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Studies on Performance of Self-Grafted Mango Cultivars under Nursery and Field Condition

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A B S T R A C T

The present investigation entitled 'Studies on performance of self-grafted mango cultivars under nursery and field condition in Punjab region' was carried out during 2016 to 2017 in farmers field in village zaffarwal block Dhariwal district Gurdaspur. To assess the performance of self-graft combinations of Dashehari, Langra, Amrappali, Malta, Surkha and Fazli for morphological traits and to evaluate which variety shows higher success in terms of days of sproutning, number of leaves, height and diameter of scion and root stock by using side veneer grafting method done on local root stock. The minimum number of days for sprout (16.10) was found in T_3. And the maximum height of Root Stock (22.23cm) was reported in the T_5 while the maximum diameter of root stock (9.61cm) was found in T_4. And in case of scion diameter, the maximum diameter of scion (9.05cm) found in T_1 and the maximum number of leaves (6.13) was recorded in T_2. The research shows that T_3 shows higher survival rate of graft and it takes minimum days to develop a new scion then all other varieties and this variety is most compatible to graft in August by using side veneer grafting.

Introduction

Mango (*Magnifera indica*) is king of fruits. It has delicious taste and flavour and also has many suitable characters. This crop belongs to Anacardiaceae family. India has 56% of share in total mango production in the world. In ancient years/times the mango was mainly propagated by stones but now a day different grafting methods are developed and utilized in cultivation of *Mangiferaindica.* The main advantage of grafting is that it changes the characteristics of plant and makes it superior than its mother plant. Other is that it increases the production by giving fruits in short time as compare to a sexual method of propagation when the plant is raised from seed it gives non-uniform bearing and fruits are inferior. Grafting also play major role in improvement of Inferior varieties. It is common and preferred method of propagation (Bally, 2006).

The main factor in grafting is compatibility. If both root stock and scion are compatible with each other, then growth of new shoot is started. The root stocks are selected on the basis of desirable characters. Seedling with good trait such as rapid growth (in diameter or in height) could reduce the waiting period

to grafting time. The proper alignments of root stock and scion cambium tissues estimate the graft success (Pina and Errea, 2005).

Materials and Methods

Field experiment was carried out during the year 2016-17 at farmer's field in village Zaffarwal district Gurdaspur, Punjab to evaluate the performance of different varieties to develop suitable graft combination by evaluating some parameter in nursery and other parameter in field condition.

Experimental details

The one factor experiment consisting of six treatment combinations was laid out in Randomized Block Design (RBD) with three replications. For each treatment combination grafting operations were performed on five rootstocks.

Observations parameters

The data on different parameters were recorded at one month interval except the times required for bud sprouting and leaf opening, percentage of graft success and percentage of graft survivability.

Data were recorded daily on bud breaking and leaf opening. The data were collected by taking the following parameters: Number of days for sprout, Height of the grafted plant, Diameter of root stock, Diameter of scion, Number of leaves/plant.

Statistical analysis

Data were analyzed statistically adopting the technique of analysis of variance (ANOVA).The various comparisons were made after working out the standard errors and critical difference at 5 per cent level of significance.

