girth under folia was not statistically different from 1.12 obtained from drip application method (Table 2). From table 1, some soluble macro and micro elements were relatively more abundant in OT as compared to individual SBE or organic manure. This probably must have facilitated the presence of soluble nutrients that enhanced cucumber growth. This agrees with the findings of Ingham (2002) that soluble nutrients and diversity of microorganism (bacteria, fungi, protozoa and nematodes) with wide variety of

plant growth-promoting substances such as auxins, cytokinins, and betaines (Khan et al, 2009) enhance plant productivity. The positive influence of folia application could be attributed to the immediate release of nutrient and the subsequent absorption for plant utilization. In a similar study carried out by Li and Mattson (2015) on tomato and petunia, sea weed extract via folia method enhanced vegetative growth of both plants. Bess (2000) also reported that application of compost tea facilitated vegetative growth of plant due to release of nutrients to leaves which enhanced stomata absorption of nutrients and fast utilization of nutrient by the plant. The non-significant difference in stem girth could be attributed to inherent genetic makeup of the plant.

Application of OT at higher concentration (20% - 40%) showed increased in the vine length, number of leaf, number of branches, and leaf area at significant ($p \leq 0.05$) level. The stem girth was not influenced by OT at all levels of application (Table 3).The variation could be as a result of different growth phases of cucumber responding differently to application rate of OT concentration. Similar observation was made by Li and Mattson (2015) that application of RWE (rock weed extract) substrate at 0 to 5 mL/L^{-1} increase dry weight, fresh weight and yield of tomato and petunia, but further application above 5 mL/L^{-1} reduced yield and yield attributes of tomato and petunia.

Result in table 4 showed the interaction between application method and level of concentration of OT. Application via folia method at 40% OT concentration influenced vegetative growth more than drip application at 40% concentration. Higher values were recorded in folia application for number of branches (3.96) and leaf area (828.76) which was not significantly different from values of drip application for number of branches (3.90) and leaf area (825.56). Values of vegetative parameters at 30% and 40% concentration via folia application were not significantly ($p \leq 0.05$) different level. There was indication that the volumes of nutrient supplied via both methods at 30% and 40% concentration were adequate and efficient to supply nutrient requirement at every growth phase of cucumber. Application of required rate of OT via folia method enhanced vegetative growth of the plants (Li and Mattson, 2015) while application of appropriate rate of OT via drip method supplied required nutrients, built the microbial strength of the soil (Sebti, 2005) and control salinity and drought stress of plant (Khan et al., 2009).

Effects of method of application of Organic tea (OT), level of application and their interaction on flowering and yield of Cucumber at DTFI and harvest: Result showed that drip irrigation method of OT application significantly ($p \leq 0.05$) influenced Number of female flower, Day to Fruit Initiation (DTFI), Number of fruit/plant, Fruit length, Fruit diameter, Fresh fruit weight and Yield as compared to Number of female flower, Day to Fruit Initiation (DTFI), Number of fruit/plant, Fruit length, Fruit diameter, Fresh fruit weight and Yield values obtained under folia application method. Male flower and female / male flower ratio were statistically higher under folia application method (Table 5). The observed differences in flowering and yield components could be attributed to judicious translocation and utilization of nutrients and reduced moisture stress under drip application method. This agreed with the findings of Sebti (2005) that drip application method supplied required nutrients, built the microbial strength of the soil and Khan *et al.*, (2009) noted that drip application method control salinity and drought stress of plant.

Application of 30% concentration of organic tea (OT) influenced the values of male flower per plant (8.51). There was no significant difference ($p \leq 0.05$) in value of male flower at 30% and 40% OT concentration. Number of female flower per plant and male / female flower ratio were not significantly different across all level OT application. The highest number of fruit was recorded from plots treated with 30% OT and the least was recorded under control. Fruit length, fruit diameter, fruit weight / plant and yield / plot were not significantly different ($p \leq 0.05$) at 20%, 30% and 40% OT application but significantly ($p \leq 0.05$) different from control (Table 6). From this study, increase in concentration (30% - 40%) showed increased in flowering and yield attributes of cucumber up to a certain limit, until there was no significant influence. This could translate to the diminishing return with increase in OT application

at flowering and fruiting growth stage. In a similar report, Li and Mattson (2015) noted that application of RWE (rock weed extract) substrate at 0 to 5 mL/L^{-1} increase dry weight, fresh weight and yield of tomato and petunia, but further application above 5 mL/L^{-1} reduced yield and yield attributes of tomato and petunia.

