

## Impact of Different Pruning Dates on The Growth And Fruit Yield of Falsa (*Grewia asiatica* L)

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**Abstract: Introduction:** There are many factors that have an effect on the quality and production of Falsa. Among those, pruning is taken into consideration a major issue answerable for production. **Methods:** The experiment was carried out on the Wayaro farm Uthal during the 2019–2020 growing season to examine the impact of various pruning dates on the yield and quality of Falsa (*Grewia asiatica* L).c.v Mera. Four treatments were included T1 (100 percent pruning the 15<sup>th</sup> of October, T2 (2<sup>nd</sup> pruning the 30<sup>th</sup> of October), T3 (3<sup>rd</sup> pruning the 15<sup>th</sup> of November) and T4 (30<sup>th</sup> of November) with four replications of the randomized complete block design (RCBD). **Results:** The results showed that T4 has a significant impact on the pre- and post-harvest parameters in Falsa, including days to sprout (9.45 days), days to flower (21.65 days), days to fruit setting (12.37 days), and yield of fruit plant (16.12 kg), while T1 has a minimal impact on these parameters (13.85 days), days to flower (33.51 days), days to fruit setting (14.19 days), and yield of fruit (12.78 kg). When compared to T1, T2 and T3 improved yield/plant and decreased days to blooming and days to sprout, but they were not significantly different from one another. **Conclusion:** The current study's conclusion is that orchard pruning management is extremely important for tree development and yield. Overall findings indicated that time of pruning is the most crucial aspect for Falsa plant development and optimal fruit yield.

**Keywords:** Falsa, pruning, sprouting, treatment, harvest, quality.

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### Introduction

The exotic plant Falsa, which belongs to the Malvaceae family, is highly prized for its delicious and refreshing flavor, attractive vivid colour, superb aroma, and exceptional nutritional and therapeutic value. In terms of horticulture, it is regarded as a minor fruit crop, but it is important for traditional medicine. Ripe fruits are consumed raw, added to sweets, and transformed into invigorating and cooling beverages. Fruits are cooling tonics that quench thirst, according to an old treatise. It is low in fat and calories and a good source of fiber, vitamins, and minerals [1]. Despite the fruits' high medicinal, nutritional, and economic value, their availability for commercial usage is limited due to their variable ripening, perishable nature, and large seed size [2]. In addition, these unwanted characteristics make it less interesting than other fruit trees that are developed. Additionally, there is no *G asiatica* cultivar



that is suitable and characterized [3]. Falsa is a deciduous, bushy plant that does well in a variety of climates; however, it grows best in subtropical and tropical environments. Fruit ripening, colour development, and good quality are typically correlated with hot or warm temperatures and sufficient sunlight. Southwest Asia and the Indo-Pak subcontinent are its native regions [4]. In Pakistan, Falsa is grown as a small fruit and is successfully cultivated in some areas of the country where the climatic conditions are favorable for its cultivation. The cultivated area is mainly 1241 hectares with a production of 4209 tonnes [5].

The production and quality of Falsa are impacted by a number of factors. Pruning is one of those that is thought to be a key problem with the best effects on Falsa production. Pruning plays a dynamic role in acquiring suitable, excellent and high yield of Falsa. As fruit buds are evident on modern 365-days increases, Falsa trimming is regarded as a crucial action for true production. It improves the color and length of fruit because of direct exposure to sun light. Pruning is said to be the best and least expensive method for achieving a maximum fruit production. Pruning is an essential operation to sustain timber power and correct quality fruit with better yield [6]. For increased production and truly excellent fruit quality, the right time of pruning is just as important as the depth of the cut. Pruning at the appropriate time can greatly help to control the development of the Falsa fruit, which in turn results in an orderly selling of this perishable fruit that may be beneficial to both consumers and fruit growers [7]. As a result of the previous research, an assessment of the ideal pruning period for Falsa was made in order to obtain appropriately excellent fruit with a larger yield. The current study's objectives were to deliver Falsa fruit to market as early as possible when its price is very high and to protect it from the hot wind in April that could severely harm unripe fruits on the plants and result in fruit loss.

