OLIVE CULTIVATION IN PAKISTAN —A REVIEW

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The edible varieties of olive (*Olea europaea*) were first introduced in the Punjab as far back as 1866. Over a period of 100 years sporadic attempts have been made to grow the tree under a wide range of climatic and edaphic conditions either by importing grafted plants from France, Italy, Spain and Turkey or by budding or top working on the indigenous wild olive (*Olea cuspidata*). The history of these attempts carried out in the Punjab, Azad Kashmir and N.W.F.P. has been well documented by Chopra (1), Khan (3) and Chaudhry (2).

Khairimurat Plantation: Of all the work done, the most productive effort has so far been the Khairimurat plantation, a 20 hectare piece of land 56 km south west of Islamabad. Here in 1965, 2-year old 4480 plants of the following 7 varieties from Italy were planted:

Pendolino
Marchiaio
Coratina
Leccino
Frantoio
Moraiolo
Canino

The area which was covered with wild growth of *Acacia modesta* (Phulai), *Olea cuspidata* (Kau) and *Dodonea viscosa* (Sanatha) was cleared and thoroughly levelled. It was divided into 7 blocks of different sizes. 0.75 m deep pits at 4.5 × 9 m and 4.5 × 6 m spacing were filled back with a mixture of soil and farmyard manure in equal proportion. Variety-wise planting was done in rows running south to north followed by one bucket of water per plant. Hand watering continued till June 1972. Another dose of fertilizer consisting of 0.90 kg of superphosphate and an equal quantity of farmyard manure was given to every plant. No systematic pruning was done at any stage although branches were removed off and on for vegetative propagation.

Trifolium alexandrinum (Berseem) was cultivated in-between the rows till 1972. Since then in addition to berseem a number of fodder crops such as maize, sorghum, barley and mustard have been grown. Irrigation from Tanaza Dam is possible only in 12 hectares, rest of the area being uncommanded.

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Bearing started in 1969. Yearwise production has been erratic as would be seen from the following table:

Year	Qty (kg)	Annual precipitation (mm)
1969	181	851
1970	60	1019
1971	404	782
1972	1910	536
1973	—	1293
1974	969	564
1975	241	658
1976	344	1258
1977	320	608

Low production has been recorded in the years of excessive rainfall and the maximum yield of 1910 kg was obtained when only 536 mm rain was received. It is possible that heavy rain resulted in premature dispersion of pollen, hindered actual pollination and also caused loss of fruit before it could be collected. As a matter of fact a considerable quantity of ripe fruit did fall on the ground in 1977 due to heavy rains and wind storm in the month of September-October.

A study to assess the fruiting performance of the seven varieties of olive in Khairimurat was done in 1977. In this year, only 340 out of the 2055 surviving trees were fruiting. These were classified into three categories viz abundant (6 kg and above/tree), normal (1-6 kg/tree) and few (0.5 to 1 kg/tree.) Only 46 trees turned out to be abundant and normal.

Variety	Total No. of plants	Number and categories of trees bearing			Total yield
		Abundant	Normal	Few	
Pendolino	210	1	4	36	8.7
Marchiaio	229	1	6	31	64.5
Coratina	360	1	5	60	36.4
Leccino	315	0	7	42	13.4
Frantoio	338	1	10	37	72.0
Moraiolo	285	0	2	30	24.0
Canino	318	1	7	58	93.1
TOTAL:	2055	5	41	294	312.7**

**Actual yield was 340 kg, 27.3 kg was not fully ripe.

Maximum average yield per tree was recorded from Marchiaio (13.2 kg) and the minimum from Pendolino (2.2 kg). Variety wise fruit characteristics such as weight, length and thickness were also noted:

Sl. No.	Variety	Average weight per fruit (gms)	Average length per fruit (cm)	Average thickness per fruit (cm)
1.	Canino	2.55	2.26	1.49
2.	Coratina	2.83	2.24	1.58
3.	Frantoio	2.39	2.13	1.40
4.	Leccino	2.93	2.32	1.45
5.	Marchiaio	2.42	2.06	1.44
6.	Moraiolo	2.52	2.16	1.44
7.	Pendolino	2.32	2.03	1.46

Raising of nurseries. *From seed.* Seed germination of both *Olea eurepaea* (Khairimurat) and *Olea oleaster* (Italy) was low and was not significantly increased by an array of seed treatments; soaking in alkali and acid of various concentrations for different durations, followed by washing and stratification:

Medium	Time of soaking
H_2SO_4 (conc) (S)	12 hours (T_1)
$NaoH_2$ 5%(CS_1), 10%(CS_2), 15%(CS_3)	24 hours (T_2)

Treated seed of *Olea europaea* was thoroughly washed for 2 hours in running water before sowing. The treated and untreated seed was sown in 9 replications on 20th November, 1977 in raised beds which were kept moist. 100 seeds were sown in each plot, there being 81 plots in all. Germination started on 18th February, 1978. Count taken on 25th June, 1978 showed an average germination of 2.7%.

Although germination percent in all the treatments has remained low, even then treatments T_2S and T_1CS_2 (soaking in H_2SO_4 for 24 hours and soaking in 10% alkali for 12 hours) have given better results (4%) than the rest of the treatments. It is expected that germination will continue.

