RESPONSE TO DIFFERENT TIMING FACTORS BY WILD OLIVE SEEDLINGS WHILE USING VARIOUS GRAFTING METHODS

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Abstract

An experiment to study "the response of different timing factors on wild olive seedlings by using various grafting methods" was conducted at Pakistan Oilseed Development Board (PODB), Khyber Pakhtunkhwa research facility at Tarnab, Peshawar, during the year 2010. Three grafting methods i.e. side graft, tongue graft and cleft graft of cultivar Coratina were used as a scion for grafting on wild olive seedling with three time intervals i.e. 1st May, 1st June, and 1st July under control condition. Each replication was containing 27 seedlings for grafting in each grafting method and time interval. The experiment was laid out in Randomized Complete Block design with two factorial arrangement replicated three times. The research revealed significantly differences for days to sprouting, Number of leaves graft^{-1}, number of shoot graft^{-1}, shoot length graft^{-1}and shoot diameter graft^{-1} for both the times and grafting methods factors. Results showed that maximum number of shoots (1.67), shoot length (3.57) and shoot diameter (7.27) were recorded in side grafting methods, while maximum number of leaves (25.0) was recorded in tongue grafting and early sprouting (10.7) was noted in cleft grafting. Minimum number of leaves (13.0), number of shoots (1.0), shoots length (1.73) and shoot diameter (2.43) were recorded in cleft grafting method, while late sprouting (2.03) was noted in tongue grafting. During timing factor maximum number of leaves (25.3) and shoot length (2.60) was recorded when grafting done in the month of May, while maximum number of shoots (1.67) and late sprouting (15.3) was observed during the month of July and maximum shoot diameter (5.43) was recorded when grafting done in the month of June. Minimum number of shoots (1.33), shoot diameter (4.83) and late sprouting (18.0) were recorded during the month of May, while minimum number of leaves (16.7) was noted in July and minimum shoot length (2.43) was observed in the month of June. It was concluded that for successful grafting side method is recommended in the month of May and June.

Introduction

Olive (Olea europea) locally in Pashto called Zaitoon or Khuna is the oldest plants cultivated by man in the world (Green and Wickens, 1989). It is originated from Asia Minor, where from it spread to Europe and North African countries. The commercial and wild olive plantation is found into belts around the world between 30-45^{o} North and south of equator. Since Pakistan is also located in same region (Seyhan and Gezerel, 2005). Olive is good source of edible oil and is also used for table purpose especially for pickles. The olive has not only nutritional and medicinal value but it's also free from cholesterol (Pietro and Carlo, 2002). The wild species of olive are found abundantly in different parts of the country particularly in the provinces of Khyber Pakhtunkhwa and Balochistan which indicate that the climate of these areas are conducive for improved cultivars (Awan *et al.*, 2011). Some of olive cultivars grown earlier shown good performance and giving good yield in Pakistan for last 4-5 years (Munir, 2009). The plant is generally grown in Mediterranean region where summers are warm and dry with mild rainy winter. The spring and autumn seasons are short. It also requires some chilling period during winter for successful flowering and fruiting but the winter temperature should not go below 0˚C for long time. It can also be grown commercially in sub-tropical zones at the altitude of 2000-3000 ft from sea level but maximum temperature during flowering and fruit setting should not more than 28˚C for getting good crop (Ayerza and Sibbett, 2001). Olive a hard to root plants when propagated through cuttings the rooting success ratio may be less than 50% (Pio *et al*., 2005). To reduce the time for commercial production of olives fruits grafting is a desirable method to propagate plants which are hard to root such as Siberian pine (Severova, 1968). Plants propagated through grafting ensure same qualities of mother plant, which is of prime importance to have an orchard with plants of known capacity (Matos, 2000).Grafting is common and successful technique use in many woody plants having same species and help plants to assists scion in sharing water and nutrients via roots and easy adaptation to the environment (Loehle and Jones, 1990). Grafting can be use for olive cultivars with self rooting problem. One year old seedling with stem diameter of 6-8 cm is suitable for grafting. The present

research was initiated to study the impact of time of grafting on olive Cultivar aiming to standardize olive propagation practices.

Materials and Methods

The experiment to study " the response of different timing factors on wild olive seedlings by using various grafting methods" was conducted at Pakistan Oilseed Development, Board , Agricultural Research institute Tarnab; Peshawar during 2010. The experiment was laid out in Randomized Complete Block design with two factorial arrangement replicated three times. Three grafting methods i.e. side graft, tongue graft and cleft graft of cultivar Coratina were used as a scion for grafting on wild olive seedling with three time intervals i.e. 1st May, 1st June, and 1st July under control condition. Each treatment was containing 27 seedlings for grafting in each grafting method and time interval. All the cultural practices were kept constant for all the treatment.

