E-ISSN: 2663-1075
P-ISSN: 2663-1067
IJHFS 2019; 1(1): 57-59
Received: 04-11-2018
Accepted: 08-12-2018

Sudipta Sourav Sahoo
Department of Fruit Science, IGKV, Raipur, Chhattisgarh, India

HG Sharma
Department of Fruit Science, IGKV, Raipur, Chhattisgarh, India

GL Sharma
Department of Fruit Science, IGKV, Raipur, Chhattisgarh, India

D Hota
Department of Fruit Science, IGKV, Raipur, Chhattisgarh, India

Thejashree CM
Department of Fruit Science, IGKV, Raipur, Chhattisgarh, India

Correspondence
Sudipta Sourav Sahoo
Department of Fruit Science, IGKV, Raipur, Chhattisgarh, India

Conjugation of genotype and environment on accomplishment of diametric growth of mango graft

Sudipta Sourav Sahoo, HG Sharma, GL Sharma, D Hota and Thejashree CM

Abstract
The main bottleneck for the increase in area under mango cultivation is due to the non-availability of quality planting material of important cultivars at proper time in required amount. Wedge grafting has a tremendous potential which can be used for multiplication of Mango plants rapidly throughout the year either inside protected structers such as green house, Shade net house as well as in the open conditions. Looking to the scope and and importance of quality mango planting material a research was carried out at the Horticulture Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during the year 2018-2019. The experiment consists of genotypes of mango *i.e.*, Dashehari, Chhattisgarh Achar, Chhattisgarh Gourav, Chhattisgarh Pawan and Chhattisgarh Swarnaprabha, and 2 different environmental condition *i.e.* Net house and Poly tube caps. Thus, there were 10 treatment combinations and replicated four times under Factorial Complete Randomized Design (FCRD). The result concludes that among the genotypes the genotype G1 (Dashehari) was found significantly superior and exhibited maximum rootstock diameter (8.36 mm) and girth of scion (6.84 mm) as compared to other treatments. In case of different environmental conditions Net house condition (E_1) showed maximum growth in diameter of Root stock (53.34).

Keywords: Wedge grafting, polytube capping, g × e interaction, dashehari, diametric growth

Introduction
Mango naturally a tropical evergreen plant but well adopts to subtropics and semi-arid regions. It is cultivated commercially in all corners of India except the cold northern hilly regions. It is propagated by both sexual and asexual methods. Previously mango was propagated mainly from seeds. Being a highly heterozygous and cross pollinated plant seeds do not give true to type seedlings except in poly-embryonic varieties. Hence vegetative propagation is the sole method to perpetuate progenies with ideal characters of mother plants. There are different factors those influence the success percentage of grafting in Mango i.e. Genotype of mango scion, root stock age, interaction between scion and root stock, duration of defoliation, Poly tube capping, season of grafting. Among all these factors, physiological maturation of the rootstock and scion wood are the most important factors for getting higher success percentage, growth of the grafts and survivability (Kains and Mc Question, 1958; Brahmachari *et al.*, 1999) [4, 3].

India produces 20.714 metric tonnes mango from 2.259-million-hectare area with the productivity level as low as 6.6 tonnes per hectare (Anonymous, 2018) [2]. Chhattisgarh has wide genetic variability in mango genotypes. The state occupies an area of 60.12 thousand hectares with a production of 292 thousand metric tonnes and productivity of 9 metric tonnes per hectare (Anon, 2017) [1]. The main bottleneck for the increase in area under mango cultivation is due to the non-availability of quality planting material of important cultivars at proper time in required amount. Now days according to climate, success percentage and various need methods of propagation that are used and gradually under improvement and adopted with different degrees of success in different areas of India. A new technique of rapid multiplication *i.e.* wedge grafting that has been developed at Central Institute for Subtropical Horticulture (CISH), Lucknow where there will be no limitation for miss match of width of scion and rootstock. Wedge grafting has a tremendous potential which can be used for multiplication of Mango plants rapidly throughout the year either inside protected structers such as green house, Shade net house as well as in the open conditions. The technique shouts out about growing the seedlings in the polythene bags, performing grafting, capping the newly grafted plants and hardening of grafts.

The sole and primary aim of grafting is production of large number of healthy true to the type plants in a short duration of time.

Material and Method

A research was carried out at the Horticulture Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during the year 2018-2019. Healthy seedling rootstocks were selected from the polythene bags those were previously available in the nursery. The seedlings of uniform length, thickness and size, about 1 year old were selected for grafting from the group of seedlings. The experiment consists of genotypes of mango *i.e.*, Dashehari, Chhattisgarh Achar, Chhattisgarh Gourav, Chhattisgarh Pawan and Chhattisgarh Swarnaprabha, and 2 different environmental condition *i.e.* Net house and Poly tube caps. The scions of Dashehari were selected from about 25 year's old mango orchard and scions of Chhattisgarh Achar, Chhattisgarh Gaurav, Chhattisgarh Pawan and Chhattisgarh Swarnaprabha, were selected from about 12 years old mango orchard.