In order to compare the effect of different treatments on the seed imported from Italy and the lot collected from Khairimurat, 3600 seeds each of *Olea oleaster* (Italy) and *Olea europaea* (Khairimurat) were sown on 15-12-1977 after H_2SO_4 (conc) treatment for 12 and 24 hours followed by thorough washing for 2 hours under running water. Sowing was

done in raised beds. Germination started on 15-3-1978. Following data were recorded on 15-6-1978:

Number of seedlings available on	*Olea oleaster*			*Olea europea*		
	T_1	T_2	T_3	T_1	T_2	T_3
15-3-1978	45	22	41	—	—	—
25-4-1978	59	32	130	1	1	1
15-6-1978	61	45	193	6	8	9

T_1 : Soaking in H_2SO_4 (conc) for 12 hours
T_2 : Soacking in H_2SO_4 (conc) for 24 hours
T_3 : Control

Untreated seed of *Olea oleaster* has given the best results so far.

Apart from above, 8400 seeds of *Olea oleaster* (Italy) were subjected to the following treatments:

T_1 : Soaking in H_2SO_4 for 24 hours followed by stratification in moist sand for 10 days at 5°C.
T_2 : Soaking in H_2SO_4 for 12 hours followed by stratification in moist sand for 10 days at 5°C.
T_3 : Soaking in H_2SO_4 for 6 hours followed by stratification in moist sand for 10 days at 5° C.
T_4 : Stratification in moist sand for 20 days at 5°C.
T_5 : Stratification in moist sand for 20 days at 0°C.
T_6 : Stratification in cow dung for 20 days
T_7 : Control.

The treated and untreated seeds were sown in beds on 11-3-1977.

Germination started on 12-12-1977. Out of 8400 seeds sown, 2214 seedlings were available on 20-6-1978:

Treatment	Replications												Total	% age
	1	2	3	4	5	6	7	8	9	10	11	12		
T_1	5	8	8	4	7	6	4	5	3	6	19	18	93	8
T_2	18	19	29	18	14	18	22	9	26	26	12	12	221	18
T_3	32	38	29	14	25	37	35	29	25	36	30	24	354	29.5
T_4	31	30	38	38	45	35	41	35	41	32	29	32	422	35*
T_5	34	27	29	27	30	37	42	44	20	26	31	31	378	32*
T_6	14	29	24	31	37	28	33	28	22	30	38	34	348	29
T_7	21	29	31	40	33	28	38	34	22	23	43	42	398	33*

*Significant.

It has been observed that seed of olive continues to germinate for more than a year irrespective of the treatment given.

From branch cuttings. 1154, 391 and 2057 branch cuttings 23 cm long and 1.5-4 cm in diameter were obtained from Khairimurat orchard on 31-10-1977, 29-12-1977 and 7-2-1978 respectively from all the seven varieties. The cuttings were planted the next day horizontally in raised beds and covered with river sand. The beds were kept constantly moist and weeded. The cuttings planted in October started sprouting after 56 days, those planted in December sprouted after 80 days and the batch planted in February took the least time and sprouts appeared after 46 days. Sprouting percent on 15-6-1978 was 14, 9 and 15 respectively. Cuttings prepared from the variety Frantoio and planted in February gave the best results; out of 340 planted, 233 sprouted. Sprouts suffered from late frost and summer heat (max temperature 41°C).

Grafting and budding. Grafting and budding of *Olea europaea* scions on *Olea oleaster* was done in January, 1978. Stock was obtained from Khairimurat, Tarnab and Mingora. The two methods have given a take of 11 and 8% respectively.

Application of fertilizers. 432 pairs of olive trees were selected. One tree each of all the above pairs was fertilized from 29-1-1978 to 6-2-1978. 1 kg ammonium sulphate +1 kg of super phosphate +0.2 kg of potash (NPK 2:2:1) per tree was given. The mixed fertilizer was spread under the crown of the tree in a radius of 1-2m and was thoroughly mixed by working the soil upto a depth of 15 cm. In addition to fertilizer, 10 kg of farmyard manure per tree was also given. Irrigation was not applied. It rained (13 mm) on the last day of fertilization.

Observation on fruiting behaviour will be recorded

Control of insect attack. The following insect pests were recorded on olives:

Psyllids (Eupyllura spp) which suck leaf sap were seen on *Olea oleaster* plants in the research garden of PFI in June, 1977. Biology of Psyllids, their parasites and predators have been studied in the laboratory as well as in the field by the entomologist. Three generations of the pest have been completed, each generation lasting about 45 days. It has been indicated that Psyllids remain under hibernation from December to mid February; female laid on an average 15 eggs; eggs hatch after 7-16 days, the nymphal and adult stages occupy about 23 days. Larvae of Chrysopa spp (a predator) were found actively feeding on Psyllid nymphs. Feeding potential of this predator worked out in the laboratory showed that on an average a Chrysopa larva consumed 317 psyllids nymphs during its larval life of eight days, 20-51 nymphs being the consumption per day.

Further studies on rearing and control are being continued in the field.

References

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