

Effect Of Different Spacings On Growth Parameters Of Gherkin (Cucumis Anguria L.) Cv. Ajax Hybrid. Under Staking Method

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Abstract:

India today emerged as the origin of finest gherkin cultivation, processing and exports to every growing world requirement. As per the previous annotations there are different spacings followed by researchers for cultivation of gherkins. An experiment was conducted on Rabi season 2019 – 20 to find out the best spacing on gherkins at Batlagundu area near kodaikanal hills, Tamilnadu, India to determine the effect of plant spacing on the phenological parameters of gherkin (*Cucumis anguria* L.). The experiment was comprised of three row spacings (30 cm, 45 cm, 60 cm) and three plant spacings (100 cm, 125 cm, 150 cm) resulting in nine treatments. Data collected from the various observations were subjected to Analysis of Variance for randomized block design (RBD). The result generated from the experiment was statistically significant ($P \geq 0.05$) for all the five growth parameters studied. The 100 cm x 30cm recorded the highest in vine length and Internodal length then spacing at 150 x 60 cm recorded maximum in number of leaves, branches and dry matter parameters.

Keywords: Plant spacing, Gherkin, Growth, Phenological etc.

INTRODUCTION:

Cucumis anguria L., popularly known as bur cucumber, bur gherkin, cackery, gooseberry gourd, maroon cucumber, West Indian gherkin, and west Indian gourd, belongs to the Cucurbitaceae family and may well be found in tropical and subtropical locations, including tropical Africa, Brazil, and the Caribbean. (Venturin et al., 2020, Shanmugapriya (2017) and Madeira et al., 2008). Gherkin is term generally used to a savory pickled cucumber belongs to the same species (*Cucumis sativus* L.) but are from different cultivar groups Shanmugapriya (2017). It is a significant cucurbitaceous crop. It is an annual trailing or climbing vine that is monoecious. Its unripe fruits are prepared into pickles, eaten as a cooked vegetable, and used in curries. (Patil et al., 2016, Purseglove, 1969) Commercial pickling cucumber growing takes place at the last 50 -100 years, in the world. It was introduced in India during late eighties for export-oriented production (Shanmugapriya, 2017). In India it gained its importance from last 20 years and Production of gherkin in India is mainly restricted to southern states of this country. India has become a one of the finest gherkin cultivation, processing and export in the competitive world with an export of Rs 1,241.22 crores value of 173 million dollars (Anonymous 2020). Crop production is generally connected with a variety of issues related to

inadequate agronomic management methods such as planting density, fertilizer, and irrigation water management. (Kefelegn et al., 2020). Improper plant spacing is one of the major aspects of crop ecology, production and management that limits crop production (Njoku et al., 2008 and Islam et al., 2011). Thus plant spacing is an important factor in crop production because it makes efficient use of space and stifles competition among plants with similar cultural requirements, enhances the nutrient composition of the soil, resists pests and can provide shade, strengthens the microclimate with due consideration to wind and moisture, and improves the interaction of beneficial microorganisms within the soil's rhizosphere. (Aniekwe et al., 2015, Nnoke, 2001).). The horticultural practice of staking had been reported to improve yield in ridge gourd (Hilli et al., 2009) cucumber (Hardy and Rowell, 2002) and yam (Ndegwe et al., 1990) and (Rojalin Pradhan et al., 2021). An adequate training system will not only allow for better control and consistent light distribution to the plants, but will also allow for closer planting, earlier fruit ripening, increased production of larger-sized fruits, and better yield of good quality seeds. (Sharma et al., 2018). Many researches emphasized the significance of choosing the optimal plant density for increasing cucumber development and output. (Aniekwe et al., 2015, Ylimaz et al., 2002). Keeping these facts in mind, the current study was carried out to investigate the influence of varying spacings on growth characteristics in gherkin using the staking approach.

