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Propagation of Strawberry Plants in Pots: Effect of Runner Order and Rooting Media

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ABSTRACT

This study was carried out to establish a system for the propagation of good quality strawberry plants. Runner plants of strawberry cultivars Brio, Selva, Pocahontas, Redchief and Tufts, were layered in conical yellow pots, which contained three different rooting media (1:1:1 soil:straight cow manure:sand as a control; 1:1 peat: perlite + nutrients as first rooting medium; and 0.75:1:1:0.5:0.75 soil:peat:perlite:sand: straight cow manure + nutrients as second rooting medium), without excising from the mother plants. Within the cultivars, the best results were obtained from the second node and rooting media 1 and 2 in cv. Brio; from the first node and rooting medium 2 in cvs. Pocahontas and Tufts; from the first node and rooting media 1 and 2 in cv. Redchief. Although no differences were observed in cv. Selva with respect to rooting media, differences were obtained in terms of nodes.

Key Words: ***Fragaria x ananassa,*** **runner, rooting medium, cold-stored runner plants.**

INTRODUCTION

The cultivation of strawberry which is well-adapted to various climate and soil conditions is carried out in an area of 9700 hectares in Turkey and 117 000 tons of produce is obtained from this area (Anonymous 2003).

In Turkey, the structure of strawberry production varies depending on the ecological features, consumption and evaluation habits of the region, similar to other fields of agriculture. Recently, increasing demand to deep-frozen fruits in domestic and export markets has led to an increase in strawberry production. However, strawberry growing concentrates only in a few regions in Turkey, due to the lack of high-quality strawberry runner plants production. Cold-stored strawberry runner plants are particularly preferred in the Mediterranean Region of Turkey in order to obtain early yield (Kaska et al 1979). Obtaining strawberry runner plants is the most common method of strawberry runner production.

The raising of strawberry runner plants has been started by Yalova – Ataturk Horticultural Research Institute by the early 1970's, but growers demand has been met in Pozantı Farm of Cukurova University from the early 1980's. However, this practice was abandoned due to high labor costs especially in the last decade.

In recent years, the development of strawberry growing, in the open field and under plastic tunnels, in the Mediterranean and the Aegean regions of Turkey has led to the appearance of new strawberry runner plant growers. However, the runner plant production is limited to ecological conditions. Therefore, growers have difficulties in obtaining sufficient runner plants of high quality (Kaska et al 1984). Moreover, growers often propagate runner plants from their own stocks. This application has mostly been the main reason of lower fruit yield and quality in strawberries (Turkben et al 1997).

Therefore, the aim of this study was to produce high quality runner plants from mother strawberry plants of different cultivars.

MATERIALS AND METHODS

This study was carried out in the Research Station of Uludag University with the soil properties given in Table 1.

Table 1. Soil properties (0-30 cm) of the research field.

Organic matter (%)	Calcium carbonate (%)	Texture			Soil (pH)	Salinity (Ec :µmhos/cm)
		Sand (%)	Clay (%)	Silt (%)		
2.32	0.61	25.52	47.20	27.28	7.88	311.0
			Clayish			

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Mother plant preparation and planting

In this study, the strawberry cultivars Brio, Pocahontas, Redchief, Selva and Tufts were used. The runners which would be the mother plants were uprooted in rest period in December from the plants that were grown for strawberry production in the previous year.

These runners were washed with tap water and their old leaves were removed before dipping for 5 seconds in the 0.1% Benomyl solution. Then these runners were put into the plastic bags and stored at 0± 1°C with 85-90% relative humidity. After about 5 months of storage, these runners were planted at 40 x 80 cm row spacing into the field of the research station on May 15.

The applications mother plants and obtaining runner plants

Each mother plant in the trial was allowed to produce 4 runners per plant and 3 plants on each runner (Figure 1). The nodes, still attached to the parent stolon, were pinned down into the conical yellow pots containing three different rooting media: 1:1:1 soil:straight cow manure:sand (control); 1:1 peat: perlite + nutrients (1st rooting medium) and 0.75:1:1:0.5:0.75 soil:peat:perlite:sand: straight cow manure + nutrients (2nd rooting medium) (Bunt 1976; Seniz 1984).

