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Studies on different levels of nitrogen on growth and yield of parthenocarpic cucumber (*Cucumis sativus* L.) under protected condition

Arjent Dawer, Raj Kumar Dhakad, DK Mishra and Ramesh Jamod

Abstract
The present investigation entitled "Studies on different levels of Nitrogen on growth and yield of Parthenocarpic Cucumber (*Cucumis sativus* L.) under protected condition" was carried out in during *kharif* season 2018-19 at Agriculture farm, Department of Horticulture under under protect condition, School of Agriculture and Rural Development Dr. B.R. Ambedkar University of Social sciences, Dr. Ambedkarnagar (Indore), Madhya Pradesh. The Experiment was laid out in randomized block design with three replications and eleven treatments were evaluated in the present study. The maximum vine length (290.92cm, 415.28cm and 553.32cm), highest number of primary branches per plant (35.08, 45.98 and 60.57 branches) and minimum days taken for flower emergence were recorded with Treatment T_5 (N:P:K- 220:125:125) at deferent days and significant Average yield vine^{-1} (7.46 kg), Average yield plot^{-1} (62.55 Kg) and Average yield ha^{-1} (54.04 qt/ha) were highest recorded with treatment T_5 (N:P:K-220:125:125). The maximum Fruit diameter (3.87cm), Fruit length (21.54cm), Fruit weight (221.02gm) were recorded with treatment T_6 (NPK-140:125:125Kg/ha).

Keywords: Growth and growth parameters, yield and yield parameters, randomize block design

Introduction
Cucumber *(Cucumis sativus* L.) is an very important vegetable and one of the most popular members of the *Cucurbitaceae* family (Lower and Edwards, 1986; Thoa, 1998) [18]. And it has chromosome number 2n = 14. It is thought to be one of the oldest vegetables cultivated by man with historical records dating back 5,000 years (Wehner and Guner, 2004) [20]. It is the second most widely cultivated cucurbit after watermelon. The second most important vegetable crop after tomato in Western Europe (Phu, 1997) [11].

The immature cucumber fruits are used as salad and for pickling. The fruits and seed possess cooling properties. It is also important to human for its medicinal value. It is very useful for natural Diuretic and thus can serve active drug for secreting and promoting the flow of urine. The fruit is also used as an astringent and antipyretic and good for people suffering from constipation, jaundice and indigestion. The seed oil is used as antipyretic.

Cucumbers are frost-sensitive high yielding vegetables. They give satisfactory yield as an early harvesting crop and well during the summer. In addition to its palatability and fairly good caloric value.

In India, cucumber is cultivated on area of 107 thousands hectare and producing 1658 million tonnes (NHB data base 2018). In Madhya Pradesh, it is grown on about 8.510 thousand hectare with total production of 116.07 metric tonnes.The Haryana state ranks first positions in production while Madhya Pradesh ranks third in area (Horticulture Statistics education, Deparment of agriculture, coopration and farmers welfare. 2016-17) [6].

Although cucumber is one of the major vine crop grown in India, its yield is quiet low. Increase in cucumber production can be achieved either bringing parthenocarpic varities under its cultivation with better cultural practices. The second approach is more often preferred and among various cultural practices fertilizer application is one of the quickest and easiest ways of increasing the yield per unit area.

Fertile and well drainage soils are good for the cultivation of cucumber and infertile soils produce in bitter and misshapen fruits which are often rejected by consumers. In the tropics condition, Bush fallowing has been an efficient, balanced and sustainable agricultural system for soil productivity and fertility restoration, but as a result of increase in the population, the fallowing periods have decreased from ten years to three years and this has had an adverse effect on the fertility restoration leading to poor yields of crops. Therefore, the use of external inputs in the form of farmyard manures and fertilizer has become imperative. Farmyard manure has been used as a soil conditioner since ancient times and its benefit have not been

fully harnessed due to large quantities required in order to satisfy the nutritional needs of crops (Makinde *et al*., 2007) [8]. The need for renewable forms of energy and reduced cost of fertilizing crops, have revived the use of organic manures worldwide (Ayoola and Adeniran, 2006) [2].

In recent years, chemical fertilizers have played a significant role in providing nutrients for intensive crop production which heralded green revolution in the country. But increased use of chemical fertilizers in an unbalanced manner has created problem of multiple nutrient deficiencies, diminishing soil fertility and unsustainable crop yields. This necessitated a review of various approaches for ensuring effective use of available renewable sources of plant nutrients for supplementing and complementing commercial fertilizers.

Parthenocarpic varieties produce fruit without the need of pollination. Parthenocarpic varieties are seedless and the fruit developed from with our fertilization. These varieties can produce seed if pollinated. Therefore, parthenocarpic varieties should be spatially isolated from other types of cucumbers to keep the fruit seedless. Because parthenocarpic varieties do not produce large numbers of seed, even when pollinated, the cost of seed production is high, and the seed of these varieties is typically more expensive than the seed of other varieties.