Drip application method and all levels of OT concentration facilitated DTFI significantly ($p \leq 0.05$) more than folia at all levels of application. Both drip and folia application methods at 30% concentration improved NMF (Number of male flower), but number of FFL (female flower) was influenced significantly ($p \leq 0.05$) under drip method at 30% OT. The ratio of male:female flower improved significantly ($p \leq 0.05$) under folia method at 30% OT. Significant increase in number of fruit per plant was observed at 30% OT under drip application method while the least value was produced at control level under both drip and folia application. FL/P (Fruit length / plant) was favoured at 30%> 40%> 20% at significant ($p \leq 0.05$) level under both application method. FD/P (Fruit diameter) at 20%, 30% and 40% under both application methods were not significantly different from one another, but varied significantly from control treatment. Fruit weight was not significantly ($p \leq 0.05$) different at 40% and 30%, but 30% > 40% under drip application method. Drip applicatiom method at 30% statistically influenced fruit yield. Fruit yield values under drip application at 40% and 20% were not significantly ($p \leq 0.05$) different from each other. Control treatment under both drip and folia method and all other treatment levels under folia application method were not significantly ($p \leq 0.05$) different from one another (Table 7).

The significant effect of drip application method at all levels of OT on DTFI and increase production of female flowers at 30% could be attributed to the improved moisture condition and increased microbial influence around the root zone which facilitated nutrient uptake of the plant. However, reduced number of female flower at 40% under drip application could be the response of cucumber to increase nutrient uptake at flowering stage. Li and Mattson (2015) mentioned that plants respond differently to compost tea and application method at different stages of growth.

Naturally, male and female flower is usually high in favor of male flower in cucurbits (Nweke et al., 2013). The influence of folia application method at 30% concentration could be attributed to earliness of male flower initiation resulting from improved vegetative growth enhancement facilitated by folia application method (Ingram and Millner, 2007). The improved performance of drip application method at 30% OT concentration on fruit and yield could be attributed to the appropriate partitioning of nutrient supplied via the roots to the various organs. Li and Mattson (2015) and Hussain *et al*., (2021), agreeing with above, noted in their separate studies on tomato that drip application method of compost tea improved fruit and yield of tomato. Li and Mattson (2015) further substantiated that increase in substrate level of compost tea substrate will jeopardize yield. In agreement therefore, further application of OT up to 40% via drip method reduced fruit yield and yield components of cucumber in this study.

Conclusion

This study suggest that production of organic tea from locally available bio-degradable materials will facilitate the release of macro and micro nutrients for optimum growth and fruit yield of cucumber. Organic tea application via drip method will be an efficient method that makes the nutrients available to the plant and also improves moisture around the root zone for enhanced cucumber productivity. Application of 30% concentration of organic tea significantly improves both vegetative and yield of cucumber.

Organic tea improves plant growth and yield if the required rate is used via appropriate method of application. Application of 30% concentration of organic tea via drip irrigation method is recommended for cucumber production in the screen house.

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Table 1: Physicochemical properties of SBE, OM and OT

S/N	Property	SBE (Spent Bleaching Earth)	Organic manure	Organic Tea
1	Colour	Greyish black	Brownish green	Greenish black
2	pH	5.80	6.88	7.05
3	EC (ds m-1)	1.74	0.76	0.91
4	N (%)	1.93	3.68	4.79
5	P (%)	1.17	2.10	2.54
6	K (%)	0.85	2.11	3.27
7	Ca	3.45	3.10	4.74
8	Na	1.56	1.81	2.95
9	Fe	0.28	0.25	0.52
10	C:N	258	158	290
11	SiO2	60	3.19	54.13
12	S	0.97	0.56	1.58
13	Mg	0.10	0.40	0.64
14	Zn	0.56	0.58	1.05

