J. Appl. Hort., 4(2):113-115, July-December, 2002

Effect of stionic combinations on growth and flowering of rose

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Abstract

The effect of rootstock-scion relationships on growth and flowering in rose was studied with four rootstocks budded with four cultivars. Budtake percentage was maximum in *R. indica* var. Odorata budded with Super Star and these plants attained significantly higher height. The cv. Happiness, when budded on *R. indica* var. Briar produced longest flower stalk. Neck length, budsize (length and diameter) also varied significantly in different rootstock-scion combinations.

Key words: Rootstock, scion, growth, flowering, rose, budtake, *R. indica* var. Odorata, flower stalk

Introduction

Rose, the queen of flowers is an important flower of Tarai region of Uttaranchal. A number of promising cultivars are grown at commercial scale in this region. However, the major drawback limiting to its cultivation in this region is its susceptibility to dieback and root rot/collar rot disease. There are many rose species and varieties available possessing diversified characters like adaptability to adverse soil and climatic conditions, hardiness and vigour, disease resistance, flowering quality, longevity, etc which have been tested as rootstock for the commercial rose cultivars at few places in India (Swarup and Malik, 1974; Sharma, 1979; Singh, 1980). The information on rootstock-scion relationship is lacking under Tarai conditions of Uttar Pradesh. The information about the behaviour of a scion cultivar on a particular rootstock in terms of vigour and other characters cannot be extended to other cultivars as these rootstocks behave differently with different scions and with same scion under varying soil and climatic conditions. Keeping these in view, the present investigation was carried out to find out the effect of rootstock-scion relationship on bud take, growth and flowering of rose.

Materials and methods

The investigation was carried out at Garden Section of G.B. Pant University of Agriculture and Technology, Pantnagar situated at the foothills of Himalaya at an altitude of 243.83 m above mean sea level and at 29° North latitude and 79.3° East longitude. Four rootstocks namely, *Rose indica* var. Odorata (S_1), *R. indica* var. Briar (S_2) *R. macrophylla* (S_3) and R. *clinophylla* (S_4) budded with four cultivars *viz.*, Super Star (C_1), Happiness (C_2), Eiffel Tower (C_3) and Kiss of fire (C_4) were taken for the study. The experiment was laid out in Factorial Randomized Block Design and replicated thrice. The planting distance of the individual plant was kept 60 x 60 cm and all the plants were maintained under uniform cultural practices during the course of investigation. The observations on bud take percentage, time taken to bud sprouting, plant height and number of branches, plant spread were recorded in different stock-cultivar combinations. Initial observations for the above characters were recorded after two weeks of budding. Thereafter, observations were recorded at different intervals depending upon the characters to be studied. The green buds were counted after two and four weeks of budding. The spread of the plant was measured in both directions *i.e.* North-South and East-West and calculated by the formula 1/2 [(N-S)+(E-W)]. The data for various parameters were collected from randomly selected ten plants and were subjected to statistical analysis for drawing conclusions.

Results and discussion

The results of the effect of rootstock-scion interaction on bud take and time taken to sprouting have been depicted in Table 1. The data show significant effect of interaction on budtake at two weeks after budding while it was non-significant after four weeks of budding. After two weeks the bud take per cent was highest (80%) in *R. indica* var. Odorata x Superstar (S_1C_1) combination followed by *R. indica* var. Odorata x Kiss of Fire (S_1C_4) (73.67%) whereas bud take was lowest (48.67%) in *R. macrophylla* x Eiffel Tower (S_3C_3) graft combination. However, after four weeks of budding, bud take percentage in different combinations was statistically at par (Table 1). The time required to sprouting in different budwood and stock combinations varied significantly. *R. macrophylla* x Eiffel Tower combinations took minimum time (21.33 days) to sprouting followed by *R. indica* var. Odorata x Happiness and *R. indica* var. Briar x Super Star which took 22.33 days and *R. macrophylla* x Kiss of Fire took maximum time (24.67 days) to sprouting (Table 1). Similar variations in bud take percentage on stionic combination of Montezuma and June Bride Scions budded on *Rosa borboniana, R. indica* var. Odorata and *R. multiflora* were reported by Kumar *et al.* (1996). Amanullah *et al.* (1996) also reported that cv. Bajazo had higher bud take than others when budded on *R. multiflora.* The effect of interaction on plant height was significant at 6 and 15 months after budding. The combination *of R. indica* var Odorata x Super Star (S_1C_1) produced the plants

with maximum height (37.67 cm) followed by interactions S_4C_1 (33.33 cm) whereas the plant height was minimum (24.67 cm) in the combinations S_2C_3 after 6 months but after 15 months of budding S_4C_4 produced tallest plants (119.67cm) which were at par with average plant heights in S_2C_4 interactions (119.33 cm). However, the least height was attained by plants in S_2C_3 stock-cultivar combination (Table 2).

