



Short Communication

Performance of olive cultivars under mid hill region of Jammu and Kashmir

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ABSTRACT

An investigation was carried out on twenty two years old olive trees at Progeny orchard of State Horticulture Department at Gobindpura, Ramban in Jammu and Kashmir. Observations were recorded on the fruit physico-chemical characteristics, yield and oil content on sixteen cultivars of olive. Fruit ripening period was also recorded for all the olive cultivars under study. The results revealed that cultivar Nocellara Messinese recorded highest fruit weight (7.98 g), fruit length (31.26 mm) and fruit breadth (21.42 mm) whereas minimum fruit weight (2.91 g) and fruit length (19.93 mm) were recorded in cultivar Cipressino and fruit breadth (14.25 mm) in cultivar Cerignola. Highest stone (0.88 g) and pulp weight (7.09 g) were recorded in cultivar Nocellara Messinese whereas minimum stone weight was recorded in cultivar Cerignola (0.43 g) and pulp weight in cultivar Cipressino (2.46 g). Fruit yield (39.25 Kg/plant) and oil content (39.86 %) were recorded maximum in cultivars Nocellara Messinese and Leccino, respectively and minimum in cultivars Azapa (24.05 kg/plant) and Nocellara Etnea (29.95 %), respectively. Early fruit ripening was observed in cultivars Brancolilla, Frantoio, Itrana, Tonda Iblea, Coratina, Moraiolo and Nocellara Etnea whereas late ripening was recorded in cultivar Nocellara del Belice. From the present investigations it is inferred that cultivar Nocellara Messinese performed better in terms of physico-chemical characteristics of fruits and fruit yield. Hence, this variety can be recommended for commercial cultivation in the mid-hills of Jammu and Kashmir.

Key words: *Olea europea*, fruit ripening, quality characters, yield.

Olive is a hardy, evergreen fruit tree, which belongs to family Oleaceae and is native of Mediterranean region (Rapoport, 11). It is known as the 'tree of liquid gold' because of the great importance of its oil. The nutritional value and health functions of virgin olive oil are due to the presence of large amount of mono-unsaturated fatty acids such as oleic acid and valuable minor components including aliphatic and triterpenic alcohols, sterols, hydrocarbons, volatile compounds, tocopherols, pigments such as chlorophylls, carotenoids and antioxidants (Kochhar, 7). The consumption of olive oil has been clinically advocated to people suffering from hypertension and coronary diseases. Olive fruit is consumed as food; its fine yellow or light greenish-brown wood is hard and used for furniture making and its leaves have medicinal value. Presently more than 65 per cent of olive production comes from Spain, Italy and Greece only which accounts for 4.48 million hectares. The major olive producing countries of the world are Spain, Italy, Greece, France, Austria and Argentina. The area under this crop in the world is nearly 108 lacs hectares with the fruit production of 208 lacs MT (FAO, 4). The olive cultivation in India is still in its infancy stage and restricted to a few pockets in the states of Jammu and Kashmir, Himachal Pradesh

and Uttarakhand but has tremendous scope for its cultivation in the Himalayan mountainous regions. In an Indo-Italian Fruit Development Programme some promising cultivars were introduced in Jammu and Kashmir during the years 1984-1987 but till date these varieties were not evaluated and the information on morphological and physico-chemical characters, these varieties was lacking. Therefore, the farmers were unaware and further breeding program could not be initiated for increasing the olive production in the state. Keeping in view of these facts the present study was carried out on sixteen different olive cultivars to study their fruiting period and physico-chemical characters.

The present investigation was carried out at the Advance Centre for Horticulture Development, Govindpura, Distt. Ramban (Jammu and Kashmir) during the years 2014 and 2015 to study the fruiting and fruit physico-chemical behavior of sixteen olive cultivars. Data on fruit weight and stone weight was taken with the help of top pan balance and expressed in grams. Fruit length, breadth and stone length and breadth was measured with the help of Vernier caliper and expressed in mm. L/B ratio was obtained by dividing the fruit length with fruit breadth, whereas pulp stone ratio was taken by dividing the pulp weight with stone weight. pH of fruit juice was taken placing electrode in the 100 ml of fruit juice and pH meter reading was noted. Time of fruit ripening was noticed when 80 per

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cent of the fruits were coloured. For estimating oil content, dried samples of olive fruits were crushed to powder form and fat analysis of the samples was done by using Soxhlet apparatus (AACC, 1). The data generated from these investigations were computed, tabulated and pooled data of two years were analyzed by applying Randomized Block Design Factorial. The level of significance was tested for different variable at 5 per cent (Panse and Sukhatme, 9).