The runner plants were separated from the mother plants in November, and plant height, root length, root number, fresh root weight, dry root weight, crown diameter and fresh plant weight were measured. The experiment was set up using a three-factor factorial design with 3 replicates, containing 21 mother plants in each replicate. Statistical analyses of variance (Minitab) and LSD tests (mean separation of significant differences) were conducted at 0.01 confidence level by the use of MSTAT-C computer program.

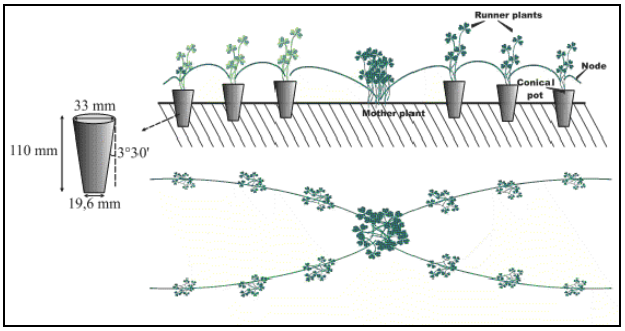

Figure 1. The view of the runner plants obtained from the mother plant

RESULTS AND DISCUSSION

The some factors affecting runner plant yield and quality are plant growth regulators (Barrit 1974; Soetardo 1979; Libari and Noto 1980; Braun and Kender 1985; Franciasi et al 1985; Wang 1992), altitude (Pırlak et al 2002) and some cultural applications (Anna and Iapichino 2002).

We investigated the effects of different runner order and rooting media on runner plants. No difference was determined among the node and rooting media treatments in root length, except 1st node-control and 3rd node-control applications in cvs. Brio and Selva, respectively (Table 2). Agaoglu (1986) also reported similar results. But it was determined that 1st node-control application were different from 2nd node-2nd rooting medium application in cv. Brio and 1st node-2nd rooting medium were different from 3rd node-control application in cv. Selva. Root number and dry weight were generally highest in the 1st node-2nd rooting medium and lowest in the 3rd node-control treatment. When the root dry weights of cultivars are compared, the highest value was obtained from cv. Tufts with the application of 1st node-2nd rooting medium, while the lowest was obtained from cv. Pocahontas with 3rd node-control application. Anna and Iapichino (2002) stated that they did not find any evidence of enhanced rootability of terminal runner tips in two strawberry cultivars. These conflicting results could be due to different rooting media used.

When crown diameter, which is one of the most important characteristics determining the runner plants quality, was evaluated, the highest value was obtained from the application of 1st node-2nd rooting medium in all cultivars expect cv. Red Chief, whereas the lowest was obtained from control medium. Moreover, these values were found to be much higher than those determined by Yilmaz et al (1996).

With respect to parameter of fresh plant weight, generally rooting medium conditions gave higher result according to controls in all cultivars.

Table 2. Effects of node position and rooting medium on root length, number and dry weight, crown diameter and plant fresh weight in five strawberry cultivars