The specific rootstock-cultivar combination significantly affected the plant spread at 6 months after budding. However, the differences in plant spread after 15 months of budding were non-significant. Interaction S_1C_2 gave the maximum plant spread (55.63 cm) which was statistically at par with S_2C_2 interaction (54.67cm) whereas plant spread was minimum in S_2C_1 interaction (34.40 cm) (Table 2). However, number of branches did not differ significantly among the different stock - cultivars combinations. It is interesting to note that Super Star, an average growing cultivar gave vigorous plants when grafted on vigorous rootstock *R. indica* var Odorata. Amanullah *et al.* (1996) studied the response of different rose cultivars budded on *R. multiflora* and reported that plant growth was greater in Bajazo than in the other two cultivars.

A perusal of the data in Table 3 reveal that the length of flower stalk was significantly influenced by the interaction of stocks and cultivars at 15 months after budding. However after 6 months of budding, flower stalks in different combinations were statistically at par. The interaction S_2C_2 produced the maximum length of flower stalk (5.43 cm) while minimum stalk length (2.87 cm) was recorded with S_2C_1. The data on neck length show that the interaction significantly influenced the neck length. It was maximum (5.27 cm) in S_1C_1, combination whereas neck length was minimum (4.22 cm) in S_3C_4 and S_4C_4 stock-cultivar combination. The variation in growth and vigour by various cultivars grafted on a single rootstock varies (Swarup and Malik, 1974) and may be attributed to compatibility level of a particular cultivar with a rootstock (Singh, 1977; Suskov and Mihneva, 1969).

Table 1. Effect of rootstock- cultivar interaction on bud take and time taken to sprouting.

Stock x Cultivar	Bud take (%) Weeks after budding		Time required for sprouting (days)
	2	4	
Rosa indica var. Odorata x Super Star	80.00 (63.45)	89.67 (71.25)	22.67
R. indica v. Odorata x Happiness	69.00 (56.17)	82.67 (65.40)	22.33
R. indica v. Odorata x Eiffel Tower	61.67 (51.75)	79.67 (63.20)	23.33
R indica v. Odorata x Kiss of fire	73.67 (59.13)	86.33 (68.31)	23.33
R indica . v Briar x Super Star	60.67 (51.16)	82.67 (65.40)	22.33
R indica v. Briar x Happiness	55.67 (48.25)	76.33 (60.89)	23.67
R. indica . *v.* Briar x Eiffel Tower	50.67 (45.38)	72.33 (58.27)	24.33
R indica . v Briar x Kiss of Fire	55.67 (48.25)	80.33 (63.68)	24.00
R.. macrophylla x Super Star	58,33 (49.80)	80,33 (63.68)	23.67
R.. macrophylla x Happiness	54.67 (47.68)	74.33 (59.56)	23.33
R.. macrophylla x Eiffel Tower	48.67 (44.24)	69.67 (56.58)	21.33
R macrophylla. x Kiss of fire	57.67 (49.41)	77.67 (61.80)	24.67
R. clinophylla x Super Star	70.33 (57.00)	88.33 (70.03)	23.00
R. clinophylla x Happiness	60.67 (51.16)	81.00 (64.17)	23.67
R. clinophylla x Eiffel Tower	56.33 (48.64)	75.67 (60.44)	22.67
R. clinophylla x Kiss of Fire	65.67 (54.13)	84.67 (66.95)	23.67
CD (*p*=0.05)	1.31	NS	0.89

Figures in parentheses indicate transformed (Arcsin) values.

