

Evaluation of Gherkin (*Cucumis sativus* L.) Varieties in Low Country Intermediate Zone of Sri Lanka

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ABSTRACT

An experiment was conducted to evaluate five gherkin varieties, Ajax, Anexo, Chandani, Vertina and Shakthi for their morphological, vegetative, reproductive, and yield parameters. Highest number of fruit per vine (50), highest yield per vine (520 g) and highest yield per hectare (9.6 t) were recorded by variety Chandani. Further it gave 21.5% yield increase over control variety Ajax. Variety Chandani showed the higher value for all vegetative parameters. Therefore, variety Chandani which showed the superior characters in small fruits over recommended variety could be successfully cultivated in low country intermediate zone of Sri Lanka.

KEYWORDS: *Cucumis sativus*, Gherkin, Yield

INTRODUCTION

Gherkin (*Cucumis sativus* L.) is a popular processed vegetable belongs to family Cucurbitaceae which has similar nutrient values as cucumber (Anon., 2013). It is an annual with a prostrate vine type of growth, having branches from the main stem and more several trailing laterals.

Gherkin is grown in commercial scale and one of the main vegetables that is being exported from Sri Lanka in both processed and semi - processed forms.

Gherkin is best grown in areas up to 1000m from mean sea level. It prefers over 22°C day mean temperature with more than 8 hours of sunlight and annual rain fall of 1500 – 2000mm with uniform distribution. The soil should be well drained, rich in organic matter and optimum pH range should be between 6 – 6.5. Saline soil is not preferred (Thushari, 2007).

In 2012, the total land extent was 2500 acres and annual production was 12,000 – 15,000MT. Approximately, 10,000 Sri Lankan farmers are involved in cultivation of this vegetable. The cultivation districts are Ampara, Monaragala, Badulla, Matale, Anuradhapura, Mahaweli System B, Polonnaruwa, and Kurunegala (Silva *et al.*, 2010).

The produce was exported to countries like South Korea, New Zealand, Japan, Australia, Holland and Russia and Rs. 1283 million was earned as foreign exchange.

Each year seed companies produce new hybrid varieties. Therefore, it is essential to check the adaptability and yield potential of these varieties, before introducing them to farmers. Hence the objective of this study was

to evaluate five gherkin varieties introduced from Holland and U.S.A. along with the standard check variety.

MATERIALS AND METHODS

Experimental Site

This study was carried out at the Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka, Makandura, situated in the low country intermediate zone (IL_{1a}), at an elevation of 30m above mean sea level. The soil is moderately well drained and characterized by soft lateritic sub soil. The rainfall at Makandura during the experimental period was 4.07 mm while the mean relative humidity and temperature were 81.2% and 26.7°C respectively. The experiment was conducted during the period from January to April 2013.

Treatments

Five gherkin varieties were tested. They were Ajax, Anexo, Chandini, Vertina and Shakthi. Ajax was the control variety.

Field Layout

Each treatment (total 5) was planted in five raised beds (bed size 2.1×4.5 m). The raised beds were prepared providing drains with 0.3 m width between beds. Each bed consisted two rows of ten plants each and distance between the rows was 1.2 m. Within each row a distance of 45 cm was maintained between plants. The five treatments were arranged in a randomized complete block design with three replicates.

Crop Establishment and Maintenance

As a basal dressing, organic and inorganic fertilizers were added to each planting hole. Two seeds per hole were sown two days after application of basal dressing. The fertilizers were added through the cropping period as given in Table 1. Ten sprays of foliar fertilizers (Green care 5 times and K plus 5 times) were used at five day intervals up to final stage of the crop. Both of them contained N, P, Mg, Mn, and Iron.

The seedlings were thinned out two weeks after emergence leaving one healthy vigorous seedling per hill. Irrigation was done and irrigation intervals were adjusted according to prevailing weather conditions. Manual weeding and other cultural practices were done as recommended.

Cotyledonary leaves were removed to control the leaf minor damage. 2 – 3 lower leaves were removed at the age of 25 days after sowing to avoid possible Downey mildew disease. Application of Naphthalene Acetic Acid was done at three day intervals after they reached reproductive stage, to reduce the abortion of fruits. Trellising, pest and disease control, watering and other cultural practices were done according to the recommendations given by the Sunfrost Ltd.

