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Effect of pruning levels and bio-fertilizers on production of rose cut flower

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ABSTRACT

The experiment was carried out at the Deptt. of Horticulture K.A.P.G., college, Allahabad (U.P.) during the year 2005-06. Two year old well established rose plants were taken for the study. The design was used 5^2 Factorial RBD with three replications. Two factors i.e. pruning and bio-fertilizer each with five levels were tried to speculate the vigor, yield, quality and economy of cut flower. The number of cut flowers per bush were recorded highest (16.18) when pruned at five bud with Recommended Dose of Fertilizers (RDF) + soil applied bio-fertilizers (SAB) + foliar spray of vermiwash. Deeper the pruning lower the cut flower number per bush were observed. Quality blooms were found to increased with increase in severity of pruning up to one bud level. The recovery of grade C flowers with four and five bud level were observed and no such kind of cut flower was recovered when pruned at 3,2 & or 1 bud level. Bio-fertilizers influenced significantly the number of cut flowers per bush and grade too. Number of cut flowers per bush at same level of pruning were found significantly greater with F_4 (SAB + vermi-wash spray) followed by F_3 (SAB + Biodynamic), F_2 (SAB + Horne manure), F_1 (SAB) and F_0 Control (RDF). Conclusively T_{14} (pruned at 3 bud + SAB + foliar spray of vermiwash) treatment was found best in terms of economy of rose cut flower production at field level.

Key words: Pruning, rose, bud, eye, bio-fertilizer, azotobacter, PSB, potash, vermi-wash, bio-dynamic, horne manure, cut flower, yield, economy.

INTRODUCTION

Among the cut flowers rose stand first in terms of trade and likeness. Its cultivation is very scientific and precise to optimize profit/unit of input investment. Hi-Tech cultivation is more easy and remunerative as compared to open field condition, where both the yield and quality attainment are the limiting factors in its commercialization.

To unfold genetic potential of the plant, environment plays crucial role. Cultural practices and nutrition remain the only feasible option on the part of the farmer to provide typical environment to the plant. Roses well responded to pruning when done judiciously and controls vigor, yield and quality characters of the plant.

Indiscriminate use of fertilizers and other agro-chemicals vanished our bountiful beneficial micro-organism from the soil and caused infertile and unproductive soil. Addition of plentiful organic residue in the soil through bulky manures as FYM & compost has become difficult due to farm mechanization. In this respect bio-fertilizers play multifaceted role by not only enriching the soil micro-organism but also as nutrients, stabilizers, hormones & insulators. They also give quick response like chemicals when applied as foliar spray.

Keeping above aspects in view the experiment was undertaken to find out the effect of pruning level and bio-fertilizer on yield and quality of rose cut flowers cv. Rakta Local in Allahabad condition.

MATERIALS AND METHODS

The experiment was carried out at K.P. Trust Farm Ujahini by the Department of Horticulture, K.A.P.G., College, Allahabad (U.P.) during the year 2005-06. The budded rose of cv. Rakta Local were purchased from Sachan Flora-nursery, and planted in the field in 2003. The progressive farmers of the area used to grow this variety as cut flower in small scale. Hardiness, vigor, floriferous-ness, input responsive, local demand and locally availability of planting material are the some positive points for the adoption. After 3-4 years of planting bushes become less productive and uneconomic. There were two factors i.e. pruning level and bio-fertilizers were tried. Pruning was done on 7th Oct, 2005 in all the plants with 5 levels (at P_0-5 bud, P_1-4 bud, P_2- 3 bud, P_3- 2 bud and P_4- 1 bud) and 5 levels of bio-fertilizers (F_0- no

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fertilizers and only RDF i.e. 120, 60, 80, NPK kg/ha. F_1-Bio-fertilizers as Azotobacter 50 gm + Phosphorus Solubulizing Bacteria, (PSB) 50 gm + Potash Mobelizing Bacteria (PMB), 50 gm/plant were incorporated in to the soil after pruning, F_2-Bio-fertilizers + Biodynamic@5% foliar spray after 45 days of pruning, F_3-Bio-fertilizers + Horne manure @ 5%, foliar spray after 45 days of pruning and F_4-Bio-fertilizers + Vermi-wash @ 5% foliar spray after 45 days of pruning.)

