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To find out appropriate type of healing chamber and stage for acclimatization in Brinjal (*Solanum melongena* L.) grafts

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Abstract
The investigation entitled "To find out the appropriate type of healing chamber and stage for acclimatization in Brinjal (*Solanum melongena* L.) Grafts" was undertaken at College of Horticulture, DBSKKV, Dapoli (M.S.) during the year 2020-2021. The experiment was conducted in split plot design (SPD) with eight treatments and three replications. The treatments comprise; T_1- Polycarbonate Polyhouse + 4 DAG, T_2-Polycarbonate Polyhouse + 5 DAG, T_3- Polycarbonate Polyhouse + 6 DAG, T_4- Polycarbonate Polyhouse + 7 DAG, T_5- Shade net + 4 DAG, T_6- Shade net + 5 DAG, T_7- Shade net + 6 DAG, T_8 - Shade net + 8 DAG. The different treatments studied in which the treatment T_6 Shade net + 4 DAG recorded the minimum days required for graft union (7.03 days), highest survival (%) at 7 (100%), 14 (97.39%) and 21 (61.11%) days after grafting and maximum girth at graft union at 7 (1.97 mm), 14 (1.98 mm) and 21 (2.00 mm) days after grafting respectively.

Keywords: Brinjal grafts, healing chamber, acclimatization, polycarbonate polyhouse, shade net

Introduction
Brinjal (*Solanum melongena* L.) is one of the widely distributed and cultivated species of the Solanaceae family. Brinjal or eggplant is the most popular vegetable crop cultivated worldwide hence regarded as "king of vegetables" (Chandan *et al.*, 2019) [3].
Brinjal is the third most widely grown vegetable species in Asia and accounts almost 50% of the world's brinjal production. India is the largest producer and consumer of Brinjal in the world with 744 thousand ha and 12682 thousand MT area and production respectively. Maharashtra ranks 9th in brinjal production in India with 19.63 thousand ha and 336.92 thousand MT area and production respectively, followed by West Bengal, Odisha, Jharkhand, Gujrat, Bihar, Madhya Pradesh, Chhattisgarh, Tamil Nadu and Maharashtra (Anon, 2019) [1].
Survival of grafts will be higher if plants are kept in a controlled environment with high RH and optimal temperatures (Davis *et al.*, 2008). Although some large-scale commercial grafting operations often use environmentally controlled growth chambers to hold plants during the healing process, these chambers are not cost-effective for most of the operations (Hassell *et at.*, 2008) [5]. Thus, the healing chamber is an economical choice for creating a humid environment, maintaining temperatures in the optimal range and creating a high relative humidity, which is prerequisite for the healing vegetable grafts.
Acclimatization of the grafts is the main operation after these grafts are healed. This can be done by exposing the grafts to low humidity (lower than RH in the healing chamber), high light intensity and temperature. Days until fully acclimatized to the environment (Miles *et al.*, 2016) [7]. Plants coming out of a high RH and low light environment need a few more days to fully acclimatize to the ambient environment inside the greenhouse, high tunnel or open condition.

Material and Methods
The field experiment was carried out at High-Tech nursery of College of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri during the year 2020-2021. The experiment was conducted in Split Plot Design (SPD) with eight treatments and three replications. Ten grafts were randomly selected and tagged in each treatment of all three replications of grafts to record the periodical observations at an interval of 7 days. The observations on the minimum days required for graft union, survival percentage of graft and girth at graft union was recorded in experiment of each treatment.

Results and Discussion

The data pertaining to the effect of different types of healing chamber and acclimatization time on number of days required for graft union of brinjal various treatment have been presented in table.1 showed that type of healing chamber has significant effect on the number of days required for graft union of rootstock and scion. The minimum days (7.20 days) was required for graft union in Shade net (C_2) and maximum (8.02 days) in Poly-carbonated polyhouse (C_1). The perusal of data revealed that the acclimatization time has significant effect on the number of days required for graft union. The minimum (7.55 days) days required for graft union was noted in D_1 Acclimatization- 4 DAG whereas, the maximum days was observed in D_3 Acclimatization- 6 DAG (7.68 days). The interaction effect on type of healing chamber and acclimatization time had non-significant difference on number of days required for graft union of rootstock and scion. The minimum days (7.03 days) required for graft union were observed in C_2D_1 whereas, maximum days required for graft union were recorded in (8.23 days) C_1D_3. This might be due to better union of vascular tissues at the graft union. Days required for graft union depends on stage of rootstock and scion as well as healing conditions in C_2-Shadenet for D_1 Acclimatization- 4 days after grafting and there was need to early acclimatize. Similar findings investigated by Onduso, J. N. (2014) [8] in tomato, Tejaswini Rathod (2017) [12] in brinjal.

