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Effects of Different Planting Applications on Productivity of Nursery Plant Production and Quality of Bursa Siyahi Fig Cultivar

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Abstract: This research was carried out in Turkey between 2000-2003 years to determine effects of different planting and growing applications on productivity of nursery plants production and quality of Bursa Siyahı fig cultivar. Applications are; the direct planting of cuttings into plastic mulched beds, under high tunnel, planting of the cuttings which were rooted in bottom heated and top fogged rooting unit, into the under high tunnel beds; planting of cuttings which were rooted in small pots into under high tunnel beds; direct planting of rootless cuttings into bottom heated under high tunnel beds; planting of rotted cuttings into open land beds; direct planting of rootles cuttings into open land beds (control, classic way of producing). According to research results taken from open land and under high tunnel applications, the better productivity and quality were obtained in mulch covered and top fogged benches by mist system, under high tunnel applications. The mulch covered applications has statistically the highest values compared other applications. Hence, it can be suggest that this application as a good way to produce a better quality and highest number of Bursa Siyahı fig nursery plants.

Key words: Fig, nursery plants production, mulch, Bursa Siyahı

INTRODUCTION

The demand for fig has become ever increasing all over the world due to fruit's high calorific and nutrient values. But, the amount of fig production has been decreased in fig producer countries because of ageing, disease and drying out of the trees[1-4].

As known, fig (*Ficus carica* L.) first cultured in Arabian peninsula and spread the other countries via the Anatolian peninsula. Bursa Siyahı fig cultivar is a local varieties of the Anatolia, but it has been spread to the other locations in recent years. Bursa Siyahı fig has wonderful aroma and attractive shape hence it is mostly consumed fresh fig in European markets. Because of this situation and some promotions, recently the amount of production has been increased in Turkey. New orchards of Bursa Siyahı fig has been established in humid and irrigated areas especially coastline regions. Even so, after all these improvements in fig production and plantation, there has been a lack of nursery plants producing in terms of number and quality[1,2,5-7]. Fig nursery plants can produced by wood-cuttings. Two or three years old branches or matured one year old shoots are suitable for the production of fig nursery plants. One year old matured shoots or branches are chosen and prepared as cuttings, then cuttings are planted into the rooting beds or orchards in spring and allowed to rooting[5,8-12].

However, nursery plants production is limited by this way due to drying and dying out of the cuttings in short time. Also, cuttings can be easily rooted in rooting units. But, this production way is not preferred due to damage on the roots during uprooting, transferring and replanting of the nursery plants[13,14]. This is the major problem that hinder the productive production of fig nursery plants.

The purpose of this study was to improve the quality and production productivity of nursery plants of Bursa Siyahı fig cultivar.

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MATERIALS AND METHODS

This research was carried out in Aydın province between (2002-2003) in Turkey. The top portion of One year old shoots were used as cuttings.

Bursa Siyahı figs are quite big in size and dark purple in colour. They are consumed as fresh. They are considered to be best fresh type of the world. They can be grown in watery areas without any sugar leakage and ripen in September. The Bursa Siyahı figs are the mostly consumed fresh figs in the European markets[2,6,7]. The top portion of One year old shoots were used as cuttings.

The effects of six different applications on quality and production productivity of nursery plants were investigated in this study. Applications are; the direct planting of cuttings into plastic mulched beds, under high tunnel; 1) planting of the cuttings which were rooted in bottom heated and top fogged rooting unit, into the under high tunnel beds; 2) planting of cuttings which were rooted in small pots into under high tunnel beds; 3) direct planting of rootless cuttings into bottom heated under high tunnel beds; 4) planting of rotted cuttings into open land beds; 5) direct planting of rootles cuttings into open land beds; 6) (control, classic way of producing).

Shoots were taken in length 20-25 cm in February and kept in wet river sand up until planting time. Production beds were designed 50 cm in width and 15 cm in height. Production beds were fertilized with 0.5 m^3 manure per 10 m^{-2} and 50 g of (15+15+15) N, P, K, compose fertilizer per m^2. Bottom heated beds were prepared by the insertation of two heating wires at 30 cm gap and 30 cm depth. The temperature were adjusted at 25°C. Mulched production beds were covered with black polyethylene mulch cover. Cuttings were prepared 20-25 cm in length and treated with fungicide then planted in March. Planting of cuttings in bottom-heated and fogged rooting unit and small pots (filled perlite) were planned as four replications. Twenty five pieces of cuttings were used for each replications (4x25). Cuttings were planted in rooting unit with a distance of 2.5x4 cm. Cuttings were planted in rooting unit and small pots by embedding half of cuttings into perlite and fogged, periodically. Rooting unit temperature was adjusted at 25°C. Cuttings which were rooted in rooting units or small pots were counted to determine the rooting rate then rooted cuttings were planted into the beds. Planting of cuttings into the production beds covered or uncovered were carried out by triple replication process. Twenty five pieces cuttings were used each replications. Cuttings were planted in beds by leaving the tips of the shoots in open air. Small pots and rooting unit rooted cuttings were planted into production beds after they had grown 2-4 leaf stage. All cuttings were planted in production beds with a distance 25x25 cm. Under high tunnel applications were fogged, periodically. All production beds were irrigated by drip irrigation system.

All nursery plants which taken from each applications were counted to determine the Numbers of Nursery plants. Nine pieces nursery plants were randomly chosen from each application in each year for measurements and statistical analysis. The Nursery plants Heights (NH), Trunk Diameters (TD), Trunk Fresh Weights (TFW), Trunk Dry Weights (TDW), Root Fresh Weights (RFW), Root Dry Weights (RDW), Numbers of Roots of each nursery plant (NR), Root Lengths of each nursery plants (RL) were determined.

