

Field evaluation of the agronomic performance of soursop (*Annona muricata* L.) clones propagated through *in vitro* micrografting

Juan Jairo Ruiz³⁻⁸, Nelson Royero²⁻⁸, Francisco Arboleda³⁻⁵, Jorge Cabra¹, Diosdado Baena⁸, Joe Tohme¹
Alvaro Mejia-Jiménez¹

¹Project SB02; ²Corporación BIOTEC; ³Project supported by Pronatta; ⁵Independent consultant;

⁸Universidad Nacional de Palmira

Background:

Between 1996 and 1999, a methodology was developed for *in vitro* propagation of selected clones of soursop (or guanábano in Spanish, *Annona muricata* L.). This methodology consists in the *in vitro* micrografting of buds over rootstocks obtained from *in vitro* germinated seeds. The buds used are obtained either from shoots cultured *in vitro*, isolated from clones growing in the greenhouse or from micrografts produced previously (cyclic micrografting). *In vitro* propagation of plants offers many advantages over traditional methods of vegetative propagation, however some propagation methodologies have been shown to produce a variable proportion of abnormality in the growth of the plants, known as somaclonal variation. Somaclonal variants can be a real problem when *in vitro* propagation is used for supplying commercial plantations with planting material.

The occurrence of somaclonal variations in *in vitro* propagated plants has been attributed to genetic or epigenetic changes caused by the use of methodologies which involve cellular dedifferentiation, callus formation or direct production of adventitious buds.

Since in the soursop propagation process no adventitious formation of new buds is involved, and only the “natural” system of axillary bud re-growth is used for the production of new buds, no genetic changes are expected to occur in the propagated trees. However the induction of epigenetic changes such as pleiotropy or juvenility or simply root malformation (see George, 1993), can not be excluded.

In order to test if the developed propagation methodology is useful for producing true-to-type planting material, we started the evaluation of trees propagated through *in vitro* micrografting at CIAT and in farms located in different soursop producing zones of Colombia in February 2000.

Methodology:

The evaluated plants were obtained from the clone Elita (Rios Castaño and Reyes, 1996) micrografted over rootstocks of the same variety. These were planted in January 1999 in farms belonging to experienced soursop growers located in Huila and Valle or later at CIAT in February of 2000. At CIAT besides the micrografted plants, other plants produced through the traditional grafting method (kindly provided by the Profrutales nursery) were planted. Micrografted plants were 8 months old while normally grafted plants were 10 months old at the time of planting at CIAT. Preliminary data on parameters related to the vegetative growth of the trees, flowering, fruit set, production, and fruit quality have been collected while more detailed data collection is on going.

Results:

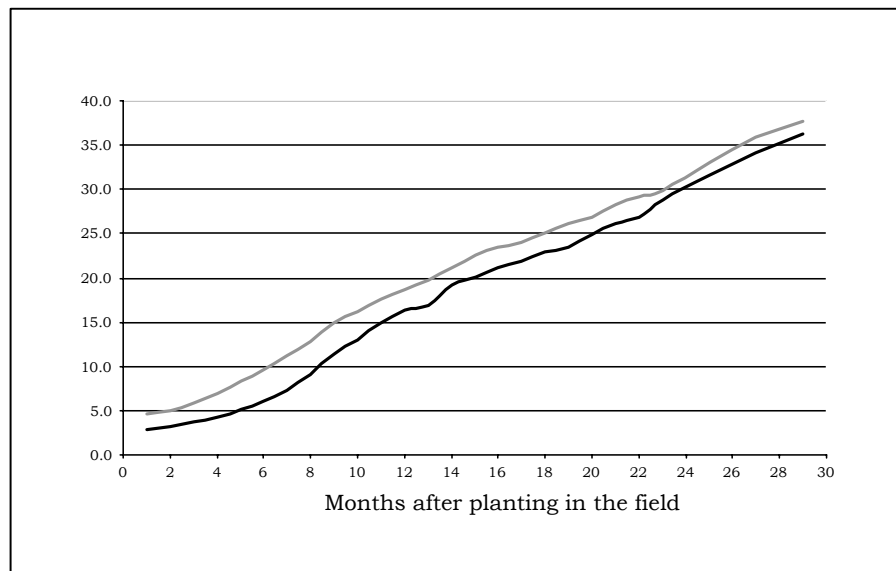
Comparison of effects of *in vitro* micrografting and traditional grafting methods on the vegetative growth of trees

In order to study if plants produced through *in vitro* micrografting are different from those produced through traditional grafting methods, the vegetative growth, fruit production and fruit quality of trees from the same genetic background and propagated through both methodologies are being evaluated at CIAT.