Materials and methods:

The present experiment was conducted during Rabi seasons of 2019 - 20 at the viralapatti village, Batlagundu, Tamil Nadu, India. The experimental site has red sandy soil with light gritty in texture and has high acidic content, low nutrient profile accompanied with low fertility status. The climate is sub-tropical warm and humid in nature with distinctive characteristics of average rainfall, high humidity. The experimental site had an annual rainfall around 1480mm per annum, a mean minimum temperature of 25⁰C, a maximum temperature of 34⁰C and relative humidity of 64.55% (Tamil Nadu agriculture weather network). The experiment was carried out in the area of 868 m² divided into plots of 6 x 4 m (24 m²) size. The experiment was designed in a randomized block design with three replications consisting of nine treatments with varied spacings, as indicated in the Table 1. Seeds of Gherkin parthenocarpic hybrid (Ajax) were sown on 19th January and all the recommended cultural practices and plant protection measures were carried throughout the growing season. After field preparation, seeds were sown at the rate of two seeds per hole and according to provided plant spacings to give the desired population densities. The crop was supplied with 25 tons per hectare of well rotten farm yard manure along with 150 kg Nitrogen, 75 kg phosphorous and 100 kg potash as per the recommended dose of fertilizers. All P, K, and 1/4th N were drilled during land preparation, and another 3/4th N was drilled in three equal splits as top dressing. For surface irrigation, the ridges and furrow irrigation system were utilized. Observations were recorded for five different growth parameters related to vine length (cm), number of leaves taken at 30, 60, 90 days after sowing, number of branches, Internodal length (cm) and Dry matter content of the plants were taken after the final harvest. The data were recorded for different characteristics were subjected to statistical analysis using Cochren and Cox (1963) method.

Data collection and analysis:

Data collection commences four weeks after transplanting. Five plants were randomly selected from each plot and tagged for the purpose of collecting data

Vine length (cm):

Five plants from each plot were marked, and the progress of the main vine will be monitored from there. The main vine length (cm) measured from the soil surface to the terminal tip of the plant using a measuring tape at 30, 60, 90 days after sowing.

Number of leaves:

Five plants from each plot were tagged from which number of leaves will be recorded. The number of leaves were counted at 30, 60 and 90 days after sowing.

Number of branches:

Number of primary branches was counted at the time of final harvest (90 days after sowing) of the plants and recorded.

Internodal length (cm):

The Inter nodal distance was recorded for each treatment plot with the help of measurement scale and expressed in centimeters.

Dry Matter Content (tons/ha):

The tagged plants were uprooted after last picking and chopped into small pieces to enable sun drying and then dried in hot air oven at 65⁰c temperature till obtained constant weight. The dry weight of the plant was used to work out the dry matter content (tons/ha).

As proposed by Panse and Sukhatme (1967), the data obtained from all observations were subjected to Analysis of Variance (ANOVA) for Randomized Block Design (RBD).

Results and discussion:

1. Vine length (cm):

The effect of plant spacing showed significant difference on the vine length of gherkin as shown in table 1. The highest growth rate and the maximum vine length was observed in plants spaced at 100 x 30 cm on 30 DAS (50.26 cm), 60 DAS (115 cm) and 90 DAS (168.32 cm) respectively. The minimum vine length was observed at 150 x 60 cm on 30 DAS (36.63 cm), 60 DAS (91.58 cm) and 90 DAS (136.26 cm) respectively. More vine length was found with the smallest spacing, which might be attributed to the intense struggle for space and light, causing the plants to grow taller. When greater growing area was available, the short and stout plants were generated at wider spacings. Similar observations were also reported by Bahlgerdi et al. (2014), Devi and Gopalkrishnan (2004), Jaffar and Wahid (2014) and Khalid (2010).

Table 1: Effect of Spacing on vine length:

Tr.NO	TREATMENTS	Vine Length		
		30DAS	60 DAS	90 DAS

T₁	100 X 30 cm	50.26	115.00	168.32
T₂	125 X 30 cm	47.46	111.23	164.52
T₃	150 X 30 cm	43.62	106.26	158.23
T₄	100 X 45 cm	44.57	107.43	160.72
T₅	125 X 45 cm	41.78	102.46	154.43
T₆	150 X 45 cm	38.26	96.84	145.28
T₇	100 X 60 cm	40.23	100.64	153.56
T₈	125 X 60 cm	37.25	95.39	140.27
T₉	150 X 60 cm	36.63	91.58	136.26
	SED	1.30	2.24	4.73
	CD (P= 0.05)	2.76	6.73	10.03

2. Number of leaves:

There was a significant variability observed in number of leaves per plant due to different plant spacings as shown in table 2. Maximum number of leaves were observed in plants with 150 x 60 cm on 30 DAS (14.36), 60 DAS (32.59) and 90 DAS (65.36) respectively. Minimum number of leaves were recorded at 100 x 30 cm spacing on 30 DAS (10.94), 60 DAS (27.33) and 90 DAS (55.27) respectively. As the number of branches per vine increased at wider spacings, the number of leaves increased simultaneously. The number of leaves decreased with higher plant density which can be due to the strong competition among the plants. Similar observations were also reported by Aniekwe et al. (2015), Khalid, (2010), Akintoye et al. (2002).