The detail of the grafting methods and timings were as followed:

G1	=	Side graft	T1	=	1st May
G2	=	Tongue graft	T2	=	1st June
G3	=	Cleft graft	T3	=	1st July

Data were recorded after four month (except days to sprout) on the following parameters.

1. Days to sprouting 2. Number of shoots graft^{-1} 3. Shoot length (cm):
4. Shoot diameter (cm) 5. Number of leaves grafting^{-1}

Results and Discussion

Days to sprouting: Data regarding days to sprouting are reported in Table 1 and Fig.1 Statistical analysis of the data revealed that days to sprouting were differed due to grafting and its timing. The interaction between grafting and timing was also significant. Early sprouting was occurred in cleft (10.7), followed by side grafting (19.3) which was at par with tongue grafting (20.3), where delayed sprouting was observed. Timing of grafting showed that delayed sprouting was occurred in seedling which was grafted in May (18.0), followed by June grafting (17.0) which was similar to the earliest sprouting occurred in the month of July (15.3). Interaction between grafting and timing showed that for both side and tongue grafting, sprouting was speed up with delay in grafting till June whereas in cleft grafting sprouting was earliest with delaying grafting up to July. The results are in line with Rodrigues *et al.* (1960) who reported that seasonal variation in graft take appears to be related to quantitative changes in the supply of materials available in the scion for forming the graft union.

Number of leaves graft^{-1}: Data regarding number of leaves graft^{-1} represented and Table 1 and Fig. 2 Data shows that number of leaves graft^{-1} was significantly affected by both type of graft and timing of grafting, while the interaction between both time and type of grafting was also significant affect. The highest number of leaves (25.0) graft^{-1} was observed in plants propagated through tongue graft while minimum (13.0) was observed in cleft grafting. While in case time of grafting maximum number of leaves (25.3) in plants grafted in May, while minimum (16.7) was recorded in July. In case of interaction maximum number of leaves was observed in plants having tongue grafting during May, while minimum was observed in plants propagated through cleft grafting during July. The higher number of leaves may be due to is due to higher sprout length. The results are in line with Simon *et al,* 1994 who states that increased xylem to phloem directly affect transport and have additive impact on the plant growth.

Number of shoots graft^{-1}: Data regarding Number of shoots graft^{-1} are reported in Table1. Statistical analysis of the data revealed that Number of shoots graft^{-1} was differed due to grafting and its timing. The interaction between grafting and timing was no significant affect. Maximum number of shoots graft^{-1} was observed in both tongue and side graft (1.67), whereas minimum (1.0) shoots graft^{-1} observed in cleft grafting. Timing of grafting showed that maximum (1.67) shoots graft^{-1} was occurred in seedling which was grafted in July, while minimum (1.33) shoots graft^{-1} was observed in May and June. Interaction between grafting and timing showed that maximum shoots graft^{-1} was noted in both side and tongue grafting, as well as at May and July. The higher number of shoot in may be due to the early sprouting and higher sprouting percentage favor by the favorable time for grafting. The results are in accordance with (Simone *et al.,* 2010) who states that difference in growth and development due to alterations in transport of water and nutrients and even the transport of some hormones.