Data Recording

Plants were harvested for small fruits (diameter-11-15mm). The harvesting was done for grade 1. Data for all characters were recorded from five randomly selected vines from each treatment in each replicate. Following data were collected.

Morphological Characters

Fruit Skin Colour

Fruit skin color was determined at harvesting using the Royal Horticultural Society colour chart.

Vegetative Parameters

Number of Branches

The number of branches was counted on main stem, ten weeks after sowing.

Internode Length

Internode length (cm) of first five nodes was recorded on main stem, ten weeks after sowing.

Reproductive Parameters

Days to First Flower and First Harvest

The number of days taken from the date of sowing to first flower and first harvest were recorded.

Fruit Length and Diameter

Five randomly selected fruits from each treatment were taken to record the fruit length (cm) and diameter (mm).

Yield Parameters

Harvesting was done daily for 35 days. The records were taken on, Number of fruits per vine, weight per fruit (g), yield per vine (Kg) and yield per hectare (t/ha). Crop was harvested for small fruits (grade 1) when the diameter was 11-15mm.

Table 1. Fertilizer application schedule

Fertilizer	Type and dosage	Time of app:
Basal dressing (Kg/ha)	Compost	500g/plant
	Urea	50
	Tsp	310
	Mop	70
Foliar spray	Green care	50 ml/16L 10 DAS
1 st Top dressing (Kg/ha)	Urea	100
	MOP	80
Foliar spray	K plus	50 ml/16L 15 DAS
2 nd Top dressing (Kg/ha)	Urea	150
	MOP	150
Foliar spray	Green care	50 ml/16L 20 DAS
Foliar spray	K plus	50 ml/16L 25 DAS
3 rd Top dressing (Kg/ha)	Urea	150
	MOP	150
Foliar spray	Green care	50 ml/16L 30 DAS
Foliar spray	K plus	50 ml/16L 35 DAS
4 th Top dressing (Kg/ha)	Urea	150
	MOP	150
Foliar spray	Green care	50 ml/16L 40 DAS
Foliar spray	K plus	50 ml/16L 45 DAS
5 th Top dressing (Kg/ha)	Urea	150
	MOP	150
Foliar spray	Green care	50 ml/16L 50 DAS
Foliar spray	K plus	50 ml/16L 55 DAS

App-Application

TSP- Triple Super Phosphate; MOP- Muriate of Potash; DBP- Days before planting; DAS- Days after sowing

Statistical Analysis

The data generated from the experiment were statistically analyzed using SAS statistical analysis package.

RESULTS AND DISCUSSION

Morphological Character

Fruit Skin Colour

Fruit skin color in all five varieties was green. However, according to the color chart, the variations in shades were observed among varieties as indicated in table 2. Generally buyers accept the recorded green color shades.

Vegetative Parameters

Number of Branches

Significant differences were observed in number of branches among varieties. Highest number (12) was recorded in Chandani while the lowest was recorded (6.47) in Shakthi. The differences between Chandani, Ajax, and Anexo were not significant (Table 3).

Internode Length

Shakthi recorded the highest internode length (7.16cm) while the Ajax recorded the lowest value (5.69cm) which was significantly different from all other four varieties (Table 3). The differences between Shakthi, Chandani, Vertina and Anexo were not significant.

Table 2. Fruit skin color of six gherkin varieties

Varieties	Fruit colour
Shakthi	Green 142 A
Chandani	Green 142 B
Ajax	Green 140 B
Vertina	Green 140 C
Anexo	Green 140 B

Table 3. Number of branches and internode length of six gherkin varieties

Varieties	Internode length (cm)	Number of branches
Shakthi	7.16a	06.47b
Chandani	6.68a	12.00a
Ajax	5.69b	11.47a
Vertina	6.91a	08.00b
Anexo	6.70a	10.73a
cv	4.48	11.11
LSD	0.56	10.18

Means followed by the same letter in each column are not significantly different at 0.05 levels.

