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VEGETATIVE PROPAGATION OF *ROBINIA PSEUDOACACIA* L.

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ABSTRACT

This paper reports preliminary results on the propagation of *Robinia pseudoacacia* L. with hardwood and softwood cuttings. The research was carried out in the greenhouse on cuttings of trees selected in Macedonia, Greece and one spherical, sterile and spineless clone. The hardwood cuttings were of different age and size and before planting they were treated with various root promoting chemicals and solutions. The green cuttings were treated only with the solution 2000 ppm of the IBA chemical and tested in two rooting media. The results were variable depending on the kind of cuttings, the pretreatment, the rooting media and the clone. The green cuttings produced from the spherical and spineless clone were the most successful among all clones and cutting tested.

INTRODUCTION

Robinia pseudoacacia, a multi-purpose, nitrogen-fixing tree species, native of North America has been naturalized throughout Europe, Mediterranean region and temperate zone.

It is also a fast growing tree, the second most extensively planted after eucalyptus species among the fast growing broad leaf trees (Keresztesi, 1980).

Robinia is mainly propagated by seeds, an easy and very cheep way of propagation. But since the seed-raised plants present a great genetic variation, this type of propagation can not be used for *Robinia*'s improved cultivars. *Robinia* can be propagated clonally by graftings and root or stem cuttings (mainly softwood cuttings). In addition, mass clonal propagation with *in vitro* methods, using as explant tissues from

various parts of the plant, seem to be very promising for this species (Barghchi, 1987; Keresztesi, 1988; Merkle *et al.*, 1989).

This paper reports about an effort made to propagate some selected genotypes of *Robinia* by hardwood cuttings in order to make use of the winter period and by softwood cuttings in early summer.

MATERIAL AND METHODS

Propagation by hardwood cuttings

Hardwood cuttings were collected from two individuals (A and B, 25-30 years old) of *Robinia*, found in Strymon valley at the end of November 1991. The cuttings were planted in a fog propagation bench in the greenhouse the following day after the collection. The treatments applied were:

- Dip in root promoting chemicals
    * IBA (2000, 4000 and 8000ppm), quick dip for 5''.
    * KIBA 2000ppm for 5''.
    * ALANINE 250ppm for 1' and 5'.

- Age of cuttings
    * one year old
    * two years old
- Dimensions of the cuttings (for each age)
    * thin
    * thick
- Control (one and two years old, thin and thick cuttings, without any dip in root promoting chemicals)

The number of cuttings in each treatment was not the same, depending on the available number of them.

As rooting medium, a mixture of peat and perlite 2:1 was used.

All the bases of the cuttings, before planting , were swirled around in a fungicidal powder (25% captan) after the application of the root promoting chemical. In addition, for

three weeks after planting, the cuttings were sprayed with a solution of benomyl and captan. The spraying was repeated after the leaf appearance of the majority of plants.

The propagation bench was cold, but heating of the greenhouse and additional lighting were applied.

Propagation by softwood cuttings (green or leafy cuttings)

Such plant material was collected from four different sources at the end of May - beginning of June 1992 and included:

(a) An ornamental clone of *Robinia* with spherical crown, which is quite spineless and sterile and is reproduced till now by grafting on common *Robinia* stock (Dini, 1991). A first lot of the cuttings was taken on April 27, 1992 and the second one on June 11, 1992 from a collection of trees planted in the FRI experimental farm. The cuttings were planted right after their collection.

(b) The two interesting individuals of *Robinia* grown in the Forest Service Nursery near Strymon river. The cuttings were collected and planted on June 2, 1992.

(c) An interesting individual (about 20 years old) with very long compound leaves near Nestos river. The cuttings were collected and planted on June 9, 1992.

The cuttings were transferred with special care to be maintained wet and turgid. They were planted a few hours after the collection in a fog propagation bench, using two different rooting media: a mixture of peat and sand 2:1, and perlite. Before planting, they were dipped for 5'' to a solution of 2000 ppm IBA.

RESULTS AND DISCUSSION

Propagation by hardwood cuttings

Three weeks after planting, the first leaves appeared on the top of the cuttings and they continued the development for 4 more weeks. The root establishment succeeded after two months

for some cuttings, but for the majority of the finally rooted after four months. The cold bench was probably the reason for this delay in rooting.

The final percentage of the hardwood rooting cuttings is shown in the following figures for both plant material sources, tree A and tree B.