## Material And Methods

### Site and studied soil description

The present study entitled “Impact of different pruning dates on the growth and fruit yield of Falsa (*Grewia asiatica* L) was conducted at the experimental fruit station Wayaro located at a distance of 30 km from Uthal and 25 km from Bela city during 2019-20. The district typically experiences hot summers and mild winters, but its coastal regions, especially Somiani, Hub, and Gaddani, tend to have more temperate and humid weather than the interior. The average annual high and low temperatures are still around 30° to 17°C in January and more than 38° to 24°C, respectively, in June. The district's soil has a sandy loam texture. Table 1 lists the fundamental attributes of the soil.

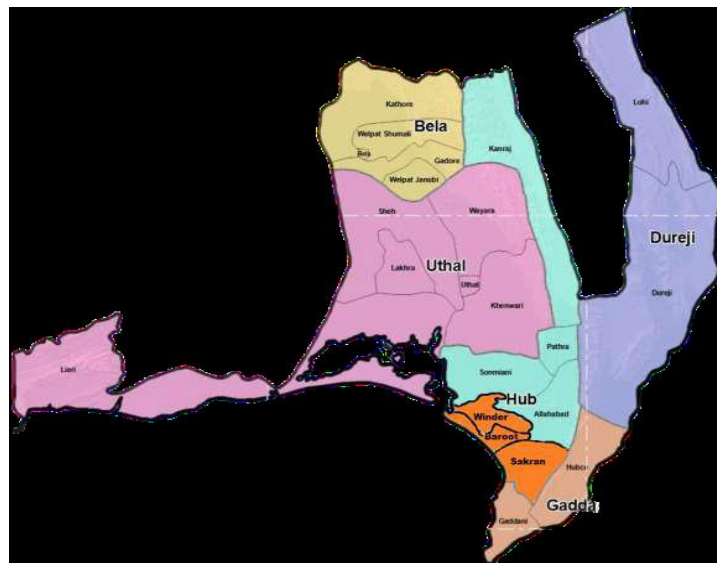


Figure 1: Map of Lasbela (District Development Atlas of Balochistan 2010)



### Experiment Description

A randomized complete block design (RCBD) was utilized in a field experiment at Wayaro Farm Uthal that had four treatments and four replications. The treatment detail of the experiment was T1 (100 percent pruning the 15<sup>th</sup> of October), T2 (2<sup>nd</sup> pruning the 30<sup>th</sup> of October), T3 (3<sup>rd</sup> pruning the 15<sup>th</sup> of November) and T4 (4<sup>th</sup> pruning the 30<sup>th</sup> of November). Nitrogen fertilizer was applied in two split doses (before flowering and after fruit set) while phosphorus and potassium were applied before flowering. Well-rotted farm yard manure (FYM) was applied at the rate of 10-12 kg/Plant after pruning. All other agricultural practices were carried out according to the recommendation. All of the plants were four years old, and the experiment's total area was one acre.

### Soil Sampling And Processing

Soil samples were collected at the depth of 0-20 cm from the experimental area randomly and made composite soil sample before conducting the experiment in the month of September, stored in the polyethylene bags, and shifted to the laboratory for further processing. In one acre plot, three trees were chosen at random for each treatment each of the three Falsa plant had two soil cores dug beneath its canopy, which were pooled into a single sample. Collected soil was left to be air-dried followed by the removal of unwanted materials including roots, stones. Soil samples were grounded and passed through a 2-mm sieve size. The separated samples were transferred to airtight malleable jars and taken to the lab of Directorate of soil and water testing ARI Sariab Quetta for further analysis.

### Soil Physio-Chemical Analysis

The soil was used to determine the some physio-chemical properties by slandered methods. pH and electrical conductivity (EC) of the soil were determined in 1:2 soil water extract using pH meter (Model WTWpH720) and an EC meter (Model HI8033)<sup>[11]</sup>. Soil organic matter content was measured by the oxidization method which involved oxidation of organic carbon by potassium di chromate and subsequent determination of the unutilized dichromate by oxidation-reduction titration with ferrous ammonium sulphate <sup>[10]</sup>. Soil texture were determined by Bouyoucos hydrometer method <sup>[8]</sup>. Hydrometer readings were utilized to quantify the percentages of sand, silt, and clay, and the USDA textural triangle was used to identify the textural class <sup>[9]</sup>. The amount of phosphorus (P) in the samples was determined using spectrophotometry, as described in the method <sup>[12]</sup> approach for blue color creation with a spectrophotometer (Model ANA 75). The available potassium (K) in the extracts was measured using a flame photometer and emission spectroscopy (JENWAY PFP 7).