Reproductive Parameters

Days to First Flower and First Harvest

No significant differences were observed in days to first flower and first harvest among

the varieties (Table 4). All varieties flowered between 24 and 27 days while first harvest was taken between 30 and 32 days.

Fruit Length and Fruit Diameter

No significant differences were observed in fruit length and diameter among the varieties (Table 4). This was mainly due to the size that they were harvested when fruits were 11- 15mm diameter.

Pests and Diseases

Damages from *Aulacophora foveicollis* (Red pumpkin beetle), *Bactrocera cucurbitae* (Melon fly), *Aphids gossypii* (Aphids) and *Liriomyza sativae* (Leaf miner) were observed. No significant damages were recorded.

Commonly observed diseases were Cucumber Mosaic Virus (CMV), Downy mildew (*Pseudoperonospora cubensis*) and Bacteria wilt (*Erwinia tracheiphila*). No significant damage was recorded from above diseases.

Table 4. Days to first flowering, days to first harvest, fruit length and fruit diameter of gherkin varieties.

Variety	Days to first flowering	Days to first harvest	Fruit length (cm)	Fruit diam. (mm)
Shakthi	26.3	32	5.7	13.2
Chandani	26.0	32	5.7	13.3
Ajax	25.7	32	5.7	12.9
Vertina	26.0	30	5.5	13.2
Anexo	24.7	32	5.4	13.9

Diam- diameter

Yield Parameters

Number of Fruits per Vine

Significant differences were observed in fruits per vine among varieties. The highest value (50) was recorded by variety Chandani. Variety Vertina and Anexo showed lower number of fruits per vine (36) (Table 5).

Weight per Fruit

No significant differences were observed in weight per fruit among varieties. However, it ranged from 10.4 to 11.6 g (Table 5). Since all fruits were harvested at similar size (diameter). The differences did not show any significance.

Yield

Fruits per vine, yield per vine and yield per hectare recorded significant differences among varieties (Table 5). The newly introduced variety showed the highest yield (9.6 t/ha) which was significantly different from the control variety Ajax (7.9 t/ha),

Vertina (7.2t/ha) and Anexo (7.7t/ha). Shakthi (8.5t/ha) gave a lower yield than Chandani (9.6 t/ha) but was not significantly different. Similarly Chandani recorded highest values for fruits per vine (50.0) and yield per vine (520.0g) over other varieties. These values too were significantly higher than the control variety Ajax.

The yield increase of Chandani was 21.5% over Ajax (Table 5). Shakthi recorded an 8.9% increase over Ajax while the other varieties, Vertina and Anexo recorded 8.9% and 2.6% lower yield than control, respectively.

Table 5. Number of fruits per vine, weight per fruit, yield per vine, yield and percentage yield increase of gherkin varieties

Variety	Fruits /vine	Fruit wt.(g)	Yield g/vine	Yield t/ha	Yield incr. %
Shakthi	42.7ab	10.9	465.4ab	8.6ab	8.9
Chandani	50.0a	10.4	520.0a	9.6a	21.5
Ajax	37.3b	11.4	425.2b	7.9b	0
Vertina	36.0b	10.8	388.8b	7.2b	- 8.9
Anexo	36.0b	11.6	417.6b	7.7b	- 2.6
<i>cv</i>	12.45		10.92	10.92	
LSD	09.47		90.69	1.68	

Means followed by the same letter in each column are not significantly different at 0.05 levels.

CONCLUSIONS

The yield results clearly indicated that newly introduced variety Chandani, performed better than all other varieties tested, when harvested for small fruits. Further this variety had similar good characteristics as control and others. However, numbers of branches were higher than others. This may have also contributed to higher number of flowers and

fruits per vine and ultimately contributing to the final yield. Variety Shakthi too showed better results than Ajax. Its yield increased was 8.9% over Ajax. It was introduced to the farmers a few years ago, and performed better than Vertina and Anexo.

The results revealed that varieties Chandani and Shakthi have performed better than recommended variety. But variety Chandani was superior in yield than Shakthi. Hence, variety Chandani can be recommended for cultivation by the farmers in future

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