Thus 5^2 factorial randomized block design with three replications farming 25 (T_0-T_{24}) treatment combinations were used. The plants were spaced at 75 x 75 cm. and 5 plants per plot (7.5 x 7.5 m plot size) were accommodated, thus total number of plants (375) were planted in 75 plots. After pruning operation five stems were left and all the sprouted shoots reaching to the bud stage were detached and counted as number of cut flowers/bush. The number of cut flowers/ha were calculated by multiplying the number of cut flowers/bush x total number of plants/ha. (i.e. 17777/ha planted at 75 x 75 cm. distance). Cut flowers were graded according to length of cut flowers (from stem base to bud tip) and data were taken as number of cut flowers/ha. of Grade A,B,C, and D. The grades were as A = cut flower stem length > 60cm., B = > 45 to 60 cm, C = 35 to 45 cm. and D = < 35 cm. The cut flower of Grade D were have no market value and in calculation of cost/benefit ratio the price of such Grade flowers was put zero. The Grades were also calculated in percentage.

To find out the cost/benefit ratios, the cost of cultivation and gross income per/ha. were calculated, as per local market (Allahabad City) trend. The Grade A cut flowers @ Rs. 2.5/stem, Grade B @ Rs. 1.5/ stem and Grade C @ Rs. 1.0/stem and Grade D @ Rs. 00/

Table 1. Effect of pruning level and bio-fertilizers on vigor of rose cut flowers (pooled data).

Treatment	Cut flower length (cm)	Cut flower dia. at base (cm)	Cut flower dia. at neck (cm)	Cut flower weight (g)	Bud length (cm)	Bud dia (cm)	Bud weight (g)	No. of leaves per shoot
T0	25.78	2.57	1.99	35.53	2.88	4.28	1.60	15.46
T1	28.68	2.74	2.22	39.64	3.12	4.63	1.73	17.20
T2	32.32	2.97	2.33	41.60	3.27	4.85	1.81	19.40
T3	31.17	2.89	2.30	41.07	3.23	4.80	1.79	18.70
T4	33.97	3.07	2.37	42.32	3.33	4.94	1.84	20.38
T5	32.11	2.95	2.31	41.25	3.25	4.82	1.80	19.26
T6	34.09	3.08	2.34	41.78	3.29	4.88	1.82	20.45
T7	36.54	3.22	2.39	42.67	3.36	4.99	1.86	21.92
T8	35.89	3.18	2.32	41.42	3.26	4.84	1.80	21.53
T9	38.68	3.35	2.40	42.85	3.37	5.00	1.86	23.20
T10	48.31	3.94	2.47	44.10	3.47	5.15	1.92	28.98
T11	58.83	4.58	2.81	15.17	3.95	5.87	2.18	35.29
T12	84.88	5.17	2.98	52.32	4.19	6.22	2.32	50.92
T13	70.79	4.91	2.83	50.53	3.98	5.91	2.20	42.47
T14	89.33	5.42	3.17	56.42	4.44	6.59	2.46	53.59
T15	87.47	5.33	3.09	55.17	4.34	6.44	2.40	52.48
T16	90.11	5.49	3.16	56.42	4.44	6.59	2.46	54.06
T17	90.83	5.53	3.18	56.78	4.47	6.64	2.48	54.49
T18	91.33	5.56	3.20	56.14	4.50	6.68	2.49	54.79
T19	91.99	5.60	3.22	57.50	4.53	6.73	2.51	55.19
T20	89.09	5.42	3.12	55.71	4.38	6.50	2.42	53.45
T21	92.18	5.61	3.22	57.50	4.53	6.73	2.51	55.30
T22	92.78	5.65	3.25	58.03	4.57	6.79	2.53	55.86
T23	93.11	5.69	3.26	58.21	4.58	6.80	2.54	55.86
T24	94.35	5.69	3.29	58.75	4.62	6.86	2.56	56.61
CD at 5 %	2.35	0.173	0.345	2.49	0.175	0.321	0.110	1.389

stem to analyze the Gross Income/ha. Net income was obtained by subtracting cost of cultivation from Gross income. Similarly the C/B ratio was worked out by dividing Grass Income with cost of cultivation.

RESULTS AND DISCUSSION

All the parameters taken were significantly affected by pruning levels and bio-fertilizers application. Number of cut flowers were reduced with reduction in retained bud per shoot. Highest number of cut flower/bush (16.18) were observed in T_4 (at 5 bud pruning + Bio-fertilizers + Vermi-wash Spray), while the lowest cut flower number/ bush (3.98) were in T_{20} (at one bud pruning + no Bio-fertilizers). As bud number/per shoot reduced the number of flower/bush also found reduced. At same level of pruning the variation in flower number was due to effect of bio-fertilizer and in all treatment combinations vermi-wash found best followed by biodynamic preparation & Horn manure. The control (only recommended dose of fertilizer) yielded lowest number of cut flowers per stem. The number of cut flowers/bush were directly proportional to the number of buds/bush retained after pruning because buds get sprouted and produced cut flowers. The effects of soil applied bio-fertilizers are obvious that they provide nutrition, hormones, congenial rhizosphere which ultimately forced bud to sprout in more number. Though bio-fertilizers spray were done after bud sprouting is well over, therefore their effect can't be realized.