### Descriptive Statistic

Descriptive statistics including mean were calculated and results were computed by using Microsoft Excel.

## Results

### Days Taken to Sprouting

There was a positive response with the different pruning date in relation to sprouting of leaves (Table 1). When it came to sprouting, it was discovered that T1 took 13.85 days, while T2, T3, and T4 took 11.64, 12.63, and 9.45 days, respectively. the study revealed that the 30<sup>th</sup> November pruning gave better results for sprouting of leaves (Table 2) A statistical difference was recorded by the pruning on 30<sup>th</sup> November (T4 than that of T2 (11.64) and T3 (12.63) ). A similar result has been reported by scientist [13] who documented that a proper date of pruning significantly affected the days taken to sprouting. Our findings concur with earlier research conducted by the researcher [14]. The reason for early sprouting might be due to higher light



interception, elimination of apical dominance and release of buds. These results are supported by the findings in jujube plants [15].

**Table 1** Basic properties of study area

Properties	Value	Unit
Soil textural class	Sandy loam	-
Electrical conductivity (EC)	1.34	dS m <sup>-1</sup>
pH	8.2	-
Soil organic matter (SOM)	0.7	%
Available phosphorus (P)	3.6	mg kg <sup>-1</sup>
Available potassium (K)	7.3	mg kg <sup>-1</sup>

**Table 2** Days taken to sprouting

Treatment	T1	T2	T3	T4
Replication	Each treatment data is average of three trees			
R1	15.25	11.25	10.21	11.15
R2	14.30	14.67	13.43	07.88
R3	12.01	09.01	14.26	09.32
<b>Average</b>	<b>13.85</b>	<b>11.64</b>	<b>12.63</b>	<b>9.45</b>
<b>S.E</b>	<b>0.96</b>	<b>1.64</b>	<b>1.24</b>	<b>0.94</b>

### Days taken to flowering

Different pruning dates in proportion to the days taken to blossom yielded positive results. (Table 2). Duration to flowering on 15 October was found to be 33.51 days whereas it took 28.16, 25.68 and 21.65 days for T2, T3 and T4 respectively. The study revealed that the pruning on 30<sup>th</sup> November gave better results for Days taken to flowering (Table 3) A statistical difference was recorded on 30<sup>th</sup> November (T4 than that of T2 (28.16) and T3 (25.68). Early flowering might be accredited to the early sprouting of vegetative buds in highly pruned trees at the proper time which ultimately induced early flowering. These results are similar to the findings of other researchers [16].

**Table 3** Days taken to flowering

Treatment	T1	T2	T3	T4
Replication	Each treatment data is average of three trees			
R1	31.03	27.25	29.10	22.12
R2	33.75	28.91	26.20	18.28
R3	35.75	28.34	21.76	24.46
<b>Average</b>	<b>33.51</b>	<b>28.16</b>	<b>25.68</b>	<b>21.65</b>
<b>S.E</b>	<b>1.36</b>	<b>0.48</b>	<b>2.14</b>	<b>1.08</b>

### Days Taken to Fruit Setting After Flowering

There was a positive response with different pruning dates in relation to Days Taken to Fruit Setting after Flowering (Table.4). Days Taken to Fruit Setting After Flowering on 15<sup>th</sup> October were found to be 14.19 days whereas it took 14.58, 14.51 and 12.37 days for T2, T3 and T4 respectively. The research showed that pruning on November 30 produced more outcomes for the number of days it took for fruit to set after flowering (Table 3). A statistical difference was



recorded on 30<sup>th</sup> November from that of T2 (14.58) and T3 (14.51). Early bud sprouting as well as flower initiation might be ascribed to the early fruit setting.[16]