Statistical analysis of the pooled data exhibited significant differences in all the studied characters among different olive cultivars (Table 1). Highest fruit weight was recorded in cultivar Nocellara Messinese (7.98 g) which was statistically higher than all other cultivars followed by cultivar Nocellara Etnea (6.61 g) whereas, cultivar Cipressino (2.91 g) had lowest fruit weight. Results obtained are in conformity with the findings of Sharma *et al.* (12) and Tubeileh *et al.* (14). Cultivar Nocellara Messinese had more fruit length (31.26 mm) and fruit breadth (21.42 mm), however fruit length was at par with cultivar Nocellara Etnea (31.20 mm) and fruit breadth was at par with cultivars Nocellara Etnea (20.49 mm), Nocellara del Belice (20.40 mm) and Brancolilla (20.38 mm). Minimum fruit length and fruit breadth was recorded in cultivars Cipressino (19.93 mm) and Cerignola (14.25 mm), respectively. Variable fruit length and diameter in

different olive cultivars was also recorded by Abo-El-Ez and Hassnein (2) and Arslan (3). Length/breadth ratio among the studied cultivars in the present study varied from 1.29 (Brancolilla) to 1.58 (Azapa and Ottobratica). Similar observations were also made by Ferrara *et al.* (5) in different olive cultivars.

Maximum stone weight (0.88 g) was recorded in cultivar Nocellara Messinese which was statistically higher among all the cultivars under study whereas minimum stone weight was recorded in cultivar Cerignola (0.43 g) (Table 1). Cultivars Nocellara Etnea (21.08 mm) and Nocellara Messinese (11.12 mm) had highest stone length and stone breadth, respectively which was statistically at par among all the studied cultivars. Minimum stone length and stone breadth was recorded in cultivars Cipressino (14.16 mm) and Cerignola (7.13 mm), respectively. The stone characters have great importance in the description and identification of different fruit varieties because of their consistency. Variability reported for stone weight, length and breadth in the present investigation is in accordance with Ferrara *et al.* (5) and Ulas and Gezeral (15).

Maximum and minimum values of pulp weight were recorded in cultivars Nocellara Messinese (7.09 g) and Cipressino (2.46 g), respectively. In this case maximum value was statistically higher among all the

Table 1. Variation in physic-chemical characteristics of different olive cultivars.

Varieties	Fruit weight (g)	Fruit length (mm)	Fruit breadth (mm)	L/B ratio	Stone weight (g)	Stone length (mm)	Stone diameter (mm)	Pulp weight (g)	Pulp/stone ratio	pH of fruit juice
Azapa	3.83	23.85	15.04	1.58	0.60	16.63	8.47	3.23	5.35	5.56
Brancolilla	5.65	26.42	20.38	1.29	0.76	17.41	8.24	4.90	6.44	5.50
Carolea	5.81	28.40	19.71	1.43	0.77	18.68	8.68	5.04	6.55	5.56
Cerignola	3.06	20.22	14.25	1.42	0.43	15.14	7.13	2.67	6.22	5.52
Cipressino	2.91	19.93	15.26	1.30	0.45	14.16	7.67	2.46	5.48	5.52
Coratina	3.33	20.72	14.54	1.42	0.51	15.62	7.48	2.82	5.49	5.76
Cornicobra Attica	5.37	26.47	19.39	1.36	0.73	17.34	8.07	4.64	6.29	5.59
Frantoio	4.30	25.62	16.80	1.52	0.48	18.53	6.46	3.82	8.00	5.61
Itrana	3.67	23.49	17.56	1.33	0.55	16.75	9.70	3.10	5.62	5.62
Leccino	3.72	23.84	15.19	1.56	0.45	18.14	8.02	3.27	7.22	5.80
Moraiolo	3.70	22.76	14.82	1.53	0.49	16.13	8.12	3.23	6.63	5.61
Nocellara del Belice	5.69	25.70	20.40	1.25	0.75	16.59	8.41	4.95	6.60	5.63
Nocellara Etnea	6.61	31.20	20.49	1.52	0.76	21.08	8.40	5.85	7.71	5.54
Nocellara Messinese	7.98	31.26	21.42	1.45	0.88	19.24	11.12	7.09	8.05	5.62
Ottobratica	3.55	22.67	14.31	1.58	0.49	16.87	7.74	3.04	6.19	5.62
Tonda Iblea	3.60	23.66	17.46	1.35	0.54	17.87	8.58	3.05	5.59	5.53
CD _(0.05)	0.47	1.25	1.32	0.05	0.10	0.71	0.37	0.38	0.60	0.10