Quality blooms recovery found to be decreased with increased in bud number/shoot. Highest best quality (Grade A) cut flower percentage (90.75) was observed in T_{24} (pruning at one bud + soil applied bio-fertilizers +

Table 2. Effect of pruning level and bio-fertilizers on yield and quality of rose cut flower (pooled data)

Treatment	No. of cut flower/ bush	No. of cut flower/ ha	No. of cut flower/ha of Grade A (000')	No. of cut flower/ha of Grade B (000')	No. of cut flower/ha of Grade C (000')	No. of cut flower/ha of Grade D (000')
To	15.83	2.81	26.69 (9.50)	80.14 (28.52)	99.05 (35.25)	75.11 (26.73)
T1	15.88	2.82	27.07 (9.60)	84.76 (30.06)	98.70 (35.00)	71.45 (25.34)
T2	15.90.	2.82	29.61 (10.50)	101.52 (36.00)	99.40 (35.25)	51.65 (18.25)
T3	15.87	2.82	27.77 (9.85)	101.52 (36.00)	99.12 (35.15)	50.76 (18.00)
T4	16.18	2.87	34.00 (11.85)	112.36 (39.15)	100.45 (35.00)	40.18 (14.00)
T5	11.09	1.97	43.34 (22.00)	83.07 (42.17)	55.61 (28.23)	15.48 (7.83)
T6	11.88	1.96	45.13 (23.03)	84.26 (42.99)	52.92 (27.00)	13.68 (6.980
T7	12.22	2.17	52.90 (24.38)	98.47 (45.69)	52.79 (24.33)	12.15 (5.60)
T8	12.11	2.15	50.14 (23.33)	95.18 (44.37)	55.14 (25.65)	14.57 (6.75)
T9	12.39	2.20	55.77 (25.35)	98.93 (44.97)	53.52 (29.33)	11.77 (5.35)
T10	9.99	1.77	111.57 (63.00)	45.61 (25.77)	18.10 (10.23)	0.00
T11	10.11	1.79	117.87 (65.85)	44.75 (25.00)	16.37 (9.15)	0.00
T12	10.32	1.83	121.40 (66.34)	53.01 (28.97)	8.58 (4.69)	0.00
T13	10.19	1.81	119.26 (65.89)	52.49 (29.00)	9.24 (5.11)	0.00
T14	10.99	1.95	130.29 (66.82)	55.67 (28.55)	9.02 (4.63)	0.00
T15	7.10	1.26	85.68 (68.00)	35.28 (28.00)	5.04 (4.00)	0.00
T16	7.23.	1.28	87.18 (68.11)	36.03 (28.15)	4.78 (3.74)	0.00
T17	7.78	1.38	96.60 (70.00)	27.80 (20.15)	13.59 (9.85)	0.00
T18	7.65	1.35	94.29 (69.85)	27.40 (20.30)	13.29 (9.85)	0.00
T19	7.88	11.40	99.37 (70.98)	26.62 (19.02)	14.00 (10.00)	0.00
T20	3.98	0.70	52.88 (75.55)	14.95 (20.50)	2.79 (3.95)	0.00
T21	4.11	0.73	56.31 (77.15)	13.38 (18.33)	3.29 (4.52)	0.00
T22	4.73	0.84	75.07 (89.38)	6.40 (7.60)	2.52 (3.00)	0.00
T23	4.29	0.76	68.08 (89.58)	5.70 (7.51)	2.21 (2.91)	0.00
T24	4.89	0.86	78.04 (90.75)	7.09 (8.25)	0.86 (1.00)	0.00
CD at 5 %	0.021	0.024	8.731	7.948	8.135	7.341

*Figures in parenthesis are % of total cut flowers

vermi-wash foliar spray) while the lowest percentage (9.50) of Grade A cut flower was observed in T_0, control (pruning at 5 bud + RDF). Number of shoot/bush was found inversely proportional to the vigor of shoot retained on to bush. Principally, the partition of metabolites, space & solar radiation among the shoots confined to that bush are the prominent causes of shoots vigor. Occurrence of grade D flowers (No market value) on bushes pruned at 4 bud and or 5 bud level might be due to the deficiency of vigor limiting factors. There was no any Grade D cut flower was observed in the bushes pruned at 1, 2 and or 3 bud level. The variation among the same level pruned treatments was due to the nutrition and Vermi-wash spray showed pronounced effect followed by biodynamic and Horn manure. Even soil applied bio-fertilizers yielded better results over control.