**Table 4** Days taken to fruit setting

Treatment	T1	T2	T3	T4
Replication	Each treatment data is average of three trees			
R1	11.92	11.23	12.34	14.34
R2	14.45	16.78	19.67	12.23
R3	16.20	15.75	11.52	10.56
<b>Average</b>	<b>14.19</b>	<b>14.58</b>	<b>14.51</b>	<b>12.37</b>
<b>S.E</b>	<b>1.24</b>	<b>1.70</b>	<b>2.06</b>	<b>1.09</b>

**Yield of Fruit Plant<sup>-1</sup>**

There was a positive response with different pruning dates in relation to Days Taken to yield of Fruit plant<sup>-1</sup> (Table.4). Yield of Fruit plant<sup>-1</sup> on 15<sup>th</sup> October was found to be 12.78 Kg whereas it was recorded to be 12.74, 14.64 and 16.12 Kg for T2, T3 and T4 respectively. the study revealed that the pruning on 30<sup>th</sup> November gave better results for the yield of fruit Plant-1 (Table 5) A statistical difference was recorded on 30<sup>th</sup> November than that of (14.64 Kg T3) than that of T2 (12.74 Kg) and T1 (12.78 Kg). The scientific reason for increasing yield with pruning (100 cm above ground level) might be due to the fact that trees with a more open canopy and extensive leaf area are exposed to more light penetration and assimilation of photosynthetic material which consequently produced more fruits. [17] Another researcher [18] also reported similar results. Further different researchers also confirmed these results in Falsa fruit [19]

**Table 5** Yield (kg) of fruit plant<sup>-1</sup>

Treatment	T1	T2	T3	T4
Replication	Each treatment data is average of three trees			
R1	12.50	12.03	15.58	16.17
R2	14.34	14.44	17.10	14.35
R3	11.45	11.75	11.25	17.85
<b>Average</b>	<b>12.78</b>	<b>12.74</b>	<b>14.64</b>	<b>16.12</b>
<b>S.E</b>	<b>0.84</b>	<b>0.85</b>	<b>1.75</b>	<b>1.01</b>

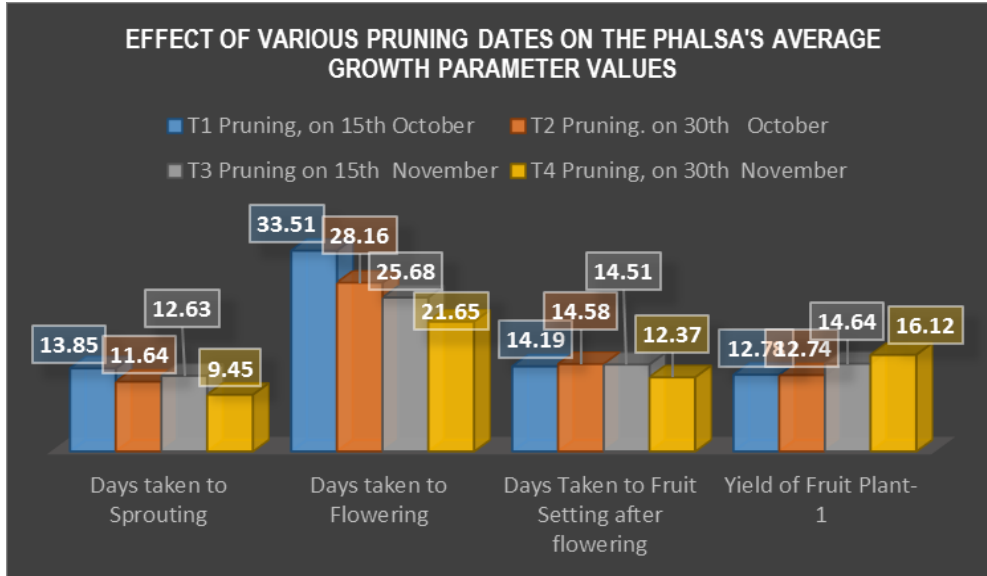
**Discussion:**

The study, Different pruning dates' impact on Falsa's growth and fruit yield in district Lasbela Balochistan developed as a result of yield instability and the quality of Falsa. Given that these two factors have a greater impact on nutrient use, the other important factor related to the yield is the timely pruning of Falsa plants. Since soil testing only provides an approximation of the available nutrient status, it was determined to develop an exact pruning time before implementing new management tactics and alterations to the fertilizer program in the field.