The data pertaining to healing chamber on survival percentage revealed non-significant effect at 7, 14 DAG while it was significant difference at 21 DAG observed in table.2. The maximum survival percentage was recorded in C_2-Shade net at 7 DAG (99.92%), 14 DAG (92.43%) and 21 DAG (52.49%) whereas, the minimum survival percentage was recorded in C_1-Poly-carbonated polyhouse at 7 DAG (98.00%), 14 DAG (89.23%) and 21 DAG (36.34%). It was noted from the results, that the acclimatization time has non-significant effect at 7 DAG, while it was significant effect at 14 and 21 DAG. The maximum survival was recorded in D_1 Acclimatization-4 DAG at 7 DAG (99.18%), 14 DAG (93.79%) which was at par with D_4 Acclimatization-7 DAG (93.55%) and at 21 DAG (52.47%) which was at par with D_3 Acclimatization-6 DAG (44.89%) whereas, the minimum survival was recorded in D_2 Acclimatization-4 DAG at 7 DAG (98.00%), 14 DAG (87.98%), and at 21 DAG (39.91%). The interaction effect on healing chamber and acclimatization time noticed that non-significant difference on survival (%) at 7 DAG, 14 DAG and 21 DAG. The maximum survival (%) was recorded in C_2D_1 at 7 DAG (100%), 14 DAG (97.39%), 21 DAG (61.11%) while minimum survival (%) was noted in C_1D_2 at 7 DAG (97.27%), 14 DAG (85.55%) and at 21 DAG (26.77%). The maximum survival percentage of grafts at 7, 14 and 21 DAG was recorded in C_2-Shadenet type of healing chamber this may be due to ideal climatic conditions provided to the grafts and starting acclimatization process after 4 DAG. Similar results recorded by the Bizhen *et al.* (2014) [2] in tomato, Kumar *et al.* (2017) [6] in brinjal, Priyanka *et al.* (2019) [9] in tomato and brinjal.

The data on effect of different types of healing chambers and acclimatization time on girth at graft union was influenced by different types of healing chambers and acclimatization time varied from 1.86 mm to 1.97 mm at 7 DAG, 1.89 mm to 1.98 mm at 14 DAG and 1.93 mm to 2.00 mm at 21 DAG reported in table.3. The data regarding the girth at graft union showed significant effect at 7, 14 and 21 DAG. The maximum girth was observed in C_2-Shade net at 7 DAG (1.94 mm), 14 DAG (1.95 mm) and 21 DAG (1.98 mm) whereas, the minimum girth was recorded in C_1-Poly-carbonated polyhouse at 7 DAG (1.90 mm), 14 DAG (1.92 mm) and 21 DAG (1.96 mm). The data in table.3 showed that the significant effect on acclimatization time at 7 DAG and 14 DAG, while it was non-significant at 21 DAG. The maximum girth was recorded in D_1 Acclimatization-4 days after grafting at 7 DAG (1.95 mm) which was at par with D_4 Acclimatization-7 days after grafting (1.94 mm), at 14 DAG D_1 Acclimatization- 4 Days after grafting (1.97 mm) was at par with D_3 (1.92 mm) and D_4 (1.96 mm) and at 21 DAG D_1 Acclimatization-4 Days after grafting (2.00 mm). The minimum girth was noted in D_2 Acclimatization-4 Days after grafting at 7 DAG (1.89 mm), 14 DAG (1.91 mm), and 21 DAG (1.95 mm). The interaction effect of healing chamber and acclimatization time had non-significant difference on girth at graft union at 7, 14 and 21 DAG. The maximum girth at graft union was recorded in C_2D_1 at 7 DAG (1.97 mm), 14 DAG (1.98 mm), 21 DAG (2.00 mm) while minimum girth was recorded in C_1D_2 at 7 DAG (1.86 mm), 14 DAG (1.89 mm), 21 DAG (1.93 mm). Hence, the maximum girth at graft union was observed in C_2 type of healing chamber i.e., shadenet which could be due to the proper healing condition to the grafts and acclimatization time at D_1 Acclimatization-4 DAG. The similar findings were also in accordance with Surve (2019) [11] in brinjal and Rayker (2020) [10] in brinjal.