The rootstock was decapitated 20-30 cm above soil level and a clean-edged cut was made down the centre of the stem for about 3 cm. About one centimetre deep cut was made at the top of the rootstock to create a "v"-shaped notch in the wood, depending on the width of the stock. The scion having 3 to 4 buds was trimmed like a wedge 2.5 to 3 cm at the lower end with outer side slightly broader than the inner side. The prepared scion was inserted into the rootstock cut to match the cambiums on the thick side of the scion, in such a way that the cambium layer of scion is in touch with the cambium layer of the stock. The grafting portion was held by wrapping firmly with 1.5 cm wide and 45 cm long, 200 gauge transparent white polythene strip to seal the union, prevent moisture loss and stop scion movement. Grafting was done with the help of a sharp knife. Polythene tape was used as wrapping material. Half of the grafts were covered with 25×3 cm (25 cm long and 3 cm wide) white transparent polythene tube to ensure high relative humidity. The grafting was done on 18 August, 2018. Thus, there were 10 treatment combinations and replicated four times under Factorial Complete Randomized Design (FCRD).

For recording the girth of rootstock a circle was made on the rootstock just below the union point with oil paints. Subsequent observations were recorded at the marked paint point to avoid error. Thickness of rootstock was measured with the help of vernier callipers and measurement was expressed in milli meter at the interval of 30 days. For recording the girth of scion a circle was made on the scion just above the union point with oil paint. Girth was measured with the help of vernier callipers. The measurement were recorded at an interval of 30 days and expressed in milli meter.

Results

Individual effect of genotypes and environmental conditions on diameter of rootstock

In case of genotypes, significant variation was observed in diameter of rootstock and there was significant increase with the duration (Table 1). The maximum rootstock diameter (8.36 mm) was found in G_1 (Dashehari) and minimum diameter (7.59 mm) was found in G_5 (Chhattisgarh Swarnaprabha) in the month of February. In case of different environmental conditions, no significant variation was observed for growth in diameter of rootstock. Maximum rootstock diameter (8.04 mm) was found in net house (E_1) condition and minimum rootstock diameter (7.90 mm) was found in poly tube capping (E_2) at 180 days after grafting (DAG).

Table 1: Individual effect of genotypes and environmental condition on diameter of rootstock

		Diameter Of Root Stock (mm)					
Sl. No.	**Treatments**	**30 DAG**	**60 DAG**	**90 DAG**	**120 DAG**	**150 DAG**	**180 DAG**
1	Genotypes						
I.	G_1	6.66	6.98	7.34	7.58	7.91	8.36
II.	G_2	6.69	6.91	7.12	7.27	7.57	7.88
III.	G_3	6.65	6.83	7.05	7.21	7.51	7.85
IV.	G_4	6.51	6.76	7.23	7.48	7.7	8.18
V.	G_5	6.5	6.62	6.85	7.09	7.28	7.59
	SEm±	0.078	0.098	0.08	0.1	0.102	0.098
	CD 5%	0.29	0.28	0.24	0.3	0.29	0.27
2	Environmental Conditions						
I.	E_1	6.62	6.81	7.13	7.35	7.65	8.04
II.	E_2	6.59	6.82	7.1	7.31	7.54	7.9
	SEm±	0.064	0.062	0.05	0.065	0.064	0.062
	CD 5%	0.18	0.17	0.15	0.19	0.18	0.17

Effect of interaction between genotypes × environmental conditions on diameter of rootstock

Interaction between genotypes and Environmental conditions was found non-significant. As regard to interaction between genotypes and Environmental conditions, the treatment combination G_1E_1 (Dashehari and Net house condition), observed maximum diameter (8.410 mm), however, minimum diameter (7.510 mm) was found in G_5E_2 (Chhattisgarh Swarnaprabha and Net house condition) after 180 days of grafting.