cultivars whereas minimum value was statistically at par with cultivars Cerignola (2.67 g) and Coratina (2.82 g). Pulp:stone ratio was highest in cultivar Nocellara Messinese (8.05) which was statistically at par with cultivars Frantoio (8.00) and Nocellara Etnea (7.71 mm) whereas lowest pulp:stone ratio was recorded in cultivar Azapa (5.35). War (16) and Sharma *et al.* (12) also made similar observations with respect to pulp weight and pulp:stone ratio in their studies on different olive cultivars. pH of fruit juice of cultivar Leccino (5.80) was highest and statistically at par with cultivar Coratina (5.76) however lowest pH of fruit juice was recorded in cultivar Brancolilla (5.50). pH of the fruit juice between a range of 5.03 to 5.66 was also observed earlier by War (16) and Tanilgen *et al.* (13) in different olive cultivars.

Pooled data for two years study presented in Fig. 1 depict that highest fruit yield was recorded in cultivar Nocellara Messinese (39.25 Kg) which was statistically at par with cultivar Leccino (38.11 Kg) whereas minimum fruit yield was recorded in cultivar Azapa (24.05 Kg) (Fig 1). Variation in fruit yield may be due to the genetic yield potential of different olive cultivars. Tubeileh *et al.* (14) and Hermoso *et al.* (6) also observed variable fruit yields while evaluating different olive cultivars at Syria and Spain, respectively.

Oil content on dry weight basis ranged from 26.95 per cent (Nocellara Etnea) to 39.86 per cent (Leccino) (Fig 1). Maximum oil content was recorded in cultivar

Leccino (39.86 %) which was statistically at par with cultivar Cipressino (39.33 %) whereas minimum oil content was obtained in cultivar Nocellara Etnea (26.95 %). Results obtained in the present investigation are in accordance with the findings of Sharma *et al.* (12) and Madeo *et al.* (8) who also reported similar range for oil content in different olive cultivars.

Cultivar Cipressino (15.99 %) accumulated maximum total soluble solids closely followed by cultivars Frantoio (14.86 %) and Moraiolo (14.67 %), however cultivar Tonda Iblea (10.62 %) accumulated minimum total soluble solids (Fig. 1). War (16) also reported that the TSS value ranged between 14.30-17.80 per cent in different olive cultivars.

Higher variation was observed with respect to fruit ripening in different olive cultivars under study during both the years (Fig. 2). Ripening of fruits in olives is not uniform and the process of ripening occurs by stages as a result there was an extending period of ripening. In the present study, fruit ripening started from 10th October in the first year and extended upto 22nd October in different cultivars viz. Brancolilla, Frantoio, Itrana and Tonda Iblea, however in cultivars viz. Coratina, Moraiolo and Nocellara Etnea, ripening extended upto 23rd October with 4 to 5 pickings of fruits. During the second year of study, fruit ripening started from 15th October and lasted on 25th October (Coratina, Itrana, Moraiolo and Tonda Iblea) and on 28th October (Brancolilla, Frantoio and

