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# CUTTINGS PROPAGATION OF SOME FIG GENOTYPES (*FICUS CARICA*)

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## Introduction

Fig plants are cultivated on a large scale in tropical, subtropical and warm temperate areas of the world, especially in Morocco, Syria and Italy. Turkey is, however, the largest producer of dried figs (Sinha, 2003). Despite its varietal diversity, fresh fig is still considered as a minor fruit in trade with Mediterranean countries (Mavsar et al, 2008).Fig plants are spread in many regions of Romania, especially in the south parts, and their fruits are very much appreciated by the consumers. Unfortunately, the offer of plant material is very low on the market. Some of the major challenges for the fig plants are the resistance to winter frost and the quality of fruits. Being considered a species of interest for Romania, many authors have presented over the years the biology and the peculiarities of the fig tree culture.Cepoiu et al (2005) mention in their book "Practical Fruit Growing" that in the climatic conditions of Romania, the fig plant can be cultivated only protected over winter with different materials or at the shelter of some buildings. In ”Pomology”, Hoza (2000) states that in our country the fig tree culture has developed in southern Banat, southern Oltenia and its sub-Carpathian depression, Dobrogea, as well as around the main cities in the west and south of the country. In these areas, local varieties or varieties are grown, producing 1-2 crops per year depending on climatic conditions. In most crop areas, the fig plant is protected during winter and, if planted in sheltered places, it can withstand even without protection. In plantations, plants need 4-5 m between rows and 2.5-4.0 m per row. In Romania it is grown in the garden next to the house, with promising results in winter protected areas (Stănică et al, 2011). A perennial woody plant, the fig plant behaves like a shrub or even a tree in the conditions of Romania, and in the pedoclimatic conditions in Iraq it can reach heights up to 12 m (Ghena et al, 2004). Due to the natural capacity of the species to form roots on sliced and rooted portions of the plant, the fig plant can be successfully multiplied by the vegetative method by means of coventional methods, such as by dry or green cuttings. (Stănică F., 2002). Fig plant is multiplied vegetative by slips, cuttings or grafting. Because it has great rooting capacity, dry cuttings is the most used method in nurseries (Hoza, 2002, Grădinariu, 2002).This paper presents the first result of the cuttings propagation of some genotypes of fig (*Ficus carica*) using an integrated system of basal heating with artificial fog.

## Materials and Methods

In the research project of identification, monitoring and propagation of valuable fig genotypes, more cuttings were collected from different fig genotypes and different regions of Romania and Iraq.

Green and dry cuttings were used and planted in benches for rooting with basal heating, in the greenhouses of the Research Center for Studies of Food and Agricultural Products Quality at the University of Agronomic Sciences and Veterinary Medicine of Bucharest. Different substrates: sand + perlite 70:30, sand + perlite +sawdust, perlite + peat + marc, wood chips with perlite, sand + perlite60:40 were used.After rooting, the new obtained plants were transferred in pots and grown under controlled conditions (cold glass houses). In the same time, part of the collected biotypes are planted in four testing plots at Pietroasa Viticulture and Wine Processing Research Station, Dăbuleni Research Station, Fruit Nursery and Farm Istrita in Buzau county and Svinița Village, Mehedinți. All the plants are monitored.

***Green cuttings:*** consists in cutting some pieces of seedlings of 13-15 cm, leaving the upper leaves unsteady and the rest of the leaves out. The cuttings thus obtained are inserted into the rooting bed at a depth of 10-13 cm. They are regularly wetted, requiring a humidity of 96-98% and a temperature at the cutting level of 20-22 degrees Celsius.

Cuttings are kept inside the rooting bench for 150-160 days after which they are carefully removed without breaking the roots. Depending on the degree of root development, the cuttings are planted in pots with a diameter of 15-20 centimeters.

***Dry cuttings*:** it is harvested after the fall of the leaves from November to the beginning of March. An important aspect to be taken into account when harvesting shoots during the cold period is the degree of freezing during the winter. The cuttings are shorten to 13-15 cm and inserted into the substrate at a depth of 11-13 cm. The rooting bench in the dry place is placed in a heated greenhouse, watering can be done manually or automated with a sprinkler system.