Table 2: Effect of Spacing on number of leaves:

Tr.NO	TREATMENTS	No of leaves		
		30DAS	60 DAS	90 DAS
T₁	100 X 30 cm	10.94	27.33	55.27
T₂	125 X 30 cm	11.43	28.02	57.36
T₃	150 X 30 cm	12.53	29.27	59.56
T₄	100 X 45 cm	11.89	28.71	58.33
T₅	125 X 45 cm	12.95	29.83	60.59
T₆	150 X 45 cm	13.62	31.96	62.78
T₇	100 X 60 cm	13.24	31.40	61.23
T₈	125 X 60 cm	13.98	32.03	63.47
T₉	150 X 60 cm	14.36	32.59	65.36
	SED	0.39	0.93	1.86
	CD (P= 0.05)	0.83	1.97	3.95

3. Number of branches:

Different plant spacings had a significant effect on the number of branches per vine shown in table 3. The maximum number of branches per vine in the Ajax hybrid was observed at

150 x 60 cm spacing on 90 days after sowing with 6.57 average branches per vine. Similarly minimum number of branches were recorded at 100 x 30 cm spacing with 3.56 average branches per vine. As the plant population reduces with wider spacings, the plants will have more area and less competition to grow resulting in high lateral growth of vine increasing the number of branches and leaves. Similar findings were recorded by Khalid (2010) in gherkin, Lacob et al. (2009) in cucumber.

4. Internodal length (cm):

The effect of different spacings of the plants had significant influence on the Internodal length of the vine shown in table 3. Maximum Internodal length was observed in Ajax hybrid at 100 x 30 cm spacing with 15.36 cm in length on 90 days after sowing. Minimum length of the internode was observed at 150 x 60 cm spacing with 10.08 cm length on 90 days after sowing. The length of internode determines the plant height, number of nodes per plant. In general, parthenocarpic hybrids bear fruits at almost every node resulting in more yield per plant. Wider spacing will allow plant to grow laterally with a greater number of nodes and have less internodal length. Similar results among the hybrids were also obtained by Bahlgerdi et al. (2014) and Devi and Gopalkrishnan (2004).

Table 3: Effect of spacing on number of branches, Internodal length and Dry matter

Tr.NO	TREATMENTS	No of branches	Internodal length	Dry matter
T ₁	100 X 30 cm	3.56	15.36	3.27
T ₂	125 X 30 cm	3.86	14.62	3.41
T ₃	150 X 30 cm	4.56	13.22	3.72
T ₄	100 X 45 cm	4.21	13.65	3.52
T ₅	125 X 45 cm	4.94	12.43	4.06
T ₆	150 X 45 cm	5.45	11.52	4.98
T ₇	100 X 60 cm	4.68	12.11	4.53
T ₈	125 X 60 cm	5.62	11.03	5.16
T ₉	150 X 60 cm	6.57	10.08	5.68
	SED	0.15	0.39	0.13
	CD (P= 0.05)	0.32	0.83	0.38

5. Dry Matter (tons/ha):

There was a differential effect of plant spacing on the dry matter content of the plants per hectare shown in table 3. The dry matter content per hectare was recorded minimum in ajax hybrid at 100 x 30 cm spacing between hybrids with 3.27 tons/ha. Maximum dry matter content was recorded at 150 x 60 cm spacing with 5.68 tons/ha. This may be due to Plants has grown stout and short with wider spacing as they get more space to grow sideways. This eventually increases the mass of plants resulting in the increased dry matter content. Similar findings were recorded by Jankauskiene and Brazaityte (2006).

CONCLUSION

According to present study the results showed that there was significant difference in all the vegetative growth parameters. Thus, spacing has a significant impact on growth parameters in gherkin. Plant spacing at 100 cm x 30cm recorded the highest in vine length and Internodal length then spacing at 150 x 60 cm recorded maximum in number of leaves, branches and dry matter parameters near Batlagundu region.

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