Cultivar	Node	Rooting medium	Root length (cm)	Root number	Dry root weight (g)	Crown diameter (cm)	Fresh plant weight (g)
BRIO	I	Control	8.70 ef	14.0 ıj	15.8 d-h	0.81 g	107.3 ıj
		1	10.94 a-f	24.0 b-j	21.8 a-h	1.06 a-g	152.5 c-j
		2	10.16 a-f	22.0 c-j	21.1 a-h	1.06 a-g	159.3 b-j
	II	Control	10.52 a-f	15.0 hıj	15.4 e-h	0.80 g	104.0 j
		1	11.88 a-d	29.0 a-g	25.0 a-g	1.04 a-g	227.0 a-e
		2	12.17 abc	29.0 a-g	28.4 abc	1.14 a-g	214.2 a-h
	III	Control	10.29 a-f	17.0 e-j	18.5 b-h	0.83 fg	135.7 d-j
		1	10.65 a-f	20.0 d-j	17.4 d-h	0.92 b-g	135.7 d-j
		2	9.45 c-f	18.0 e-j	16.6 d-h	0.90 c-g	176.8 b-j
SELVA	I	Control	11.23 a-e	19.0 d-j	19.6 a-h	1.08 a-g	161.7 b-j
		1	11.22 a-e	25.0 a-j	19.9 a-h	1.18 a-g	193.5 a-j
		2	12.59 a	27.0 a-j	26.4 a-e	1.30 ab	221.3 a-f
	II	Control	11.77 a-d	21.0 c-j	20.8 a-h	1.06 a-g	174.2 b-j
		1	12.15 a-d	25.0 a-j	19.7 a-h	1.08 a-g	181.5 b-j
		2	11.99 a-d	26.0 a-j	22.6 a-h	1.06 a-g	179.0 b-j
	III	Control	9.66 b-f	17.0 f-j	17.2 d-h	0.86 d-g	118.1 g-j
		1	11.97 a-d	24.0 b-j	18.9 b-h	1.10 a-g	159.7 b-j
		2	12.43 ab	25.0 a-j	23.1 a-h	1.16 a-g	162.1 b-j
POCAHONTAS	I	Control	11.19 a-f	16.0 f-j	17.6 c-h	0.86 d-g	116.1 hıj
		1	11.17 a-f	26.0 a-j	22.1 a-h	1.07 a-g	217.7 a-g
		2	12.47 ab	34.0 abc	24.2 a-g	1.19 a-g	172.7 b-j
	II	Control	11.19 a-f	21.0 c-j	19.9 a-h	0.89 c-g	128.4 e-j
		1	10.55 a-f	16.0 g-j	15.1 fgh	0.98 b-g	122.2 f-j
		2	10.80 a-f	23.0 b-j	19.4 a-h	1.10 a-g	140.0 d-j
	III	Control	10.82 a-f	20.0 d-j	20.1 a-h	0.83 fg	132.0 d-j
		1	9.23 def	21.0 c-j	20.4 a-h	0.82 g	136.5 d-j
		2	8.26 f	13.0 j	13.1 h	0.90 c-g	118.9 g-j
REDCHIEF	I	Control	12.29 abc	33.0 abc	26.0 a-h	1.26 a-d	201.4 a-j
		1	11.85 a-d	30.0 a-f	26.3 a-c	1.29 ab	242.1 ab
		2	12.19 abc	36.0 ab	22.9 a-h	1.24 a-e	256.5 ab
	II	Control	12.13 a-d	25.0 a-j	24.3 a-g	0.86 d-g	156.2 b-j
		1	11.75 a-d	28.0 a-g	25.4 a-f	1.18 a-g	205.5 a-ı
		2	11.88 bcd	30.0 a-f	14.3 gh	1.22 a-f	215.1 a-h
	III	Control	10.96 a-f	21.0 c-j	21.9 a-g	0.82 g	164.3 b-j
		1	12.46 ab	26.0 a-j	24.7 a-g	1.14 a-g	196.7 a-j
		2	12.56 ab	32.0 a-d	19.9 a-h	1.14 a-g	200.1 a-j
TUFTS	I	Control	12.68 a	30.0 a-f	28.9 ab	1.19 a-g	207.1 a-ı
		1	11.58 a-e	25.0 a-j	30.6 a	1.43 a	226.6 a-e
		2	12.58 ab	38.0 a	18.2 b-h	1.43 a	283.7 a
	II	Control	10.52 a-f	24.0 b-j	26.6 a-d	1.02 b-g	192.9 a-j
		1	11.76 a-d	26.0 a-j	26.5 a-d	1.19 a-g	210.8 a-h
		2	11.02 a-f	25.0 a-j	17.4 c-h	1.23 a-e	229.4 a-d
	III	Control	10.28 a-f	27.0 a-j	24.9 a-g	0.97 b-g	152.1 c-j
		1	12.22 abc	26.0 a-j	19.7 a-g	1.15 a-g	182.3 b-j
		2	11.80 a-d	26.0 a-j	11.8 a-d	1.15 a-g	191.6 a-j

Anna and Iapichino (2002) also found that total fruit production from primary, secondary or tertiary plug plants were comparable. Therefore, further studies will be conducted in our research station to better understand the effects of rooting medium and runner order on strawberry yield and quality.

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