Results and Discussion

The minimum number of days for sprout (16.10) was found in T_3 followed by T_5 (17.16) while the maximum number of days for sprout (22.60) was taken in T_4 (Table 1). The perusal of data revealed that all these early sprouting showed moderate to high yielding potential. Variability in days of sprouting has also been reported by Verma *et al.,* (2012) carried Pusa Navrang as rootstock was proven the most compatible with Pusa Urvashi as scion partner for growth parameters. At 30 days the maximum plant height of grafted plant (19.26cm) was observed in T_5 which was followed by T_4 (18.40cm) with at par value. The lowest value of plant height (15.80cm) was found in T_3. These results are also correlated with Chandan *et al.,* (2006) (Table 2). And at 60 days the maximum height of plant (20.80cm) was reported in the T_5. The lowest value in height (17.33cm) was found in T_3. A significant varietal differences were also observed Sivudu *et al.,* (2014) stated that Banganapalli grafted on Bangalora rootstock recorded the maximum graft height under Anantharajupet conditions. And these results also correlated with Kumar *et al.,* (2012). At 90 Days the maximum height of plant (22.23cm) was reported in the $T_5$and the lowest value of plant height (18.96cm) was found in T_3. And at 120 days the maximum height of plant (23.76cm) was reported in the T_5 which was followed by T_4 (23.13cm).The lowest value of plant height (20.50cm) was found in T_3. Geetha *et al.,* (1997) observed that grafting success is dependent on the speed of graft union formation. The maximum diameter of root stock (8.12cm) was found in T_4 and minimum diameter (6.40cm) recorded in T_5at 30 days. Bhuiyan *et al.,* (2010) stated that girth was highly influenced by the different combinations of rootstock and scion. At 60 days the maximum diameter of root stock (8.67cm) was found in T_4 and lowest (6.95cm) was found in T_5 (Table 3).

Table.1 Number of days for sprout in different varieties of mango

Treatment	No. of days for sprout
T_1	21.40
T_2	18.46
T_3	16.10
T_4	22.60
T_5	17.16
T_6	20.66
C.D.	1.73
SE(m)	0.54
SE(d)	0.76
C.V.	4.84

Table.2 Height of root stock at different time in different varieties of mango

Treatments	Height of root stock 30 days	Height of root stock 60 days	Height of root stock 90 days	Height of root stock 120 days
T_1	16.46	18.00	19.63	21.16
T_2	18.26	19.80	21.50	23.00
T_3	15.80	17.33	18.96	20.50
T_4	18.40	19.93	21.60	23.13
T_5	19.26	20.80	22.23	23.76
T_6	18.13	19.66	21.30	22.70
C.D.	1.50	1.58	1.60	1.72
SE(m)	0.47	0.49	0.50	0.53
SE(d)	0.66	0.70	0.71	0.76
C.V.	4.60	4.47	4.17	4.17

Table.3 Diameter of root stock at different time in different varieties of mango

Treatments	Diameter of root stock (30 days)	Diameter of root stock (60 days)	Diameter of root stock (90 days)	Diameter of root stock (120 days)
T_1	7.63	8.18	8.60	9.13
T_2	6.74	7.29	7.71	8.23
T_3	7.37	7.92	8.34	8.86
T_4	8.12	8.67	9.08	9.61
T_5	6.40	6.95	7.55	8.07
T_6	7.66	8.21	8.64	9.16
CD	0.25	0.59	0.62	0.72
SE(m)	0.08	0.18	0.19	0.22
SE(d)	0.11	0.26	0.27	0.32
CV	1.92	4.09	4.07	4.46

Table.4 Diameter of scion at different time in different varieties of mango

Treatments	Diameter of scion (30 days)	Diameter of scion (60 days)	Diameter of scion (90 days)	Diameter of scion (120 days)
T_1	7.68	8.05	8.53	9.05
T_2	6.62	6.98	7.46	8.08
T_3	6.16	6.53	7.01	7.53
T_4	6.62	6.99	7.46	7.99
T_5	7.10	7.47	7.95	8.47
T_6	6.76	7.13	7.61	8.13
CD	0.42	0.51	0.83	NS
SE(m)	0.13	0.16	0.26	0.28
SE(d)	0.18	0.22	0.36	0.40
CV	3.38	3.89	5.87	6.09

Table.5 Number of leaves at different time in different varieties of mango

Treatments	No. of leaves after 30 days	No. of leaves after 60 days	No. of leaves after 90 days	No. of leaves after 120 days
T_1	5.20	7.02	8.68	10.87
T_2	6.13	7.95	9.62	11.80
T_3	5.40	7.22	8.88	11.07
T_4	2.96	4.78	6.45	8.64
T_5	3.63	5.62	7.29	9.47
T_6	5.73	7.52	9.19	11.37
CD	1.28	1.41	1.42	1.38
SE(m)	0.40	0.44	0.44	0.43
SE(d)	0.56	0.62	0.63	0.61
CV	14.34	11.44	9.23	7.11