Table 2. Effect of stionic combinations on plant height and spread

Stock x cultivar	Plant height (months after budding)		Plantspread (months after budding)	
	6	15	6	15
Rosa indica var odorata x Super Star	37.67	117.67	37.50	108.67
Rosa indica var odorata x Happiness	29.33	110.67	55.63	110.33
Rosa indica var odorata x Eiffel Tower	25.67	84.33	47.50	167.50
Rosa indica var odorata x Kiss of Fire	30.33	121.33	50.50	150.50
Rosa indica var Briar x Super Star	26.00	108.67	34.40	107.67
Rosa indica var Briar x Happiness	24.33	107.00	54.67	109.67
Rosa indica var Briar x Eiffel Tower	24.67	82.67	46.50	166.33
Rosa indica var Briar x Kiss of Fire	27.33	119.33	49.67	148.67
Rosa macrophylla x Super Star	27.33	112.67	36.27	107.33
Rosa macrophylla x Happiness	28.33	109.33	54.40	109.33
Rosa macrophylla x Eiffel Tower	27.00	85.67	45.67	165.67
Rosa macrophylla x Kiss of Fire	30.33	118.33	48.17	147.33
Rosa clinophylla x Super Star	33.33	113.33	36.67	106.50
Rosa clinophylla x Happiness	31.67	112.67	53.67	108.33
Rosa clinophylla x Eiffel Tower	28.00	85.00	45.00	164.67
Rosa clinophylla x Kiss of Fire	31.67	119.67	48.00	146.17
CD (p=0.05)	1033.00	1.11	1.06	NS

Table 3. Effect of stionic combination on neck length, bud size and flowering

Stock x Cultivar	Neck length (cm)	Bud size (cm)		Number	Flowering	
		length	diameter		Av. wt. (gm)	Flower size (cm)
R. indica var. Odorata x Super Star	5.27	2.89	1.82	24.04	146.00	6.83
R. indica var. Odorata x Happiness	4.62	2.72	1.70	21.70	126.17	5.73
R. indica var. Odorata x Eiffel Tower	4.58	2.70	1.62	20.57	102.17	5.40
R. indica var. Odorata x. Kiss of fire	4.23	2.71	1.85	18.50	84.48	6.27
R. indica var. Briar x Super Star	4.85	2.53	3.33	20.50	115.45	6.40
R. indica var. Briar x Happiness	4.55	2.60	1.60	20.80	127.53	6.10
R. indica var. Briar x Eiffel Tower	4.38	2.58	2.88	19.90	98.17	6.23
R. indica var. Briar Kiss of Fire	4.25	2.58	1.55	19.37	87.77	6.10
R. macrophylla x Super Star	4.70	3.55	1.58	21.20	121.52	5.70
R. macrophylla x Happiness	*4.47*	2.53	1.58	22.33	133.28	5.23
R. macrophylla x Eiffel Tower	4.40	2.53	1.57	22.23	108.92	4.83
R. macrophylla x Kiss of fire	4.22	2.60	1.57	20.20	90.18	5.60
R. clinophylla x Super Star	4.70	2.60	1.62	20.70	118.65	6.60
R. clinophylla x Happiness	4.53	2.50	1.57	20.10	122.60	5.43
R. clinophylla. x Eiffel Tower	4.35	2.50	1.48	20.00	100.00	5.73
R. clinophylla x Kiss of Fire	4.22	2.55	1.60	21.23	96.27	5.27
CD (*p*=0.05)	0.12	NS	NS	0.66	7.99	0.21

The bud size (length and diameter) was non significantly influenced by stock -cultivar interaction. The data on flower yield reveal that interaction significantly affected flower yield both in terms of number of flowers per plant and weight of flowers per plant (Table 3). The interaction S_1C_1 produced the maximum number of flowers (24.04) and weight (146.00 g) followed by S_3C_2 which produced 22.33 flowers with a flower weight of 133.28 g whereas the number of flowers and flower weight were minimum (18.50 and 84.48 g, respectively) in S_1C_4. The flower size varied significantly from 4.83 cm in *Rosa macrophylla* x Eiffel Tower to 6.83 cm in *Rosa indica* var. Odorata x Super Star. The use of suitable root stock increases rose flower yield (Rapparecht, 1974).

The results of the present investigation show that budtake percentage was maximum in *R. indica* var. Odorata budded with Super Star and these plants attained significantly higher height. The performance of the scion also varied significantly in different rootstock-scion combinations.

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