Heights of nursery plants and lengths of the roots were measured by tape-measure. The trunk diameter was determined by an electronic compass at a 5 cm distance from the soil surface. When counting the numbers of the roots, 2 mm in diameter or thicker roots were taken into consideration. After all these measurements, roots and trunks of nursery plants were separated for the fresh and dry weights measurements. Fresh and dry weights were measured with 0.01 electronic balance. Dry weight measurements were carried out after a period of 48 h incubation of roots and shoots at 60°C in etuve. All data was analysed with analysis of variance by using SAS.

RESULTS AND DISCUSSION

Bursa Siyahı cuttings were showed average 93% rooting rate in rooting unit and small pots for each years. This finding correlates with previous studies which are suggesting that fig cuttings are highly rootable[13-15]. Third application gave average 31 number nursery plants, this result indicated that rooting of the cuttings in small pots which were filled with perlite has been effective on the survival and establishment of the plants due to keeping the roots when uprooting and replanting. Fourth application were gave 27 nursery plants. Its concluded that bottom heating were stimulate rooting of the cuttings by heating the soil which cuttings were inserted. Second and fifth applications gave sequentially 37 and 31 nursery plants. Lower values in the second and fifth applications were due to the damage which occurred during the uprooting and replanting of perlite rooted cuttings and the adaptation stress for the producing beds. This findings correlate with previous studies. It was noted that when cuttings were rooted in perlite rooting unit, they did not survive and resulted in a high loss when later planted into different places[13-15]. Sixth applications gave 40 number nursery plants. It is concluded that the lower value in sixth application were due to adaptation

Table 1: LSD groups of features for each applications

Applications	Height (cm)	TD (cm)	TFW (g)	TDW (g)	RFW (g)	RDW (g)	NR	RL (cm)
1	125.08^{a}	2.30^{a}	297.79^{a}	198.74^{a}	46.75^{a}	26.89^{a}	4.98^{ab}	52.39^{a}
2	112.16^{ab}	1.52^{b}	220.98^{ab}	113.37^{b}	18.83^{b}	9.74^{b}	3.61^{b}	40.33^{bc}
3	112.7^{ab}	2.06^{a}	275.44^{a}	170.94^{a}	52.87^{a}	21.94^{a}	5.83^{a}	47.38^{ab}
4	96.09^{abc}	1.5^{b}	147.33^{b}	51.51^{c}	18.24^{b}	8.12^{b}	3.22^{b}	41.10^{bc}
5	81.60^{bc}	1.75^{b}	150^{b}	98.66^{b}	18.26^{b}	8.30^{b}	3.94^{b}	32.16^{d}
6	75.97^{c}	1.76^{b}	176.49^{b}	91.55^{b}	20.43^{b}	8.09^{b}	3.89^{b}	37.72^{cd}
LSD 0.05	34.08	0.27	92.86	38.68	13.93	8.13	1.68	7.45

TD: Trunk Diameter, TFW: Trunk Fresh Weight, TDW: Trunk Dry Weight, RFW: Root Fresh Weight, RDW: Root Dry Weight
NR: Numbers of Roots and RL: Roots Lengths

difficulties of the rootless cuttings to the environmental conditions. First application gave 54 numbers nursery plants, it is the highest number in application.

The first application has the highest value for the plant height but there were no considerable differences between first, second, third and fourth applications and all of them are in the same statistical group (Table 1). However, there were considerable differences between the first and second with fifth and sixth applications for the plant heights. First application has the highest values for trunk diameters, root fresh weights and root dry weights but first and third applications are in the same statistical group and there are not staistically differences between them. For trunk fresh weights first and third application have the highest values and both are in the same statistical group together second applications. The fourth applications has the lowest value for trunk fresh weights. Also, first and third applications have the highest values for the trunk dry weights and both are in the same statistical group. Third application has the lowest value for trunk dry weights. Third application has the highest values for the number of roots. but there were no statistically differences between first and third. Also, first application has the remarkable highest value for RL. When compared all applications, the first application has the highest values for the features which analised in study including nursery plant numbers (Table 1).

These findings indicated that polyethylene mulch covering were more effective on quality and numbers of nursery plants. There is a clearly relation between mulching and rooting. Mulching has a remarkable effect on the rooting, growing and survival of the cuttings. It is concluded that mulching stimulates rooting, establishment and growing of the cuttings by the way keeping soil moisture, temperature and weed growing. These results are in agreement with previous studies. According to Kuznetsov *et al.*[16] who studied with sea buckthorn cuttings (Hipophae rhamnoides), dark polyethylen mulch had a beneficial effect on rooting. Salman and Gorski[17] noted that black plastic mulch cover increased the soil temperature above that of bare soil and efficient in maintaining soil moisture than clear plastic. According to, Schonbeck and Evanylo[18] Black plastic mulch increased the soil temperature and yields were generally highest with black plastic mulch. Also, Raman *et al.*[19] who studied various field crops noted that soil temperature was higher with plastic mulch. It was noted that mulched plants grew faster and gave more yield than unmulched and evaporation was reduced by mulch[20-22]. Hochmuth and Howell[22] studied with sweet potato noted that jewel were significantly higher in mulched plants than unmulched. Lourduraj *et al.*[23] noted that plastic mulching significantly increased yield and the plastic mulch was very effective at controlling weeds. According to Ells *et al.*[21] who studied *Cucurbita pepo* mulching and full irrigation treatments resulted in the highest yields.

Results showed that the best way of producing nursery plants was application number one. (direct planting of wood-cuttings into mulch covered beds under fogged high tunnel) for the quality and the number. Although applications 3 and 4 gave a high number of nursery plants neither the quality nor the numbers were as good as the first applications.

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