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Original Research Article

Effect of Pruning and Plant Growth Regulators on Vegetative Growth of Phalsa (*Grewia asiatica* L)

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Keywords

Pruning, PGR, Vegetative Growth, GA3, NAA and Phalsa

A B S T R A C T

The present investigation entitled "Effect of Pruning and Plant Growth Regulators on Vegetative Growth of Phalsa (*Grewia asiatica* L.)" was carried out during December –June 2014 to 2015 at research farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture Technology & Sciences, Allahabad. The results of the present study, regarding the effect of GA3, and NAA on phalsa, have been discussed interpreted in the light of previous research work done in India and abroad. The experiments was carried out in Randomized block design (RBD) with 13 treatments and each treatments replicated thrice and thus making a total of 39 plants. The study showed significant finding and concluded that the treatment T6 (90 cm + GA3@200ppm + NAA@200ppm) resulted with maximum Number of canes per bush (13.67), Days to sprouting of shoots (36.53), Number of sprouted shoots per cane 30.30), Days to first flowering (61.24), Total number of flowers per plant at 75 days after pruning (2927.41), Length of shoots per cane (84.64cm), Number of fruiting nodes per shoots (27.72), Number of leaves per shoots (23.46), Leaf area (240.78cm2) and Leaf area index (7.65cm2) of Phalsa.

Introduction

Phalsa (*Grewia asiatica* L.) also known as star apple, is a sub- tropical fruit native to India, belongs to family tiliaceae. This family has about 41 genera and 400 species, which are mostly distributed in the tropical and sub – tropical region of the world. It is commercially grown in Punjab, Haryana, Gujarat, Maharashtra and Bihar. Its cultivation is favoured around big cities where fruits find a read and quick sale. Regarding keeping quality, it is highly perishable in nature. It may be grown as an intercrop with mango, aonla, bael and ber.

Phalsa is a bushy plant and can be grown in kitchen garden also. Ripe fruits are sub acidic and good source of vitamin A and vitamin C they are also fair source of phosphorus and iron . Fruits contain 50-60% juice 10-11% sugar and 202.5% acid (Aykroyd, 1983). The fruits are used for making excellent juice and squash, it is also used as table fruit for children. The composition of phalsa berries, it contain 80.80% moisture, 14.40% carbohydrates, 1.5%, protein, 0.90% fat and calcium 129 mg, phosphorus 89mg, iron 3.1mg niacin 0.3mg vitamin C 2.2 mg and carotene 4.9 mg/100 of pulp. Application of growth substances *viz.*, auxins and gibberellins has been effective in increasing fruit set and yield in several fruit crops including phalsa (Randhawa *et al*., 1959). Application of GA3 results in increased yield and better grade phalsa fruits (Randhawa *et al*., 1967). Ethrel

sprayed at full bloom stage found to be increasing TSS content of the phalsa fruits (Rema and Sharma, 1991) and efficacy of kinetin in increasing shelf life by reducing the physiological loss of weight of fruit crops was shown by various workers (Dedolph *et al*., 1961: Randhawa *et al*., 1976). Pruning and plant growth regulators (PGR's) have been commonly used in modifying various physiological processes with advantage in plant growth, flowering, fruit yield and other attributes in phalsa crop. Pruning and PGR's give the significant results like increasing the yield and quality of phalsa.

Materials and Methods

An experiment entitled "Effect of Pruning and Plant Growth Regulators on Vegetative Growth of Phalsa (*Grewia asiatica* L)" was carried out under Allahabad agro climatic conditions at the research farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture Technology & Sciences, Allahabad. Allahabad (U.P.) India. Allahabad is situated at 25.57$_0$N latitude and 81.50$_0$E longitude and at an altitude of 987 m above mean sea level. Allahabad has subtropical and semi – arid climate with the monsoon commencing from July and withdrawing by the end of September. The temperature reaches up to 47.5$_0$C in summer and goes down as 1.5$_0$C in winter. The pruning was done on 15/12/2014, with the help of lopper by manual labour. Prior to start the pruning, only 8-12 canes were selected from each bush for the observation. All the pruned canes were almost similar in diameter; the average diameter per cane was 2.5 cm. The experiment was conducted with Randomized Block Design (RBD) with 13 treatments and each treatment replicated thrice, thus making a total 39 plants. The allocation of treatment to the individual plots was done using random number in each replication. The following observations were recorded Number of canes per bush, Days to sprouting of shoots , Number of sprouted shoots per cane , Days to first flowering , Total number of flowers per plant at 75 days after pruning , Length of shoots per cane (cm) , Number of fruiting nodes per shoots , Number of leaves per shoots , Leaf area and Leaf area index. The data recorded on during the course of investigation were subjected to statistical analysis as per method of analysis of variance.