Experimental Details

Name of crop	: Mango (*Mangiferaindia L.)*
Scion	: Langra, Daseheri, Surkha,Malta,Fazli,Amrapali
Experimental design	: Randomized Block Design
(a) Grafting time	: August 2016
(b) Grafting methods	: Side veneer grafting
Number of replication	: 3
Treatment combination	: 6
Treatment unit (tree/treatment	: 5
Total number of plants	: 90
Rootstock used for grafting	: local variety

Details of Treatments

Treatments Variety	
T_1Daseheri	
T_2Amrapali	
T_3Surkha	
T_4Langra	
T_5 Malta	
T_6Fazli	

Temperature, humidity & rainfall condition at different time

Month	Temperature		Humidity		RF mm
	MAX(˚C)	MIN(˚C)	RH. (M %)	RH. (E %)	
June -2016	37.6	25.6	69.92	51.86	253.2
July-16	33.5	25.9	86.92	75.09	234.2
August -16	32.8	24.9	86.24	70.69	194.5
Sept-16	33.1	24.2	87.45	70.47	63.3
Oct-16	32.1	18.3	81.34	55.22	0.1
Nov-16	26.4	11.6	81.03	58.74	1.0
Dec-16	21.8	8.5	88.93	65.83	0.0
Jan-2017	17.9	7.5	69	69	111.4

MAX= Maximum, MIN= Minimum, RH= Relative Humidity, RF= Rainfall, M= Morning, E= Evening

These results also correlated with Singh and Srivastava (1979). The maximum diameter of root stock (9.08cm) was found in T_4 and lowest (7.55cm) was found in T_5 at 90 days. The maximum diameter of root stock (9.61cm) was found in T_4 and lowest (8.07cm) was found in T_5 at 120 days. Mishra (2012) conducted on experiment to study the effect of scion length, duration of defoliation and poly tube capping on success of wedge grafting in mango cv. Dasehri. At 30 days the maximum diameter of scion (7.68cm) found in T_1. And the lowest diameter (6.16cm) was noted in T_3. Radhamony *et al.,* (1989) studied the cultivars Priur and Banganapally gave the highest percentage of scion growth. The maximum Diameter of scion (8.05cm) was found in T_1 and minimum (6.53cm) obtained T_3at 60 days. Prasad *et al.,* (1990) studied certain aspects of veneer grafting in mango (*Mangifera indica* L.) cv. Banganapally in Tirupati. At 90 days the maximum diameter of scion (8.53cm) found in T_1 and the lowest diameter of scion (7.01cm) is reported in T_3. The maximum Diameter of scion (9.05mm) found in T_1 and minimum (7.53mm) noted in T_3 at 120 days. Ram and Bist (1982) conducted an experiment to determine the effect of defoliation, diameter of scion and grafting time in mango (Table 4). And at 30 days the maximum number of leaves (6.13) was recorded in T_2 and lowest leaves (2.96) were found in T_4. Kudmulwar *et al.,* (2008) performed grafting under Parbhani condition using local variety rootstock of custard apple (*Annonas quamosa* L.) with Balanagar scion and reported the highest number of leaves (21.93) in plants produced after grafting. At

60 days the highest number of leaves (7.95) was recorded in T_2 and lowest leaves (4.78) was found in T_4. The research worker has also reported the observation Ram *et al.,* (2012) recorded the maximum number of leaves on Amrapali scion at 30 and 60 days after stone grafting on different cultivars of mango. At 90 days the maximum number of leaves (9.62) was recorded in T_2 and lowest leaves (6.45) were found in T_4 (Table 5). Gangwar *et al.,* (2003) studied the compatibility behaviour of a plum rootstock with peach scions. They reported that the maximum leaf area was recorded in Flordasum and Kala Amritsari graft combination. At 120 days the maximum number of leaves (11.80) was recorded in T_2 and lowest leaves (8.64) were found in T_4.

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