They are best suited for greenhouse or indoor scenarios where no pollinators are present. They differ slightly from Gynoecious in that pollination of a Gynoecious - Female Cucumber will not necessarily produce an undesirable fruit. Parthenocarpic cucumbers are nearly all gynoecious, meaning that they only produce female flowers. However, not all gynoecious cucumbers are parthenocarpic.

Materials and Method

The present experiment was laid out in the farm of Agriculture, Department of Horticulture under Polyhouse, School of Agriculture and Rural Development Dr. B.R. Ambedkar University of Social sciences, Dr. Ambedkarnagar (Indore), Madhya Pradesh. The experiment was laid out in the simple Randomized Block Design with three replications and the deferent levels of nitrogen treatments. Terminator variety is taken for experiment under drip irrigation system. Sowing of seeds wasdone in line method by hand at the spacing of 1.5 m row to row and 1.0 m in plant to plant per plots. Sowing of seed was done in the morning hours immediately followed by irrigation for proper seed germination. A week after gap filling was done.

Table 1: Treatments Detail

Treat. Symbol	N (Kg/ha)	P (Kg/ha)	K (Kg/ha)
T_1	140	125	125
T_2	160	125	125
T_3	180	125	125
T_4	200	125	125
T_5	220	125	125
T_6	240	125	125
T_7	260	125	125
T_8	Control		

Result and discussion

Growth parameters

The mean data pertaining on growth and growth parameters of cucumber plants were influenced by different level of nitrogen are presented in Table: 2. and graphical presentation in Fig: 1. the growth and growth parameters observation was recorded at 30, 60 and 90 days after sowing.

Table 2: Mean performance of growth parameters on different level of nitrogen application in Cucumber.

Treatments no.	Vine length (cm)			Number of primary branches vine^{-1} at		
	30DAS	60DAS	90DAS	30DAS	60DAS	90DAS
T_1	250.74	375.96	443.86	25.64	39.58	48.99
T_2	261.36	379.44	470.30	27.12	40.21	51.36
T_3	241.59	378.50	455.70	28.15	41.14	53.03
T_4	273.15	382.60	498.07	30.95	44.64	54.06
T_5	290.92	415.28	553.32	35.08	45.98	60.57
T_6	258.28	385.24	514.33	31.53	42.21	55.58
T_7	242.33	379.54	470.31	30.55	43.40	54.70
T_8	235.78	362.41	425.31	22.22	34.32	44.66
SE(m)	0.53	1.21	6.37	0.23	0.28	0.60
CD(P=0.05)	1.64	3.73	19.51	0.70	0.86	1.86

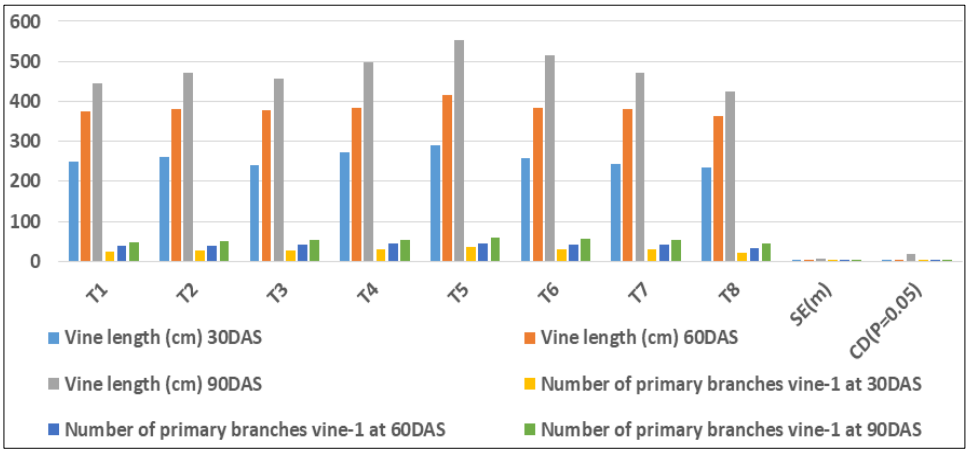

Fig 1: The growth and growth parameters observation was recorded at 30, 60 and 90 days after sowing

The maximum vine length (290.92cm, 415.28cm and 553.32cm), maximum number of primary branches per plant (35.08, 45.98 and 60.57 branches) and minimum days taken for flower emergence were recorded with treatment T_5 (N:P:K- 220:125:125). The highest days taken for flower emergence values was noted in T_8 (43.91 days). The increase in growth and growth parameters might be due to enhanced availability of nutrients and production of growth promoting substances that might have caused cell elongation, cell multiplication and appropriate nitrogen availability to the plants and these findings are closely related to Bhella and Wilcox (1986) [3], Singh and Chhonkar (1986) [16], Al-Sahaf and Al-Khafagi (1990) [1], El Hassan (1991) [5], Suresh and Pappaiah (1991) [17], Premalakshmi *et al.* (1997) [12], Sandhya

Rani (1998) [13], Niaz *et al.* (2016) [10] and Meena and Bhati (2017) [9], in cucumber.