Three-bud pruning level showed best results over 4,5,2 and or 1 bud pruning level in terms of vigor, yield, quality and economy of cut flower production. Cost/ Benefit ratios were found significantly better with 3 bud pruned bushes than those pruned rather at 5, 4, 2 and or 1 bud level. Highest C/B ratio (1:1.96) was observed in T_{14} pruned at 3 bud + SAB and foliar application of vermi-wash) treatment. Treatment T_{24} yielded maximum percentage (90.75) of Grade A cut flowers but stem number/bush were found to reduced drastically so that C/B ratio (1:0.97) too. The control (T_0) produced higher number of cut flower/bush (15.83%) but due to Grade D cut flowers very high in percentage (26.73) made them uneconomic and C/B ratio remains only 1:1.52. The variation among the same pruned treatments was observed due to bio-fertilizers.

Table 3. Effect of pruning levels and bio-fertilizers on economy of rose cut flowers production (pooled data)

Treatment	Income from grade A cut flower (Rs. 000') /ha	Income from grade B cut flower (Rs. 000') /ha	Income from grade C cut flower (Rs. 000') /ha	Gross income (Rs. 000') /ha	Cost of cultivation (Rs. 000') /ha	Net return (Rs. 000') /ha	Cost/ benefit ratio
To	66.73	120.21	99.05	286.00	187.00	99.00	1 :1.52
T1	67.68	127.15	98.70	293.53	187.00	106.53	1 :1.56
T2	73.76	129.27	99.75	302.79	187.00	115.79	1 :1.61
T3	69.44	128.16	98.27	295.88	187.00	108.88	1 :1.58
T4	85.02	131.77	97.58	314.37	187.00	127.37	1 :1.68
T5	108.35	124.61	55.61	288.57	200.00	88.57	1 :1.44
T6	112.84	126.39	52.92	292.15	200.00	92.15	1 :1.46
T7	132.26	147.71	52.79	332.76	200.00	132.76	1 :1.66
T8	125.39	147.77	55.14	328.31	200.00	128.31	1 :1.64
T9	139.42	148.40	53.52	341.32	200.00	141.32	1 :1.70
T10	278.77	68.41	18.10	365.30	213.00	152.30	1 :1.71
T11	294.68	67.12	16.37	378.18	213.00	165.18	1 :1.77
T12	303.50	69.12	8.58	391.60	213.00	178.60	1 :1.83
T13	298.15	78.73	9.24	386.13	213.00	173.13	1 :1.81
T14	325.74	83.50	9.02	418.28	213.00	205.28	1 :1.96
T15	214.20	52.92	5.04	272.16	213.00	59.16	1 :1.27
T16	217.95	55.04	4.78	276.78	213.00	63.78	1 :1.29
T17	241.50	41.71	13.59	296..80	213.00	83.80	1 :1.39
T18	235.74	41.10	13.29	295.90	213.00	82.90	1 :1.38
T19	248.43	39.94	14.00	302.37	213.00	89.37	1 :1.41
T20	132.21	21.52	2.76	156.50	213.00	-56.49	1 :0.73
T21	140.79	20.07	3.29	164.16	213.00	-48.83	1 :0.77
T22	187.69	9.60	2.52	199.81	213.00	-13.18	1 :0.93
T23	170.20	8.56	2.21	180.97	213.00	-32.02	1 :0.84
T24	195.11	10.64	0.86	206.61	213.00	-6.38	1 :0.97
CD at 5 %	1.85	3.74	3.84	2.73	-	8.19	-

These findings are in conformity with the findings of Rajan *et al.* (7) in Potato, Ganesh (1) in Okra, Joi and Shinde (3) in Onion, Wange (8) in Garlic, Moe (5), Gault and Synege (2), Pal (6), and Malik and Dadlani (4). Pruning levels and bio-fertilizers influenced significantly the vigor, yield, quality and C/B ratio in rose cut flower production. Cultivar Rakhta Local returns higher when pruned at 3 bud level along with soil application of bio-fertilizers and foliar spray of vermi-wash in Allahabad condition.

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