Table 2: Effects of method of application of organic tea (OT) on the vegetative growth of cucumber (*Cucumis sativum L.*) at 50% flowering stage

	Parameters				
Method of application	Vine length (cm)	No of branch	No of leaf	Leaf area (cm)	Stem girth (cm)
Folia	68.75^{a}	3.97^{a}	45.96^{a}	842.29^{a}	1.12^{a}
Drip	62.19^{ab}	3.71^{ab}	43.72^{b}	827.68^{ab}	1.12^{a}

Values followed by similar letters under the same column are not significantly different at $p \leq 0.05$ according to Duncan's multiple range test (DMRT)

Table 3: Effects of level of concentration of organic tea (OT) on the vegetative growth of cucumber (*Cucumis sativum L.)* at 50% flowering stage

	Parameters				
Level of Conc.	Vine length (cm)	No of leaf	Leaf area (cm^2)	No of branch	Stem girth (cm)
0	50.34^{c}	33.26^{c}	824.89^{b}	3.19^{b}	1.11^{a}
20	64.76^{b}	34.98^{b}	826.55^{ab}	3.89^{a}	1.13^{a}
30	67.29^{a}	35.72^{a}	827.11^{a}	3.93^{a}	1.13^{a}
40	67.13^{a}	35.67^{ab}	827.16^{a}	3.93^{a}	1.13^{a}

Values followed by similar letters under the same column are not significantly different at $p \leq 0.05$ according to Duncan's multiple range test (DMRT).

Table 4: Interaction effects of application method and level of concentration of organic tea (OT) on the vegetative growth of cucumber (*Cucumis sativum L.*) at 50% flowering stage

		Parameters				
MOA	OT Conc (%)	VL (cm)	NOB	NOL	LA (cm^2)	SG (cm)
Folia	0	50.31^{d}	3.17^{c}	33.25^{c}	825.25^{b}	1.10^{a}
	20	65.18^{c}	3.89^{b}	34.75^{b}	828.50^{a}	1.14^{a}
	30	67.30^{ab}	3.94^{a}	35.44^{a}	828.75^{a}	1.14^{a}
	40	67.58^{a}	3.96^{a}	35.45^{a}	828.76^{a}	1.14^{a}
Drip	0	50.36^{c}	3.20^{bc}	33.27^{c}	824.53^{b}	1.11^{a}
	20	64.34^{b}	3.88^{b}	35.21^{ab}	824.59^{b}	1.12^{a}
	30	67.28^{b}	3.91^{ab}	36.00^{a}	825.47^{ab}	1.12^{a}
	40	66.68^{b}	3.90^{ab}	35.89^{a}	825.56^{ab}	1.12^{a}

Note; MOA (method of application), OT (organic tea), VL (vine length), NOB (number of branches), NOL (number of leaf), LA (leaf area), SG (stem girth)
Values followed by similar letters under the same column are not significantly ($p \leq 0.05$) different according to Duncan's multiple range test (DMRT).

Table 5: Effects of method of application of organic tea (OT) on flowering and fruit yield of cucumber (Cucumis sativum L.) at flower initiation and maturity

	Parameter								
MOA	DTFI	NMF	NFF	M/FR	NOF	FL/p (cm)	FD/p (cm)	FW/p (kg)	Y/Pl (kg)
Folia	35.25^{b}	8.33^{a}	8.02^{b}	0.98^{a}	2.85^{b}	20.02^{b}	5.17^{b}	0.58^{b}	7.14^{b}
Drip	40.75^{a}	8.32^{b}	8.07^{a}	0.96^{b}	3.13^{a}	26.70^{a}	5.61^{a}	0.85^{a}	7.52^{a}

Note; MOA (method of application); DTFI (date to flower initiation); NMF (number of male flower); NFF (number of female flower); M/FR (male/female flower ratio); NOF (number of fruit); FL/p (fruit length /pod); FD/p (fruit diameter/pod); FW/p (fruit weight/pod); Y/Pl (yield/plot). Values followed by similar letters under the same column are not significantly ($p \leq 0.05$) different according to Duncan's multiple range test (DMRT).