Tree height, volume of the canopy and perimeter at the grafting site, were taken as indices of vegetative growth during the first 12 months. But because the micrografted plants have to be pruned starting from the 12th month after planting (MAP) in order to initiate tree formation, from this time onwards only the perimeter of the stem could be taken into account, in order to have a reliable estimate of tree growth.

Until 30 MAP, the growth rates of the trees propagated through both systems are the same in the field. (Fig. 1). The small differences in size of the stems shown by the different propagation methodologies can be attributed to the differences in age and size of the trees at the time they were planted in the field.

Figure 1 Comparison of the vegetative growth of trees of the combination Elita/Elita propagated *in vitro* by micrografting (darker line) and through traditional grafting methodologies (lighter line), planted at CIAT in February 2000.



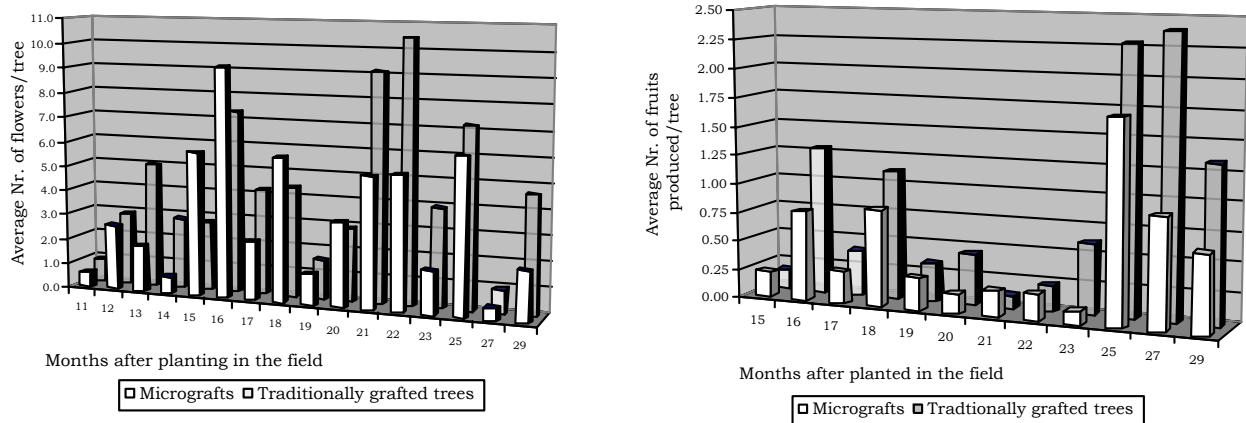
Comparison of flower set and fruit production of trees propagated by *in vitro* micrografting and by traditional grafting methods

Just as was the case with trees propagated by traditional methods, micrografted trees initiated flowering at 11 MAP and produced the first fruits at 15 MAP in the field. Trees propagated by both methods showed a cyclic behavior in flowering and fruit production, which possibly coincided with the seasonal climate changes at CIAT (Figure 2).

Although these are preliminary results because soursop trees stabilize their production only after 7 years of planting, the measurements made so far, led to the conclusion that

the plants propagated through *in vitro* micrografting suffered no delays in flowering and fruit production when compared to those propagated through the traditional methods.

Fig. 2 Flower and fruit production per tree of Elita/Elita micrografted plants planted in the field in



February 2000.

Field evaluation of new combinations of scions from selected clones and rootstocks of soursoap and related species

Hitherto, only plants from one combination of scion and rootstock (Elita /Elita) have been evaluated under different field conditions. During the first half of 2002, a total of 11 new combinations were planted at Yaguará (Huila) and La Esneda (Valle; Table 1). Additionally, more than 1400 trees of similar combinations will be planted in other locations at the end the year 2002 and the beginning of 2003.

Conclusions:

No genetic or epigenetic modification, which can be attributed to the propagation process, has been observed in any of the trees propagated through the *in vitro* micrografting method.

The *in vitro* micrografting propagation procedure is a safe method for producing genetically uniform and disease-free planting materials of this species.

Table 1 Micrografted plants of different combinations of scion and rootstocks planted for field evaluation during the year 2002 in farms belonging to experienced soursop growers

Scion	Rootstock	Quantity of plants
San Francisco, Yaguará - Huila		
Elita	Cristina	84
Elita	Rosa	68
Rosa	Elita	43
Rosa	Cristina	42
Elita	Elita	19
Cristina	Rosa	13
Cristina	Elita	9
Cristina	Cristina	8
Elita	<i>A. montana</i>	8
Rosa	Rosa	4
Rosa	<i>A. montana</i>	2
Total		300
La Esneda - Valle		
Cristina	Rosa	20
Cristina	Elita	20
Rosa	Elita	20
Elita	Rosa	20
Total		80

Future plans:

- The project from which this field evaluation has been funded (PRONATTA project No. 981763225) comes to an end in December 2002. This activity will be continued if additional funds are received.

References:

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