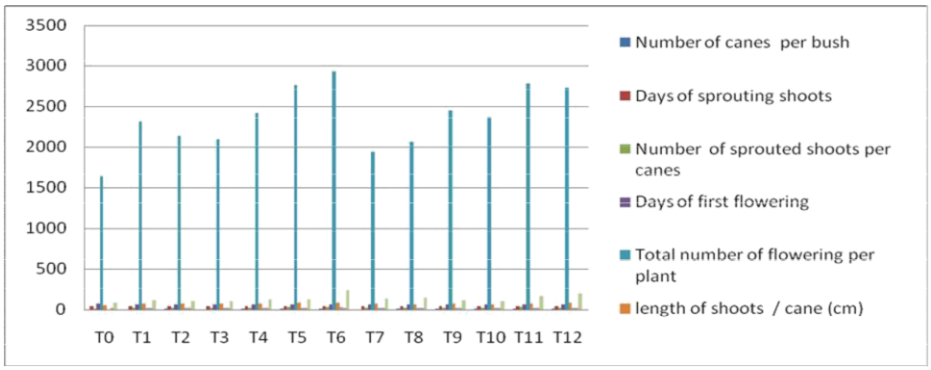
Results and Discussion

The data on vegetative growth as influenced by different growth regulators are presented in table 1. The T6 (90 cm + GA3@200ppm + NAA@200ppm) gave maximum no. of canes per bush (13.67) and closely followed T11 (90 cm + GA3@100ppm + NAA@200ppm) (12.60). The minimum no. of canes per bush was noticed in control (5.34). Rawat *et al.* (1998) also reported similar results. The T6 (90 cm + GA3@200ppm + NAA@200ppm) took significant less days to sprouting (36.53) followed by T8 (30 cm + GA3@200ppm + NAA@150ppm) (39.67. The maximum days to sprouting of shoots was noticed in control (46.55). Veno (1957) also reported similar results. The treatment T6 (90 cm + GA3@200ppm + NAA@200ppm) recorded significantly maximum number of sprouted shoots per canes (30.30) closely followed by T11 (90 cm + GA3@100ppm + NAA@200ppm) (27.34). The minimum number of sprouted shoots per canes recorded with control (14.11). The treatment T6 (90 cm + GA3@200ppm + NAA@200ppm) took significantly less number of days first flowering (61.24) followed by T5 (90 cm + GA3@100ppm + NAA@150ppm) (62.37). The maximum number of days taken to first flowering was noticed in control (75.37). Dalal *et al.* (2005) also reported similar results. The maximum total number of flowering per plant T6 (90 cm + GA3@200ppm + NAA@200ppm) the maximum total number of flowering per plant (2927.41) was obtained which were significantly superior over other treatments followed by T11 (90 cm + GA3@100ppm + NAA@200ppm) (2776.65). The minimum total number of flowering per plant (1633.34) was noticed with control. The treatment T6 (90 cm + GA3@200ppm + NAA@200ppm) recorded significantly maximum length of shoots per canes (84.64cm) closely followed by T12 (90 cm + GA3@200ppm + NAA@150ppm) (78.35). The minimum length of shoots per canes with control (55.67) Srivastava *et al.* (1971) also reported similar results. The treatment T6 (90 cm + GA3@200ppm + NAA@200ppm) recorded significantly by maximum number of nodes per shoots of phalsa (27.72) closely followed T12 (90 cm + GA3@200ppm + NAA@150ppm) (25.06).