***The rooting bank*** for green cuttings is made of an aluminum vat about 20 centimeters deep above which is mounted an arcade system that supports a shading net that ensures future plants maintain humidity and a temperature easier to control . Also on the arcade system is mounted the artificial fog system which is connected with a device called "artificial leaf" with the purpose of starting and stopping the irrigation system. The biological material studied consists in different genotypes (Table 1).

## Tables and pictures

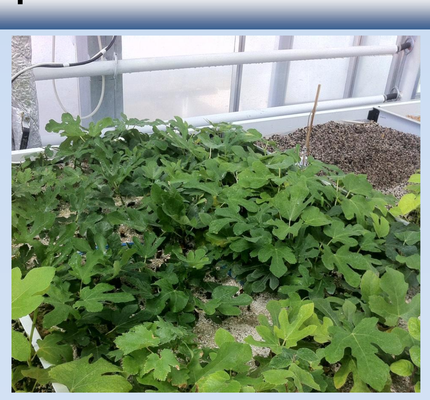

**Figure 1. Fig plant cuttings detail**

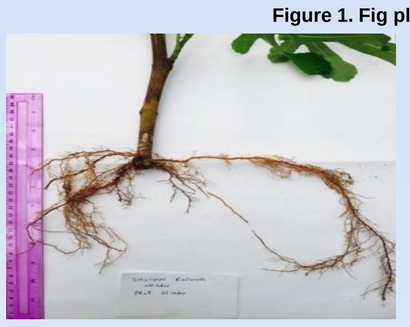

**Figure 2.Rooted cuttings detail**

**Table 1. Fig genotypes**

| Variant | Genotype | Origin |
|---|---|---|
| V1 | Secuilor 1 | București, România |
| V2 | Secuilor 2 | Bucuresti, România |
| V3 | Negoiești 01 | Prahova, România |
| V4 | Str. Ștefan cel Mare | București, România |
| V5 | Muzeul Storck | București, România |
| V6 | PH Corno | Prahova, România |
| V9 | Sebus | Oradea, Bihor, România |
| V10 | Stoica Dan | Mangalia, Romania |
| V11 | Galben mare Giurgiu (Braniștea G.) | Giurgiu, Romania |
| V17 | Olimpia Tm | Timișoara, Romania |
| V18 | Smochin negru | Ploiesti, Prahova, Romania |
| V21 | Str. Părintele Stăniloae | Bucureşti, România |
| V28 | Brazi | Str. Trandafirilor, Brazi,Prahova, România |
| V34 | Rot negru Otiman | Sviniţa, CS, România |
| V42 | Irak 1 | Kerkuk, Irak |

**Table 2. Rooting results on fig genotypes**

| Variant | Lenght (cm) | Roots (no) | Average length (cm) |
|---|---|---|---|
| V5 | 40.33 | 7.33 | 5.23 |
| V9 | 86.67 | 9.67 | 8.57 |
| V11 | 87.50 | 10.00 | 5.54 |
| V17 | 35.40 | 5.80 | 6.04 |
| V21 | 95.50 | 11.10 | 8.78 |
| V28 | 75.33 | 11.67 | 6.54 |
| V34 | 84.67 | 9.00 | 9.77 |

**Table3.Rooting percentage of cuttings depending on the substrate used in the bench**

| No. | Number of banks (substrate type) | Percentage of success(%) |
|---|---|---|
| 1. | Bank I sand + perlite (70:30) | 61.87 |
| 2. | Bank II sand + perlite + sawdust | 30.00 |
| 3. | Bank III perlite + peat + marc | 21.76 |
| 4. | Bank IV sand + perlite (60:40) | 44.50 |

**Table 4.The degree of rooting according to the type of cuttings**

| No. | Cuttings type | Initial cuttings (no) | Final rooted cuttings (no) | Rooting percentage (%) |
|---|---|---|---|---|
| 1. | Green | 490 | 72 | 14.69 |
| 2. | Dry | 920 | 387 | 42.07 |