Table 1: Effect of different types of healing chambers and acclimatization time on number of days required for graft union of rootstock and scion of brinjal

Days required for graft union					
Treatment	**Graft**				
	D_1	**D_2**	**D_3**	**D_4**	**Mean**
C_1	8.07	8.00	8.23	7.77	8.02
C_2	7.03	7.27	7.13	7.37	7.20
Mean	7.55	7.63	7.68	7.57	7.61
	RES	S.Em±		CD at 5%	
C	SIG	0.11		0.66	
D	SIG	0.12		0.36	
C X D	NS	0.16		-	

Type of Healing Chamber	**Starting of acclimatization process**	
C_1- Poly-carbonated Polyhouse	**D_1-** 4 Days after grafting	**D_1-** 4 Days after grafting
C_2- Shade net	**D_3-** 6 Days after grafting	**D_3-** 6 Days after grafting

Table 2: Effect of different types of healing chambers and acclimatization time on survival (%) at 7, 14 and 21 days after grafting in brinjal

Survival rate (%)															
Treatment	**7 DAG**					**14 DAG**					**21 DAG**				
	D_1	**D_2**	**D_3**	**D_4**	**Mean**	**D_1**	**D_2**	**D_3**	**D_4**	**Mean**	**D_1**	**D_2**	**D_3**	**D_4**	**Mean**
C_1	98.37 (82.66)	97.27 (80.48)	97.83 (81.54)	98.55 (83.08)	98.00	90.19 (71.75)	85.55 (67.66)	85.67 (67.75)	95.53 (77.79)	89.23	43.82 (41.45)	26.77 (31.16)	40.19 (39.34)	34.58 (36.02)	36.34
C_2	100.00 (90.00)	98.73 (83.54)	98.35 (82.63)	98.60 (83.20)	98.92	97.39 (80.69)	90.41 (71.96)	90.34 (71.89)	91.57 (73.12)	92.43	61.11 (51.42)	53.04 (46.74)	49.58 (44.76)	46.22 (42.83)	52.49
Mean	99.18	98.00	98.09	98.57	98.46	93.79	87.98	88.00	93.55	90.83	52.47	39.91	44.89	40.40	44.42
	RES	S.Em±		CD at 5%		RES	S.Em±		CD at 5%		RES	S.Em±		CD at 5%	
C	NS	0.48		-		NS	0.91		-		SIG	1.34		8.18	
D	NS	0.70		-		SIG	1.39		4.29		SIG	2.76		8.50	
C X D	NS	0.99		-		NS	1.97		-		NS	3.90		-	

Type of Healing Chamber	**Starting of acclimatization process**	
C_1- Poly-carbonated Polyhouse	**D_1-** 4 Days after grafting	**D_1-** 4 Days after grafting
C_2- Shade net	**D_3-** 6 Days after grafting	**D_3-** 6 Days after grafting

Table 3: Effect of different types of healing chambers and acclimatization time on girth at graft union (mm) of brinjal graft at 7, 14 and 21 days after grafting

Girth at graft union (mm)															
Treatment	**7 DAG**					**14 DAG**					**21 DAG**				
	D_1	**D_2**	**D_3**	**D_4**	**Mean**	**D_1**	**D_2**	**D_3**	**D_4**	**Mean**	**D_1**	**D_2**	**D_3**	**D_4**	**Mean**
C_1	1.94	1.86	1.87	1.92	1.90	1.95	1.89	1.88	1.96	1.92	1.99	1.93	1.94	1.98	1.96
C_2	1.97	1.91	1.92	1.96	1.94	1.98	1.93	1.94	1.97	1.95	2.00	1.96	1.97	1.99	1.98
Mean	1.95	1.89	1.90	1.94	1.92	1.97	1.91	1.91	1.96	1.94	2.00	1.95	1.96	1.99	1.97
	RES	S.Em±		CD at 5%		RES	S.Em±		CD at 5%		RES	S.Em±		CD at 5%	
C	SIG	0.04		0.23		SIG	0.05		0.29		SIG	0.00		0.01	
D	SIG	0.02		0.06		SIG	0.03		0.08		NS	0.03		-	
C X D	NS	0.03		-		NS	0.04		-		NS	0.04		-	

Type of Healing Chamber	**Starting of acclimatization process**	
C_1- Poly-carbonated Polyhouse	D_1- 4 Days after grafting	D_2- 5 Days after grafting
C_2- Shade net	D_3- 6 Days after grafting	D_4- 7 Days after grafting

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