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Stages of vine pruning for vine production of bottle gourd varieties and lines in summer season

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ABSTRACT

Four bottle gourd varieties and lines (V_1 : BARI Lau-3, V_2 : BARI Lau-4, V_3 : LS 0012-5-3 and V_4 : LS 0026-5-3) and three pruning stages (P_1 : Pruning at two vine stage, P_2 : Pruning at 3 vine stage and P_3 : Pruning at 4 vine stage) were implied to observe the effect of pruning on the maximization of vine production in bottle gourd. V_4 produced maximum number of vine (117.2/plant) and highest vine yield (10.2 t/ha) among four varieties while P_3 produced maximum number of vine (109.2/plant) and highest vine yield (9.1 t/ha) among three pruning techniques. The maximum number of harvested vine (118.0/plant) and highest vine yield (10.73 t/ha) was found from V_4P_3 which was statistically followed by V_4P_1 and the lowest vine yield was recorded from V_2P_1 (6.62 t/ha). LS 0026-5-3 along with pruning of terminal shoots four vine stages can be recommended for better vine production in bottle gourd for use as leafy vegetable.

Key Words: *Lagenaria siceraria*, Pruning, Varieties & lines vine and Yield

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I. Introduction

Bottle gourd (*Lagenaria siceraria*) is a commonly cultivated summer seasonal vegetable in Bangladesh belongs to Cucurbitaceae family. Beside fruit production the tender leaves and vines of bottle gourd are also used as a very delicious and highly nutritious vegetable in Bangladesh. Growth and yield performance varied due to the genotypic variation thus facilitate the great opportunity to select the better genotype (Jamal Uddin et al., 2014; Rajesh et al., 1999; Ram et al., 2005) of bottle gourd (Koffi, 2009). Pruning can modify plant growth according to desired levels (Jarrick, 1986). Vine pruning has generally been done for many purposes (Humphries and Vermillion, 1994) more specifically increases the branching of plants. Our current target is to produce more vine of bottle gourd. As bottle gourd tender leaves and vine used as vegetable, so vine pruning may help to increase the production of more leaves and vines by increasing the number of branches. For this circumstance, present study was

conducted to develop the vine pruning stages in maximizing vine production of bottle gourd for use as leafy vegetable.

II. Materials and Methods

The experiment was carried out at the research field of Olericulture Division, Horticulture Research Center, Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur, Dhaka, Bangladesh during summer season of 2014. The experiment consisted two factors, i.e., four bottle gourd varieties and lines (V₁: BARI Lau-3, V₂: BARI Lau-4, V₃: LS 0012-5-3 and V₄: LS 0026-5-3) and three stages of pruning (P₁: Pruning at two vine stage, P₂: Pruning at 3 vine stage and P₃: Pruning at 4 vine stage). Each vine contained main branch during pruning. The seeds of four bottle gourd varieties were sown in poly bags on 10th May 2014 and the seedlings were transplanted in the main field on 5th June 2014. The experiment was laid out in randomized complete block design with three replications. The unit plot size was 10.0 x 2.5 m maintaining 2.0 x 2.5 m spacing. The land was fertilized with cow dung, N, P, K, S and Zn @ 20000, 175, 175, 150, 100 and 12 kg/ha, respectively. The total amount of cow dung, P, S and Zn and 1/3rd of each of N and K were applied during final land preparation and in the pit. The rest of N and K were applied in four equal installments at 21, 35, 55 and 75 days after transplanting. The intercultural operations were done as and when needed. Pruning started after first female flower opening and no fruit was allowed in whole experiment. Data were recorded from three randomly selected plants per treatment per replication on number of vines/plant, weight of vine/plant (kg), vine length (cm), vine diameter (cm), leaf area (cm²), internodes length (cm) and vine yield (t/ha). The collected data on different characters were statistically analyzed using MSTAT-C computer package program and mean differences were determined by Duncan's Multiple Range Test (DMRT) at 5% level of probability (Gomez and Gomez, 1984).