The results of this study show that treatment T4 has a significant (p>0.05) impact on the pre- and post-harvest parameters in Falsa, including days to sprout (9.45 days), days to flower (21.65 days), days to fruit setting (12.37 days), and yield of fruit plant (16.12 kg), while treatment T1 has a minimal impact on these parameters (13.85 days), days to flower (33.51 days), days to fruit setting (14.19 days), and yield of fruit (12.78 Kg). When compared to T1, T2 and T3 improved yield/plant and decreased days to blooming and days to sprout, but they were not significantly different from one another. The current study's findings indicate that, in a field trial, the most crucial aspect for plant development and fruit output is the timing of pruning. Pruning duration and intensity had a big impact on vegetative development, flowering, yield, and quality parameters. The findings of this study closely match those of [20] Falsa



research.



**Figure 2:** Effect of various pruning dates on the Falsa's average growth parameter values

Falsa pruning is thought to be the most practical and affordable procedure for giving the plant a regular framework, yield, and quality of the Falsa fruit, according to a previous study conducted by a researcher. The size and colour of the fruit are also improved in trimmed trees due to greater light exposure. Annual trimming guarantees consistent and substantial fruiting and promotes new, healthy shoots [21].

Falsa should be pruned at a height of 3.5 to 4 feet in order to produce more shoots and a higher yield than at 1.5 to 2 feet or at ground level, according to studies done in Pakistan. Additionally, he noticed that fruit output and size had an opposite connection, with smaller fruits producing juice with a higher specific gravity. One of the main causes of the fall in Falsa yield and quality in D.I.Khan is pruning. We measured the lengths and numbers of Falsa twigs (shoots) under various pruning intensities. Bush pruning led to considerable regrowth increases and declines at varied durations and intensities. [22]

When pruning was carried out in Falsa between the 20th of December and the 20th of January, in 2001 [16] and 2018 [23] different researchers reported similar types of results on yield and quality parameters. Due to the ideal weather conditions that existed from the last week of December to the first two weeks of January. The sprouting time, bush height, number of twigs, fruiting clusters, number of fruits per cluster, weight of the fruits, total soluble solids, and fruit yield per plant were all found to be significantly influenced by the timing and intensity of pruning. The bushes were pruned at 20 cm from ground level on January 15th, which was much higher than the other treatment combinations. This resulted in the maximum average fruit output (4.91 kg/plant), average fruit weight and diameter (1.14 g and 1.26 cm), and total soluble solids (25.02°Brix). According to the study's findings, pruning in Falsa should be done between January 15 and January 20 in western Rajasthan under the Bikaner agro-climatic conditions at a height of 20 cm from the ground. Pruning may have helped the Falsa bushes produce more sprouts, flowers, and fruiting clusters earlier than usual. This would have had a significant positive impact on the bushes' ability to produce a higher yield of fruits of higher quality.

### Conclusion

This study concluded that the treatment T4 has a significant impact on the pre- and post-harvest parameters in Falsa, including days to sprout (9.45 days), days to flower (21.65 days), days to fruit setting (12.37 days), and yield of fruit plant (16.12 kg), while treatment T1 has a minimal impact on these parameters (13.85 days), days to flower (33.51 days), days to fruit setting



(14.19 days), and yield of fruit (12.78 kg). When compared to T1, T2 and T3 improved yield/plant and decreased days to blooming and days to sprout, but they were not significantly different from one another. In light of these results, it is recommended that pruning on 30th November can be effective for harnessing better yield and quality of Falsa fruit.

### **ETHICS APPROVAL AND CONSENT TO PARTICIPATE**

Not applicable.

### **HUMAN AND ANIMAL RIGHTS**

No animals were used in this study. The study on humans was conducted in accordance with the ethical rules of the Helsinki Declaration and Good Clinical Practice.

### **CONSENT FOR PUBLICATION**

Not applicable.

### **AVAILABILITY OF DATA AND MATERIALS**

None.

### **FUNDING**

None.

### **CONFLICT OF INTEREST**

The authors declare no conflict of interest, financial or otherwise.

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