Table 2: Individual effect of genotypes and environmental conditions on diameter of Scion

		Diameter of Scion (mm)					
Sl. No.	**Treatments**	**30 DAG**	**60 DAG**	**90 DAG**	**120 DAG**	**150 DAG**	**180 DAG**
1	Genotypes						
I.	G1	5.26	5.49	5.76	5.95	6.17	6.53
II.	G2	4.85	4.98	5.51	5.7	5.99	6.21

III.	G3	5.03	5.14	5.26	5.47	5.73	5.88
IV.	G4	5.19	5.48	5.88	6.1	6.25	6.4
V.	G5	5.19	5.2	5.7	5.81	5.94	6.05
	SEm±	0.087	0.11	0.095	0.075	0.059	0.06
	CD 5%	0.25	0.3	0.27	0.2	0.15	0.17
2	Environmental Conditions						
I.	E1	5.06	5.26	5.51	NS	NS	6.17
II.	E2	5.13	5.37	5.74	5.8	6.02	6.26
	SEm±	0.054	0.07	0.191	0.047	0.037	0.038
	CD 5%	0.16	0.19	0.17	0.13	0.1	0.11

Individual effect of genotypes and environmental conditions on diameter of scion

In case of the effect of genotypes, different genotypes those have used in research work were found to have significant variation in growth of scion diameter (Table 2). However, highest growth in the diameter of scion (6.53 mm) was recorded in G_1 (Dashehari) in the month of February, while minimum growth in the diameter of scion (5.88 mm) was recorded in G_3 (Chhattisgarh Gaurav) in the month of February. In case of use of different environmental conditions, significant variation was observed in growth of diameter of scion in from 30 DAG to 90 DAG. After that it was seen that there was no significant growth in scion diameter because of prevalence of winter. Due to low temperature there was no significant growth in diameter of scion. But after 150 DAG there was again significant growth in diameter due to rise in temperature. The maximum diameter (6.26 mm) of scion was found in E_2 (Poly tube capping) in the month of February and minimum (6.17 mm) in E1 (Net house).

Effect of interaction between genotypes × environmental conditions on diameter of Scion

After proper analysis of data it concluded that Interaction between genotypes and Environmental conditions have significant variations till 120 DAG in the area of growth of diameter of scion (Table 3). As regard to interaction between genotypes and environmental conditions, the treatment combination G_1E_2 (Dashehari and Poly tube capping), observed maximum diameter (6.57 mm), however, minimum diameter (5.85 mm) was found in G_3E_1 (Chhattisgarh Gaurav and Net house condition) after 180 days of grafting.

Similar result was also obtained by Brahmachari *et al.* (1997) [3] in mango cv. Amrapali when veneer grafting was done. Mandal *et al*. (2012) [5] also found that the linear growth and diametric growth of grafts in case of cultivars Zardalu and Mahmood Bahar on performance of softwood grafting. Our result coincides with Mishra (2012) [6] who found increase of diametric growth of mango graft by wedge grafting along with polytube capping.

Table 3: Effect of interaction between genotypes x environmental conditions on diameter of Scion

	Diameter of scion (mm)						
	Treatment						
Sl. No.	**Interactions**	**30 DAG**	**60 DAG**	**90 DAG**	**120 DAG**	**150 DAG**	**180 DAG**
1	Genotypes × Environmental conditions						
I.	G_1E_1	5.33	5.64	5.81	6.00	6.21	6.49
II.	G_2E_1	4.86	5.00	5.27	5.65	5.96	6.14
III.	G_3E_1	4.96	4.96	5.26	5.58	5.72	5.85
IV.	G_4E_1	5.20	5.48	5.79	6.04	6.26	6.36
V.	G_5E_1	4.96	5.25	5.42	5.80	5.90	6.00
VI.	G_1E_2	5.20	5.34	5.72	5.90	6.13	6.57
VII.	G_2E_2	4.85	4.96	5.75	5.75	6.02	6.28
VIII.	G_3E_2	5.10	5.31	5.27	5.36	5.75	5.92
IX.	G_4E_2	5.19	5.48	5.97	6.16	6.24	6.45
X.	G_5E_2	5.32	5.59	5.78	5.83	5.98	6.10
	SEm±	0.12	0.15	0.13	0.10	0.08	0.08
	CD 5%	0.36	0.43	0.39	0.29	NS	NS

References

1. Anonymous. Area and Production of Horticulture Crops - All India, (Third Advance Est.) DAC&FW, 2017.
2. Anonymous. NHB Data Base, 2018. http://nhb.gov.in/Statistics.aspx?enc=WkegdyuHokljEtehnJoq0KWLU79sOQCy+W4MfOk01GFOWQSEvtp9tNHHoiv3p49g
3. Brahmachari VS, Kumar N, Kumar R. Seasonal effect on success of veneer grafting in mango cv. Amrapali. Horticultural Journal. 1997; 10(2):1-5.
4. Kains MG, Mc Question M. Propagation of Plants. Grage Judd Publishing Company, Inc, New York. 1958, 225.
5. Mandal J, Mandal BK, Singh RR, Jaiswal US. Effect of grafting height and cultivars on the performance of soft wood grafting in mango. The Asian J Hort. 2012; 7:171-174.
6. Mishra P. Effect of scion length, duration of defoliation and polytube capping on success of wedge gafting in mango cv. Dashehari. MSc Thesis Indira Gandhi Krishi Vishwavidyalaya, Raipur, 2012, 34.