**Table 5.The influence of shading on survival percentage of transplanted cuttings**

| No. | Growth conditions | Cuttings into pots (no) | Viable cuttings after two weeks (no) | Rate % |
|---|---|---|---|---|
| 1. | Sun | 55 | 34 | 61.81% |
| 2. | Shadow | 144 | 129 | 89.91% |

## Results and Discussion

The results obtained were synthesized in the following tables and graphs. Five months after planting in rooting lawns (Figure 1), the cuttings were transplanted into pots and analyzed the following: the percentage of viability of the plants obtained, the number of roots formed and their length, the size of the cuttings. Table 2presents the number of roots formed by genotype and their size, 5 months after planting in the rooting bed (Figure 2). V21 genotype presented the best parameters followed closed by V11, V9 and V34 genotypes.

As a result of the vegetative propagation activities of fig plants, the influence made by the composition of the substrate in the rooting process was made (Table 3). From the measurements made it was found that the substrate in which perlite and sand is in the ratio of 30:70 proved to be the best substrate for this type of propagation, confirming the authors cited (Stănică et al, 2002; Hoza, 2000).

In order to observe the most effective method of propagation, the percentage of those who formed viable roots was transcribed when rooted cuttings were planted in pots. Thus, for the genotypes studied as a vegetative propagation method, the dry one, which had a rate of 42.07%, is favorable as opposed to the one in the green which has a percentage of 14.69%. (Table 4) Depending on the sun's exposure during the first two weeks of transplantation, the plants responded differently. They have undergone two different situations. One of the situations requires the plant to be exposed in full sunshine, and in the second plants it is protected from the sun's rays (Table 5). As a result of the measurements made it was found that the sun exposure of the plants transplanted on the pots is not indicated, so that at this stage the fig plants have to be sheltered from the direct sun rays in accordance with the results presented by Stănică et al, 2002.

Two years later measurements were made on plant growths, foliar surfaces, and the number of fruits obtained.In Table 6 one can observe the measurements made on pot plants. It can be noticed that the largest length of the plants was made at genotypes V6 and V11 (71.8 cm).

The largest number of shoots was formed at genotypes V2 and V4 (4.2).The average number of leaves per plant had values between 8.0 for genotype V42 and 17.80 for genotype V4. Most genotypes have fruits, but the average value did not exceed 5 fruits per plant.The highest value was recorded in genotypes V3 and V18 (4.25).

## Conclusion

For the fig genotypes studied the best vegetative propagation method is dry cuttings instead of green cuttings.

The substrate in which perlite and sand is in the ratio of 30:70 proved to be the best substrate for this type of propagation. After transplanting the plants in pot, they have to be put in a shadow space for better results.

V21 genotype presented the best rootingparameters followed closed by V11, V9 and V34 genotypes.

After two years in pots, several parameters were analysed to the studied genotypes. This study is completed with the morphological one made on the obtain plants (Ahmad et al, 2017).

**Table 6.Measurements made of potted plants**

| Variant | Length (cm) | Shoots (no.) | Leaves (no.) | Fruit (no.) |
|---|---|---|---|---|
| V1 | 52.60 | 3.20 | 12.80 | 2.60 |
| V2 | 54.40 | 4.20 | 14.80 | 1.00 |
| V3 | 63.00 | 1.62 | 14.00 | 4.25 |
| V4 | 53.40 | 4.20 | 17.80 | 2.20 |
| V5 | 60.85 | 1.57 | 13.43 | 1.28 |
| V6 | 71.87 | 1.50 | 10.37 | 2.50 |
| V10 | 54.20 | 1.40 | 15.40 | 2.40 |
| V11 | 71.80 | 1.60 | 12.40 | 2.40 |
| V18 | 4.20 | 2.20 | 8.30 | 4.25 |
| V34 | 46.25 | 2.00 | 11.50 | 1.75 |
| V42 | 21.75 | 1.50 | 8.00 | 1.25 |

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