III. Results and Discussion

Main effect of variety on vine production in bottle gourd

The main effect of variety on vine production in bottle gourd is presented in Table 01. The vine production was statistically influenced by the varieties. Earlier harvest was performed by the variety LS 0012-5-3 (59.00 days). The maximum number of harvested vine (117.2/plant) was produced by LS 0026-5-3 and the highest vine yield was recorded from LS 0026-5-3 (10.2 t/ha). The lowest number of harvested vine (102.8/plant) was observed LS 0012-5-3 and vine yield (7.0 t/ha) was observed in the line BARI Lau-4. The number branches/vines of bottle gourd varied due to the variation of the variety (Singh *et al.*, 2002). Similar results for the variation in vine length were also reported by many researchers in bottle gourd (Munshi and Acharya, 2005; Samadia, 2002; Badade *et al.*, 2001; Mathew *et al.*, 2001; Kumar *et al.*, 2007; Harika *et al.*, 2012), in ash gourd (Sahu *et al.*, 2015), in sponge gourd (Pandey and Singh, 2007), in bitter gourd (Radha Rani, 2014).

Table 01. Varietal effect on the vine production in bottle gourd

Varieties	Days to first harvest	Average vine								Leaf area (cm ²)	Internodes length (cm)	Vine yield (t/ha)				
		number /plant	weight (kg/plant)	length (cm)	diameter (cm)	number	weight	length	diameter							
V ₁	61.4	a	111.0	b	6.4	b	95.2	ab	0.81	ab	530.7	a	14.3	b	9.4	b
V ₂	58.4	c	104.9	c	4.7	d	96.4	ab	0.71	b	391.7	c	13.6	c	7.0	d
V ₃	59.0	bc	102.8	c	5.2	c	93.6	b	0.81	ab	499.6	b	13.9	c	7.9	c
V ₄	59.7	b	117.2	a	6.9	a	97.6	a	0.85	a	545.7	a	14.7	a	10.2	a
LSD(0.05)	1.1		2.6		0.4		3.3		0.13		21.2		0.4		0.6	
CV (%)	1.13		1.4		4.3		2.0		9.67		2.54		1.5		4.2	

Here, V₁ = BARI Lau-3, V₂ = BARI Lau-4, V₃ = LS 12-5-3 and V₄ = LS 26-5-3

Effect of pruning on vine production in bottle gourd

The main effect of pruning on vine production in bottle gourd is presented in Table 02. The variation was observed among the different pruning in vine production in bottle gourd. The highest number of harvested vine was recorded in P₃ (109.2/plant) followed by P₂ (109.0/plant) and lowest in P₁ (108.8/plant). The internodes length was maximum in P₁ (14.3 cm) and minimum in P₂ (14.0 cm). The highest vine yield was recorded in P₃ (9.1 t/ha) followed by P₂ (8.5 t/ha) and the lowest yield was

found in P₁ (8.3 t/ha). Our study showed the significantly different results for studied parameters at different stages of vine pruning. Positive and significant correlation was present between leaf area of vine and weight of bunches in vine (Senthilkumar *et al.*, 2015) i.e., pruning increase the leaf area but severity of pruning decrease the leaf area while pruning severity increased internodal distance (Brandon *et al.*, 2012).

Table 02. Effect of pruning technique on the vine production in bottle gourd

Pruning techniques	Days to first harvest	Average vine				Leaf area (cm ²)	Internodes length (cm)	Vine yield (t/ha)
		number /plant	weight (kg/plant)	length (cm)	diameter (cm)			
P ₁	60.4 a	108.8 a	5.6 b	94.1 a	0.79 a	499.5 a	14.3 a	8.3 b
P ₂	59.8 ab	109.0 a	5.7 b	96.1 a	0.79 a	501.8 a	14.0 a	8.5 ab
P ₃	58.8 b	109.2 a	6.1 a	96.9 a	0.80 a	474.5 b	14.0 a	9.1 a
LSD(0.05)	1.1	2.6	0.2	3.3	0.13	21.2	0.6	0.6
CV (%)	1.1	1.4	4.3	2.0	9.67	2.5	1.5	4.2