Table 6: Effects of level of concentration of organic tea (OT) on flowering and fruit yield of cucumber (Cucumis sativum L.) at Day to Fruit Initiation (DTFI) and maturity

	Parameter								
OT conc (%)	DTFI	NMF	NFF	M/FR	NF/P (cm)	FL/P (cm)	FD/P (kg)	FW/P (kg)	Y/PL
0	35.0^{b}	8.13^{c}	8.00^{a}	0.98^{a}	2.78^{b}	20.02^{b}	5.07^{b}	1.49^{b}	7.10^{b}
20	38.0^{a}	8.23^{b}	8.00^{a}	0.97^{a}	2.91^{ab}	26.37^{a}	5.51^{a}	1.65^{a}	7.31^{a}
30	38.5^{a}	8.51^{a}	8.08^{a}	0.98^{a}	3.22^{a}	28.02^{a}	5.53^{a}	1.82^{a}	7.41^{a}
40	38.5^{a}	8.44^{a}	8.03^{a}	0.95^{a}	3.06^{a}	26.52^{a}	5.50^{a}	1.75^{a}	7.35^{a}

OT (organic tea); DTFI (date to flower initiation); NMF (number of male flower); NFF (number of female flower); M/FR (male/female flower ratio); NOF (number of fruit); FL/p (fruit length /pod); FD/p (fruit diameter/pod); FW/p (fruit weight/pod); Y/Pl (yield /Plot)
Values followed by similar letters under the same column are not significantly ($p \leq 0.05$) different according to Duncan's multiple range tests (DMRT).

Table 7: Interaction effects of application method and level of concentration of organic tea (OT) on flowering and fruit yield of cucumber (Cucumis sativum L.) at Day to Fruit Initiation (DTFI) and maturity

		Parameter								
MOA	OT conc (%)	DTFI	NMF /p	NFF /p	M/F ratio	NF/p cm	FL/p cm	FD/p kg	FW/p kg	Y/Pl
Folia	0	35^{c}	8.12^{d}	7.99^{c}	0.98^{b}	2.80^{d}	20.00^{d}	5.12^{b}	1.48^{c}	7.04^{c}
	20	35^{c}	8.22^{b}	8.00^{bc}	0.97^{c}	2.82^{d}	25.03^{c}	5.22^{a}	1.48^{c}	7.14^{c}
	30	36^{b}	8.50^{a}	8.05^{b}	1.00^{a}	2.93^{c}	25.04^{c}	5.24^{a}	1.53^{c}	7.14^{c}
	40	35^{c}	8.44^{a}	8.02^{b}	0.95^{d}	2.85^{d}	25.01^{c}	5.20^{a}	1.51^{c}	7.14^{c}
Drip	0	35^{b}	8.14^{c}	8.00^{bc}	0.98^{b}	2.76^{de}	20.05^{d}	5.02^{b}	1.50^{c}	7.14^{c}
	20	41^{a}	8.23^{c}	8.00^{bc}	0.97^{c}	3.00^{c}	27.70^{b}	5.80^{a}	1.82^{b}	7.48^{b}
	30	41^{a}	8.52^{a}	8.10^{a}	0.95^{d}	3.51^{a}	31.00^{a}	5.82^{a}	2.10^{a}	7.68^{a}
	40	41^{a}	8.43^{ab}	8.04^{b}	0.95^{d}	3.26^{b}	28.03^{b}	5.80^{a}	1.98^{a}	7.57^{b}

MOA (method of application); OT (organic tea); DTFI (date to flower initiation); NMF (number of male flower); NFF (number of female flower); M/FR (male/female flower ratio); NOF (number of fruit); FL/P (fruit length /pod); FD/P (fruit diameter/pod); FW/P (fruit weight/pod); Y/Pl (yield / Plot).
Values followed by similar letters under the same column are not significantly ($p \leq 0.05$) different according to Duncan's multiple range test