Research Note

EFFECT OF PLANT GROWTH REGULATORS ON GROWTH AND YIELD OF BRINJAL AT KHAJURA, BANKE

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ABSTRACT

A field study was conduced in split-plot design with three replications to assess the effect of plant growth regulators (PGRs) on morphological characters and yield of brinjal cvs. Pusa Purple Long (PPL) and Pusa Purple Cluster (PPC) as main plot factor at Khajura, Banke district during summer-rainy season of 2004. The sub-plot treatments composed of fresh water (control), 40 ppm NAA, 10 ppm GA_3, 2 ppm 2,4-D, 300 ppm ethephon, 30 ppm BAP and 5 ppm triacontanol. The first spray was at flowering stage and the others at 20 days interval. The PGRs had no significant effect on plant height and stem diameter at the end of crop period and days to 100% plant flowering whereas the cultivars differed significantly. The PPL was earlier to 100% plant flowering, which took 33 days after transplanting. The treatments had no significant influence in fruit number per plant and fruit yield. The interaction effect showed that the. PPL did not produced statistically different fruit number per plant with respect to growth regulators, while it had significantly higher fruit yield (17.76 t/ha) at 40 ppm NAA than that at 10 ppm GA_3 and 30 ppm BAP. The PPC produced significantly higher fruit number per plant and higher fruit yield (t/ha) at 30 ppm BAP than all other treatments except 5ppm triacontanol.

Key words: Growth regulators, cultivar, season, marketable, unmarketable, yield

INTRODUCTION

Brinjal (*Solanum melongena* L.) is an important vegetable crop, particularly of the Terai region of Nepal. Poor fruit set and low yield are the major problems. Plant growth regulators have been reported to improve germination, growth, fruit set, fresh vegetable and seed yields and yield quality (Saimbhi, 1993). Application of plant growth regulators as seed treatment and seedling root dip at transplanting have been found effective in enhancing germination and seedling growth, and in reducing transplanting shock. In pot experiment on brinjal, Das and Prusty (1972) reported that GA at 10 ppm enhanced seed germination. Sadawarte and Gupta (1968) also reported 24h soaking of brinjal seeds in GA at 40 ppm, IAA at 50 ppm or NAA at 25 ppm improved seed germination. Similarly, Sambasiva Rao *et al.* (1980) recorded dipping of brinjal seedling roots in NAA at 0.1 or 0.2 ppm for 24 hours influenced growth and development. Bisaria and Bhatnagar (1978) obtained higher yield with foliar sprays of IAA at 20 ppm. Gupta (1971) reported that eggplant seeds treated with GA, IAA or NAA at 10 ppm significantly enhanced germination than at higher concentration or control. Hooda *et al.* (1985) reported higher fruit yield with cytozyme seed treatment at 10 % and foliar spray at 1.25%. Foliar spray of mixatol at 4 ppm four weeks after transplanting produced the highest fruit yield (Shukla and Prabhakar, 1988). Plant growth regulators can also be used to stimulate parthenocarpic fruit development in brinjal. Foliar spray of 2,4-D at 0.00025% to freshly opened flower cluster induced parthenocarpy in brinjal. Patel *et al.* (1997) reported that the Surati Ravaiya with application of 2,4-D at 4 ppm produced higher yield (54.11 t/ha) than with control treatment (33.07 t/ha). This study was conducted to assess the effect of various plant growth regulators on growth and yield of brinjal.

MATERIALS AND METHODS

This study was conducted in split plot design to assess the effect of various growth regulators on fruit set and yield with three replications at Khajura, Banke during summer-rainy season of 2004. The two cultivars Pusa Purple Long and Pusa Purple Cluster were main-plot factors and the applications of growth regulators such as control (Fresh water), 40ppm naphthalene acetic acid (NAA); 10ppm gibberellic acid (GA); 2 ppm 2,4-dichlorophenoxyacetic acid (2,4-D); 300ppm ethephon (Kripon); 30ppm benzyl adenine purine (BAP) and 5ppm triacontanol (Ki-plan) were sub-plot factors. The individual plot size was 5.4m^2 consisting of 30 plants.

The field was ploughed twice, first with disc plough and the second with cultivator. Farm yard manure (FYM) @ 30t/ha and chemical fertilizers @ 40:60:60: NPK kg / ha were applied in each plot separately at the time of final land preparation. Fifty-five days old seedlings (20th February nursery sowing) were transplanted on 16th April 2004 at 60 cm row to row and 30 cm plant-to-plant distance. Four side dresses each with 20 kg N/ha were made at regular interval of 20 days. Surface irrigation was practiced at 4-7 days interval in summer and when necessary in rainy season. Weeding was practiced along with side dresses. Days to 50 % and 100% flowering after transplanting were recorded. Plant height and stem diameter were measured thrice at an interval of 30 days. Average number of marketable, unmarketable and borer infected fruits per plant were counted. The marketable, unmarketable and borer infected yields were recorded. The MSTAT-C computer package was used to analyze the data.

RESULTS AND DISCUSSION

Morpho-phenological characters

The morphological characters, such as plant height and stem diameter were measured at three growth stages. The first measurement at the flowering stage, the second at prolific fruiting stage and the third at the end of crop period. The growth rate of plant height was very high between flowering and first harvest periods and then declined. The growth rate of stem diameter was more stable than that of plant height. The Pusa Purple Cluster had significantly thicker stem diameter at all growth stages. Hence, the Pusa Purple Cluster had taller plants with thicker stem diameter than Pusa Purple Long.