Table.1 Effect of Pruning and Plant Growth Regulators on Vegetative Growth of Phalsa (*Grewia asiatica* L)

Treatment No.	Treatments combination	Number of canes per bush	Days of sprouting shoots	Number of sprouted shoots per canes	Days of first flowering	Total number of flowering per plant	length of shoots / cane (cm)	Number of fruiting nodes / shoots	Number of leaves per shoots	Leaf area per plant $(cm)^2$	Leaf area index
T_0	Control (water control)	5.34	46.55	14.11	75.37	1633.34	55.67	14.52	17.50	78.64	4.60
T_1	30 cm + GA3@100ppm + NAA@150ppm	10.13	42.24	23.03	63.41	2310.34	70.50	20.33	18.76	112.73	6.31
T_2	30 cm + GA3@200ppm + NAA@200ppm	11.20	44.44	22.01	63.38	2133.54	73.48	24.27	19.55	105.24	6.46
T_3	60 cm + GA3@100ppm + NAA@150ppm	10.36	42.44	22.70	65.64	2090.48	75.46	25.52	20.47	102.26	6.64
T_4	60 cm + GA3@200ppm + NAA@200ppm	11.31	41.40	24.88	67.39	2420.54	77.59	21.31	19.46	122.43	6.75
T_5	90 cm + GA3@100ppm + NAA@150ppm	12.36	40.31	28.26	62.37	2760.41	78.44	20.44	22.84	120.38	6.55
T_6	90 cm + GA3@200ppm + NAA@200ppm	13.67	36.53	30.30	61.24	2927.41	84.64	27.72	23.46	240.78	7.65
T_7	30 cm + GA3@100ppm + NAA@200ppm	9.37	42.23	21.24	65.20	1932.54	67.78	23.53	19.41	133.48	5.80
T_8	30 cm + GA3@200ppm + NAA@150ppm	10.69	39.67	21.10	63.31	2064.65	60.52	21.51	17.48	148.27	5.48
T_9	60 cm + GA3@100ppm + NAA@200ppm	11.17	38.69	23.95	64.52	2449.41	68.52	20.74	22.36	115.55	5.58
T_{10}	60 cm + GA3@200ppm + NAA@150ppm	10.98	43.40	24.92	62.38	2365.41	66.89	21.34	20.30	102.30	6.35
T_{11}	90 cm + GA3@100ppm + NAA@200ppm	12.60	44.48	27.34	63.60	2776.65	76.43	23.72	22.60	163.46	5.27
T_{12}	90 cm + GA3@200ppm + NAA@150ppm	12.33	42.59	24.13	66.75	2733.65	78.35	25.06	22.53	201.43	6.46
	F-test	S	S	S	S	S	S	S	S	S	S
	C.D. at 0.5%	0.552	0.308	1.483	0.220	0.126	0.331	0.400	1.617	2.361	0.292
	S.Ed	0.267	0.149	0.719	0.107	0.061	0.160	0.194	0.783	1.144	0.141

Chart.1 Effect of Pruning and Plant Growth Regulators on Vegetative Growth of Phalsa (*Grewia asiatica* L)



The minimum number of nodes per shoots was recorded with control (14.52). The treatment T6 (90 cm + GA3@200ppm + NAA@200ppm) recorded significantly by maximum number of leaves per shoots of phalsa (17.50) closely followed T5 (90 cm + GA3@100ppm + NAA@150ppm). The minimum number of leaves per shoots was recorded with control (23.46) Filippenko (1960) also reported similar result. The maximum Leaf area per plant (cm)2 was recorded with T6 (90 cm + GA3@200ppm + NAA@200ppm) (240.78) which was significant superior to other treatment followed by T12 (90 cm + GA3@200ppm + NAA@150ppm). The minimum Leaf area per plant (cm)2 was noticed with control (78.64). The maximum Leaf area index was recorded with T6 (90 cm + GA3@200ppm + NAA@200ppm) (7.65) which was significant superior to other treatment followed by T4 (60 cm + GA3@200ppm + NAA@200ppm). The minimum Leaf area index was noticed with control (4.60) Singh and Gaur (1989) also reported similar result. From the present investigation it is concluded that the treatment T6 (90 cm + GA3 @200ppm + NAA@200ppm) were resulted in maximum plant growth.

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