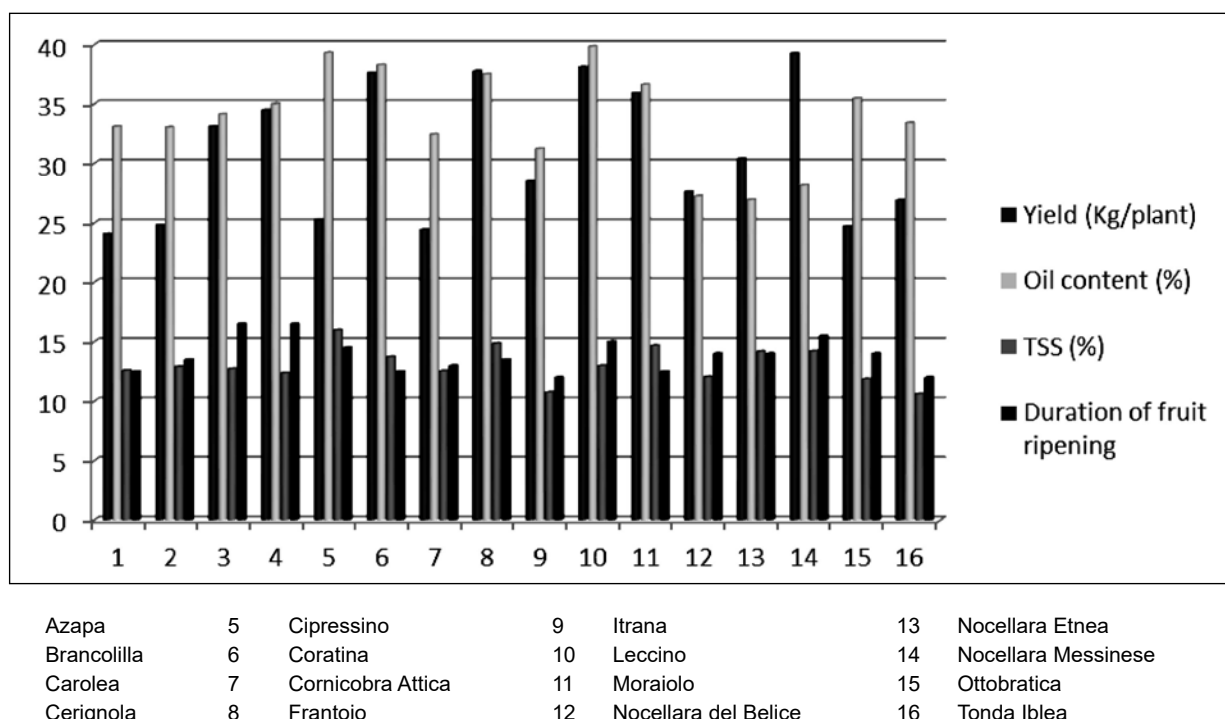


Fig. 1. Variation in yield, oil content, TSS and duration of fruit ripening among olive cultivars.

Nocellara Etnea). Late ripening of fruits was recorded in cultivar Nocellara del Belice in both the years of study i.e. from 5th to 17th November in the first year and from 8th to 20th November in second year. In the earlier studies, Tubeileh *et al.* (14) observed that ripening in different olive cultivars starts from end of September to mid-November whereas, Ramos *et al.* (10) reported that ripening in olive begins from mid-October to the first fortnight of December. The year to year variation in the ripening period of olive cultivar may be due to the prevailing environmental conditions and also depends upon the inherent behavior of the variety. Longest duration (17 and 16 days) of fruit ripening was noticed in cultivars Carolea and Cerignola in both the years, respectively followed by cultivars Leccino and Nocellara Messinese i.e. 16 days in the first year and Nocellara Messinese and Ottobratica i.e. 15 days in the second year (Fig. 2). Minimum duration (12 and 10 days) of fruit ripening in both the years was observed in cultivar Cipressino.

From the above discussion, it is concluded that cultivar Nocellara Messinese performed better in most of the parameters studied followed by cultivars Leccino and Nocellara Etnea hence can be recommended for commercial cultivation in mid hill regions of Jammu and Kashmir.

DECLARATION

The authors declare no conflict of interest.

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