The different plant growth regulators employed did not influence both plant height and stem diameter significantly (Table 1). The Pusa Purple Long and Pusa Purple Cluster differed significantly in plant height and stem diameter at all growth stages. The cv. Pusa Purple Long produced flowers significantly earlier than Pusa Purple Cluster ($P<0.01$). The period from transplanting to 100 percent flowering was 33 days in Pusa Purple Long (Table 2). The growth regulators did not influence days to 100% plant flowering significantly in both cultivars.

Table 1. Effects of different PGRs on brinjal morphological characters of cvs. Pusa Purple Long and Pusa Purple Cluster at Khajura, Nepalgunj during summer-rainy season, 2004

Treatments	PH on 10th July	SD on 10th July
Control	66.40	1.58
NAA 40 ppm	63.23	1.59
GA3 10 ppm	66.90	1.57
2,4-D 2ppm	64.65	1.47
Ethephon 300 ppm	62.00	1.64
BAP-30 ppm	68.60	1.51
Triacontanol-5ppm	67.00	1.52
LSD	ns	ns
CV%	9.70	7.82

PH=Plant Height, ns= Non-significant; SD= Stem Diameter

Table 2. Varietal differences in Days to 100% flowering, plant height and stem diameter at Khajura, Banke during summer-rainy season, 2004

Treatments	Days to 100% flowering	Plant height on 10th July	Stem diameter on 10th July
Pusa Purple Long	33b	58b	1.391b
Pusa Purple Cluster	44a	73a	1.726a
P value	<0.01**	<0.05*	<0.01**
CV%	5.66	9.7	7.82

Mean within the column followed by the same letter/s do not differ significantly at 0.05 (*) and at 0.01 (**) level by DMRT

Yield and yield components

The growth regulators did not influence significantly in fruit number (marketable, total, unmarketable and

borer infested) per plant and fruit yield (marketable and unmarketable) (Table 3). However, the treatments 30 ppm BAP, 40 ppm NAA and 5 ppm triacontahol applications produced higher yields than other treatments.

Table 3. Effects of different PGRs on yield attributes of brinjal at Khajura, Banke during summer-rainy season, 2004

Treatments	MFN/Plant	MFY t/ha	UMFN/plant	BIFN/plant	UMFY t/ha
Control	5.83	12.46	4.00	4.00	7.31
NAA 40ppm	6.50	14.98	4.00	3.66	7.57
GA3 10ppm	5.50	10.72	4.50	4.16	7.87
2,4-D 2ppm	6.17	13.22	3.50	3.50	6.26
Ethephon 300ppm	5.50	11.05	3.50	3.50	5.98
BAP 30ppm	7.66	15.16	4.00	3.50	7.39
Triacontanol 5ppm	6.16	14.15	4.00	3.83	8.74
LSD	ns	ns	ns	ns	ns
CV%	29.92	23.70	21.81	21.12	27.25

Note: MFN= Marketable Fruit Number, MFY= Marketable Fruit Yield, UMFN= Unmarketable Fruit Number, BIFN= Borer Infected Fruit Number and UMFY= Unmarketable Fruit Yield

In the. Pusa Purple Long the growth regulators did not produce significantly higher marketable fruit number per plant than that of control,while the. Pusa Purple Cluster produced significantly higher marketable fruit number per plant at BAP 30 ppm than those at all other treatments (Table 4). The marketable fruit numbers of the Pusa Purple Long at 40 ppm NAA and 2 ppm 2,4-D and of the Pusa Purple Cluster at BAP 30 ppm were at par. The Pusa Purple Long produced significantly higher yield at 40 ppm NAA than at GA_3 10 ppm and 30 ppm BAP while, the yields at other treatments were at par. Sharma *et al.* (1992) reported that brinjal Pusa Purple Long sprayed with 300 ppm GA_3 flowered earliest and had the highest number of fruits and yield per plant. The results do not follow this findings it might be associated with concentration of GA_3. The Pusa Purple Cluster produced significantly higher yield at 30 ppm BAP than those at all other treatments except 5 ppm triacontanol (Table 4).

Table 4. Interaction effects of different PGRs and varieties on marketable fruit number and yield of brinjal at Khajura, Banke during summer-rainy season, 2004

Treatments		Control	NAA 40	GA3 10	2,4-D	Ethephon	BAP	Triacontanol	LSD	CV%
		ppm	ppm	2ppm	300ppm	30 ppm	5ppm			
MFNO	PPL	6.66bc	8.33ab	6.00bc	7.00a-c	6.33bc	5.33bc	6.67bc	2.891*	27.7
Per plant	PPC	5.00bc	4.67c	5.00bc	5.34bc	4.67c	10.00a	5.66bc		
MFY t/ha	PPL	13.52a-c	17.76ab	9.71c	14.79a-c	12.70bc	11.08c	14.70abc	5.63*	25.53
	PPC	11.40bc	12.20bc	11.73bc	11.66bc	9.31c	19.25a	13.59abc		

Note: MFNO= Marketable Fruit Number, MFY= Marketable Fruit Yield, PPL= Pusa Purple Long and PPC= Pusa Purple Cluster; Mean within the column followed by the same letter/s do not differ significantly at 0.05 levels by DMRT

Hence, 30ppm BAP was found most effective followed by 5ppm triacontanol in. Pusa Purple Cluster while 40ppm NAA, 2ppm 2,4-D and 5ppm triacontanol had shown positive effect on yield in the Pusa Purple Long.

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