Here, P₁: Pruning at two vine stage, P₂: Pruning at three vine stage, P₃: Pruning at four vine stage

Combined effect of variety and pruning on vine production in bottle gourd

Significant variations were found in the combined effect of variety and pruning in the vine production in bottle gourd (Table 03). The maximum number of harvested vine per plant (118) was resulted in LS 0026-5-3 along with four vine pruning stage (V₄P₃). The highest vine yield (10.7 t/ha) was recorded from the line LS 0026-5-3 when the vines were pruned at four side vine stage (V₄P₃) which was statistically followed by the same line when the vines were pruned two side vine stage (V₄P₁) and the lowest vine yield was recorded from the BARI Lau-4 (6.6 t/ha) when it was pruned at two side branch stage (V₂P₁).

Table 03. Effect of variety and pruning technique combination on the vine production in bottle gourd

Varieties	Days to first harvest	Average vine				Leaf area (cm ²)	Internodes length (cm)	Vine yield (t/ha)
		number /plant	weight (kg/plant)	length (cm)	diameter (cm)			
V ₁ P ₁	61.3 ab	111.0 b	6.2 cd	97.2 bc	0.82 abc	551.3 b	14.3 c	9.0 de
V ₁ P ₂	62.3 a	111.3 b	6.6 bc	96.6 c	0.72 cd	565.4 ab	14.4 bc	9.8 bc
V ₁ P ₃	60.7 b	110.7 b	6.3 c	91.9 d	0.88 a	475.5 f	14.1 cd	9.4 cd
V ₂ P ₁	59.0 c	104.0 cd	4.4 f	91.8 d	0.74 bcd	412.1 g	13.8 de	6.6 h
V ₂ P ₂	58.7 cd	105.3 c	4.6 f	96.0 c	0.72 cd	382.7 h	13.4 f	6.8 gh
V ₂ P ₃	57.7 d	105.3 c	5.0 e	101.3 a	0.66 d	380.4 h	13.5 ef	7.4 fg
V ₃ P ₁	60.7 b	103.3 cd	5.0 e	91.4 d	0.8 abc	518.2 c	14.2 cd	7.6 f
V ₃ P ₂	58.7 cd	102.3 d	5.0 e	95.3 c	0.87 ab	483.7 ef	13.7 ef	7.5 f
V ₃ P ₃	57.7 d	102.7 d	5.8 d	94.1 cd	0.78 abc	497.0 de	13.6 ef	8.7 f
V ₄ P ₁	60.6 b	116.7 a	6.9 ab	96.0 c	0.81 abc	516.6 cd	15.0 a	10.1 b
V ₄ P ₂	59.3 c	117.0 a	6.5 bc	96.4 c	0.83 abc	575.3 a	14.4 bc	9.9 bc
V ₄ P ₃	59.0 c	118.0 a	7.2 a	100.3 ab	0.91 a	545.2 b	14.7 ab	10.7 a
LSD(0.05)	1.1	2.6	0.4	3.3	0.13	21.17	0.4	0.6
CV (%)	1.1	1.4	4.3	2.0	9.67	2.54	1.5	4.2

Here, V₁= BARI Lau-3, V₂= BARI Lau-4, V₃= LS 12-5-3 and V₄= LS 26-5-3;

P₁: Pruning at two vine stage, P₂: Pruning at three vine stage, P₃: Pruning at four vine stage

IV. Conclusion

LS 0026-5-3 along with pruning of terminal shoots four vine stages can be recommended for better vine production in bottle gourd for use as leafy vegetable. The present investigation is going on also in summer 2014-15. Again the experiment will be repeated with other varieties and lines for detail study in the next year in both the winter and summer seasons.

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