Yield and yield parameters

The mean data on yield and yield parameters of cucumber were influenced by different level of nitrogen are presented in Table: 3. and graphical presentation has been shown in Fig: 2. The Days taken for flower emergence(27.29), Number of fruits vine^{-1} (8.50), Average yield vine^{-1} (7.46 kg), Average yield plot^{-1} (62.55 Kg) and Average yield ha^{-1} (54.04 qt/ha) were highest recorded with treatment T_5 (N:P:K-220:125:125). The maximum Fruit diameter (3.87cm), Fruit length (21.54cm), Fruit weight (221.02gm) were recorded with treatment T_6 (NPK-140:125:125Kg/ha). This might be due to efficient translocation of photosynthats to fruits thereby increase in dry matter accumulation of fruits hence increase fruit yield. These findings are closely related to Bolotskikh and Levic (1987) [4], Satish Siayag and Arora (1988) [14], Sharma *et al*. (1997) [15], Waseem *et al*. (2008) [19], Jilani *et al.* (2009) [7], and Meena and Bhati (2017) [9], in cucumber.

Table 3: Mean performance of growth and growth parameters influenced different level of nitrogen application in Cucumber is presented blow

Treat. no.	Days taken for flower emergence	Fruit diameter (cm)	Fruit length (cm)	Fruit weight (gm)	Number of fruits vine^{-1}	Average yield vine^{-1} (kg)	Average yield plot^{-1} (Kg)	Average yield ha^{-1} (Qt)
T_1	28.61	3.42	15.62	201.60	6.23	6.53	52.37	43.49
T_2	28.83	3.44	16.35	205.56	6.61	6.61	53.12	44.42
T_3	29.53	3.51	16.59	203.70	5.71	6.65	54.43	45.50
T_4	28.46	3.56	17.76	203.72	6.54	6.81	58.28	48.44
T_5	27.29	3.55	17.93	203.90	8.50	7.46	62.55	54.04
T_6	29.31	3.87	21.54	221.02	7.22	6.98	58.44	48.72
T_7	30.45	3.59	17.63	204.45	6.24	7.03	59.32	49.32
T_8	34.91	3.18	14.16	198.47	5.26	5.37	43.52	35.62
SE(m)	0.45	0.03	0.40	1.57	0.09	0.12	0.21	0.12
CD(P=0.05)	1.40	0.09	1.25	4.82	0.29	0.39	0.66	0.37

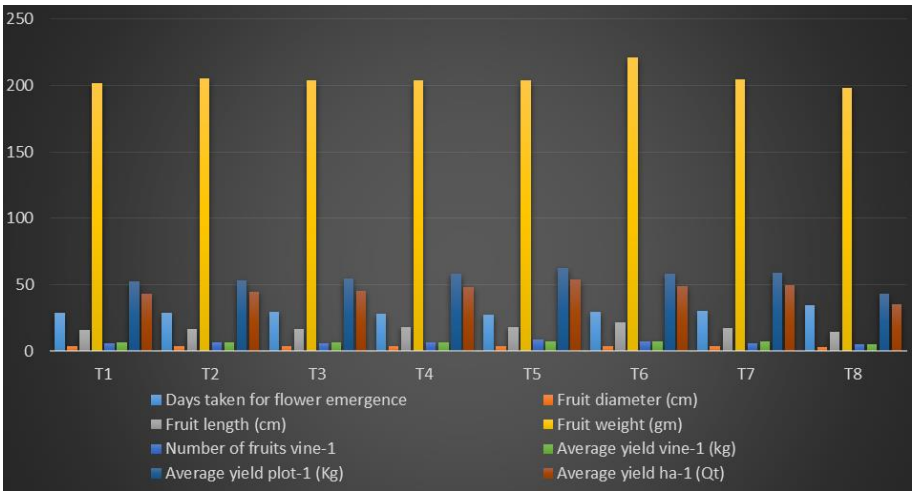

Fig 2: Mean performance of growth and growth parameters influenced different level of nitrogen application in Cucumber is presented blow

Conclusion

The present results on the "Studies on different levels of Nitrogen application on growth and yield of Parthenocarpic Cucumber (*Cucumis sativus* L.) Under protected condition" conclude that the treatment T_5 performed the best with respect to productivity and economical gain under the Malawa agro-climatic conditions.

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