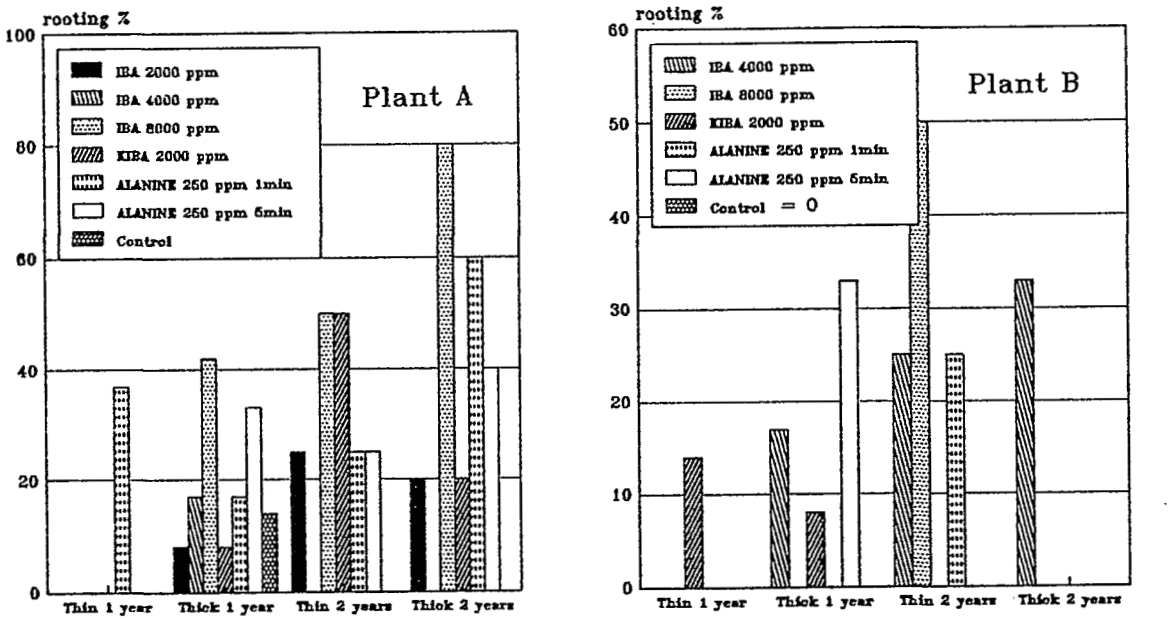

Fig.1 Percentage hardwood rooting cuttings of two sizes and ages.

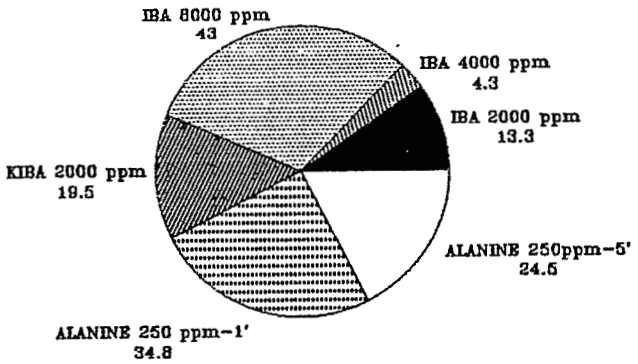

Fig. 2 Mean rooting percentage for each root promoting chemical

Due to the revealed lack of environmental uniformity in the propagation bench, the collected data were not suitable for statistical analysis. Nevertheless, some conclusions can be drawn.

- The root promoting chemicals were very useful, since the majority of control plants failed to establish roots. Only one out of 42 cuttings were rooted.
- The one year old, thin cuttings with a diameter of less than 5mm failed to establish roots and the leaves that had already emerged as well as the whole cutting got soon dried.
- In the remaining cuttings, the percentage of root establishment was 18% (41 out of 231 cuttings).
- Although the first roots were observed about two months after planting in some cuttings, the majority of the finally rooted cuttings was ready for transplanting after four and for some cases after five months.

This method of propagation seems to be, under these circumstances, expensive and not very effective, although it is very useful if one needs to save time using the winter period, as we wanted to.

Nowadays, this type of asexual propagation for *Robinia* is not mentioned at all and the only paper found was that of Fowells (1965) reporting 60% success in the field and 90% in the greenhouse. But , he also mentions that this method requires careful control of temperature during precallusing, careful control of moisture in the callusing medium and very careful handling during transplanting.

We tried propagation of *Robinia* directly in the field with hardwood cuttings in the past, but we did not have successful results.

Propagation by softwood cuttings

The first lot of *Robinia* cuttings (the spherical crown clone), planted on April 27, 1992 was favoured by mild temperatures during the critical precallusing period. The majority of cuttings (90%) started rooting within the two first weeks in

the part of bench with the perlite being the rooting medium and some days later in the medium with mixture of peat and sand. This clone seemed to root readily, especially in perlite. This rooting success may be inherent to the particular clone tested, since Papp (1976) reports that there are differences in propagation ability of different clones of *Robinia*. It also appears that perlite was a better rooting medium for the tested clone.

On the contrary, the rest of the plant material, including the second lot of the spherical crown *Robinia* clone, planted within the following two weeks, was not successfully rooted perhaps due to the higher air temperatures of that period , but mainly due to technical problems appeared in the bench. These problems resulted to a water stress of the leafy cuttings during the critical first days after planting and a gradual leaf falling and drying out.

The maintenance of the leaf turgor till good establishment of the roots is considered to be the critical point of the whole procedure for leafy cuttings in general (Hartmann *et al* 1983) and for *Robinia* in particular (Papp, 1976).

The water stress influenced also the already rooted cuttings of the spherical *Robinia* clone, and resulted to a final production of a very limited number of plants.

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