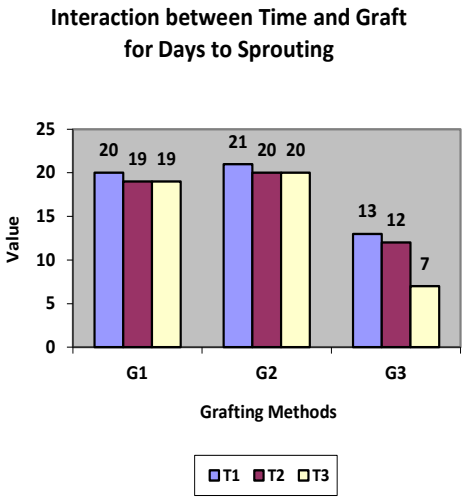

Fig. 1

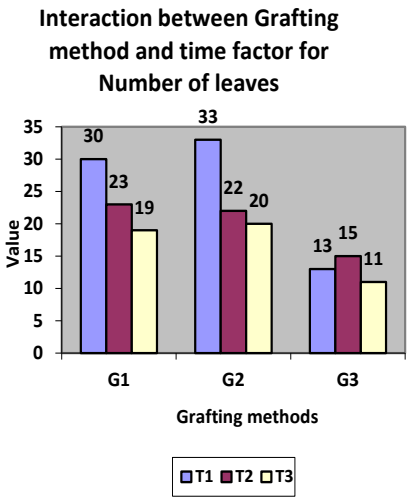

Fig. 2

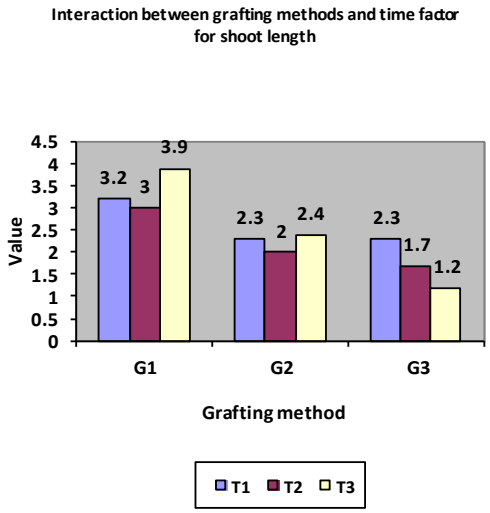

Fig. 4

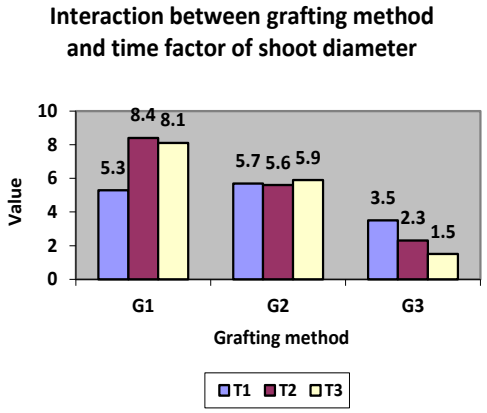

Fig. 3

Shoot diameter (cm): Data regarding shoots length graft^{-1} are reported in Table 1and Fig.3. Statistical analysis of the data revealed that shoots length graft^{-1} was differed due to grafting and its timing. The interaction between grafting and timing was also significant. Maximum shoots length (3.57) graft^{-1} was observed in side graft followed by Tongue graft (2.23), whereas minimum shoots length (1.73) graft^{-1} observed in cleft grafting. Timing of grafting showed that maximum shoots length (2.60) graft^{-1} was occurred in seedling which was grafted in May, while minimum shoots length (2.43) graft^{-1} was observed in June. However the interaction between grafting and timing showed that maximum shoots length graft^{-1} was noted in side graft during July. The results are in accordance with Simone *et al.* (2010) who worked on different Cultivar of Brazilian grape tree (*Myrciaria cauliflora*) with different grafting timing stated sprout length was different in different Cultivar grafted on same root stock at same time. According to the Adil *et al.* 2004, states that different Cultivar increase chlorophyll content as temperature increases (38/27 ^{o}C) which has positive impact on plant growth and development.

Shoots length graft^{-1}: Data regarding shoot diameter (cm) represented and Table 1 and Fig.4 The statistical analysis of variance shows that shoot diameter (cm) was significantly affected by both type of graft and timing of grafting, while the interaction between both time and type of grafting was also significant affect. Maximum shoot diameter (7.27 cm) was observed in plants propagated through side grafting followed by tongue grafting (5.73 cm) while minimum (2.43 cm) was observed in cleft grafting. In case time of grafting maximum shoot diameter (5.43cm) in plants grafted in June, while minimum shoot diameter (4.83 cm) was observed during May. Interaction between time and type of grafting showed that maximum shoot diameter (8.40cm) was

observed during the month of June in side grafting, while minimum shoot diameter (1.50 cm) was observed in plants propagated through cleft grafting during July.

Table 1. Mean data for day to sprout, number of leaves, number of shoots, shoot length and shoot diameter of olive seedling as affected by grafting and timing.

Grafting Methods	Days to sprouting	No. of leaves	No. of shoot	Shoot diameter (cm)	Shoot length (cm)
G1 (Side)	19.3a	24.0a	1.67a	3.57a	7.27b
G2 (Tongue)	20.3a	25.0a	1.67a	2.23b	8.40a
G3 (Cleft)	10.7b	13.0b	1.00b	1.73c	8.10a
LSD	**1.67**	**7.82**	**0.60**	**0.38**	**0.80**
Time factors					
May	18.0a	25.3a	1.33b	2.60a	4.83b
June	17.0a	20.0a	1.33b	2.43b	5.43a
July	15.3b	16.7ab	1.67a	2.50b	5.17a
LSD	**1.65**	**7.58**	**0.16**	**0.08**	**1.04**

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