The Influence of Indole-3-Butyric-Acid in *Prunus laurocerasus* Vegetative Propagation

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PURPOSE OF THE STUDY

Fig. 1: The mother plant

Can we improve the vegetative propagation of the species ?

Auxin IAB

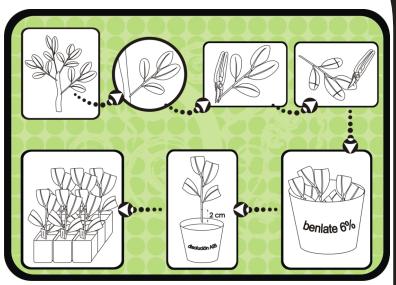
Which was the effect of different IBA concentration on rooting of cuttings ?

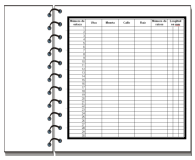
What was the influence in the quantity and quality of rooting ?

MATERIAL AND METHODS

Starting date: 15th April 2007
Where? Greemhouse ESACB
Number of cuttings: 150 (30 per treatment)
Treatments: Control
- 1000ppm IAB
- 2500ppm IAB
- 5000ppm IAB
- 7500ppm IAB

End: one month after bench cutting plantation





The measured parameters:
- Number of rooted cuttings (R)
- Number of cuttings with *callus* (C)
- Number of cuttings with mortality (M)
- Mean number of roots (NR) per rooted cutting.
- Mean main root length (MRL) per rooted cutting.

The experimental design:
- Block design, with each treatment replicated five times.
- Six cuttings per block, thus 30 per treatment

Statistical analyses of R, C and M:
- **Analysis of variance (ANOVA)**
- Mixed linear model: $Xij = \mu + Pi + Bj + eij$
- The angular transformation **arcsen √(p/100)** was applied to the percentage of R, C and M
- Duncan's multiple range test

Number of cuttings: i=1,...,k; -Number of block: j=1,...,m; -General mean: μ; -Fixed effect: Pi; -Random effect: Bj; -Experimental error: eij

Statistical analyses for the NR and MRL:
- Levene's test: no variances' homogeneity
- The non-parametric Kruskal-Wallis method.
- Mann-Whitney U for multiple comparison procedures

RESULTS

Effect of IBA concentration on rooting, callus formation and mortality:

- Rooting was independent of the IBA concentration, but significantly lower when no auxin was applied (Fig 2)
- The lowest and the highest concentration of IBA, 1,000 ppm and 7,500 ppm, had the highest rooting percentage; rooting ranged from 67 up to 80% in the IBA treated cuttings (Fig 2).
- Differences among treatments were not significant for the parameters callus and mortality, at a 5% level (Fig 2).

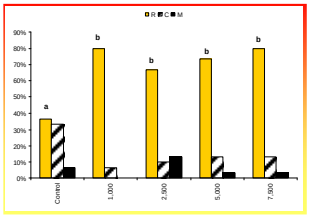


Fig. 2: Percentage of rooting (R), *callus* formation (C) and mortality (M) one month after cutting potting, per treatment. Different letters comply with significant differences (P≤0.05) with the Duncan test.

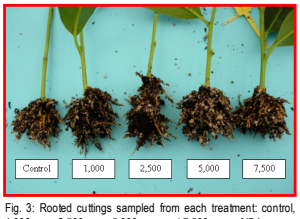


Fig. 3: Rooted cuttings sampled from each treatment: control, 1,000 ppm, 2,500 ppm, 5,000 ppm and 7,500 ppm of IBA.

Effect of IBA concentration on the number of roots and length of the longest root per rooted cutting:

- No differences were found among IBA treatments, with respect to the mean number of roots per rooted cutting, but they were all significantly different from the control (Fig. 3). The minimum was five roots in the control compared with a maximum of 27 NR in the treatment with the highest IBA concentration (Fig. 4).
- IBA-treated cutting had significantly longer roots per rooted cutting compared with the control. Without IBA, the MRL was, on average, 9.4 mm, and with auxin application it ranged from 18.4 to 24.7 mm (Fig. 5).

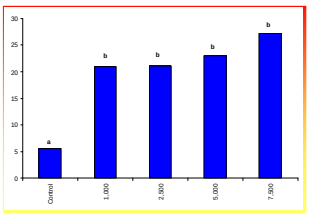


Fig. 4: Mean number of roots (NR) recorded in each treatment one month after cutting potting, per treatment. Different letters comply with significant differences (P≤0.05) with the Mann-Whitney U test.

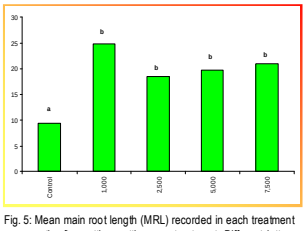


Fig. 5: Mean main root length (MRL) recorded in each treatment one month after cutting potting, per treatment. Different letters comply with significant differences (P≤0.05) with the Mann-Whitney U test.

CONCLUSIONS

- In all the studied parameters, except C and M, the control treatment was significantly inferior to the other ones.
- The NR and the MRL of the IBA-treated cuttings were significantly higher than the control: the regulator could provoke an earlier and/or faster root growth, which is important for rooting quantity and quality.
- The use of auxin in this species can be justified by the rooting rate increase, the higher volume of roots achieved, and the quicker production of more plants prone to have a good vigour and, in the conditions used in the current study, IBA should be applied at a concentration of 1,000 ppm.

References

Blazich F.A., Wright R.D., Shaffer H.E. 1983. Mineral nutrient status of 'Convexa' holly cuttings during intermittent mist propagation as influenced by exogenous auxin application. *J. Amer. Soc. Hort. Sci.*, 108:425-429.
Blazich, F. 1988. Chemicals and formulations used to promote adventitious rooting. p. 132-149. In: T. Davies, B.E. Haissig and N. Sankhla, (eds.), Adventitious Root Formation in Cuttings. Dicorides Press. Portland.
Coombes, A.J. 1992. Trees. Dorling Kindersley. New York.
Dirr, M.A. and Heuser, C.W. 1987. The reference manual of woody plant propagation: from seed to tissue culture. Varsity Press. Georgia.
Gaspar, T. and Hofinger, M. 1988. Auxin metabolism during adventitious rooting. p. 117-131. In: T. Davies, B.E. Haissig and N. Sankhla, (eds.), Adventitious Root Formation in Cuttings. Dicorides Press. Portland.
Hartmann, H.T., Kester, D.E., Davies, F. and Geneve Y.R. 1997. Plant propagation: principles and practices.6th ed. Prentice-Hall, Upper Saddle River. New Jersey.
Lopez González, G. 2004. Guía de los árboles y arbustos de la Península Ibérica y Baleares. 2nd ed. Ed. Mundi-Prensa. Barcelona.
Preece, J.E. 2003. A century of progress with vegetative propagation. Hortsience. 38: 1015-1025.
Ribeiro, M.M. and Antunes, M.A. 1997. Enraizamento de estacas de azereiro (*Prunus lusitanica* L. ssp. *lusitanica*) após realização de ferida e aplicação de auxinas. Congreso Forestal Español. Pamplona, Spain 21-27 June. 3:527-532.
Steel, R.G. and Torrie, J.H. 1981. Principles and procedures of statistics a biometrical approach. Mcgraw-Hill, Singapore.
Sokal, R.R. And Rohlf, F.J. 1981. Biometry. W.H. Freeman And Co., San Francisco.