

Evaluation of the Productive and Vegetative Aspects of the Cultivar 'Imperial Gala' Apple Tree with EM-9 Interstem in Different Lengths

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Abstract

The obtaining of a compact plant, with less vigor and high productivity, equivalent to a conventional plant, constitutes a strong tendency in the current horticulture, aiming at a raising of the fruit production at the same planted area. One of the techniques that have had success nowadays is the interstem use. This study was developed in a commercial orchard of Randon Agro Silvo Pastoril S.A. (RASIP), located in the Rio Grande do Sul state, Brazil. The purpose of this work was to evaluate the vegetative and productive development of apple trees of 'Imperial Gala' with different lengths of EM-9 interstem. The treatments consisted of five interstem lengths: 10, 15, 20, 25, 30 cm. In the seventh year of implantation the following parameters were evaluated: the height of the plant, the diameter of the 'Imperial Gala' 5 cm above the second graft point, the volume of the tree-head (height, width and length), the number of bud per branch, and the number of fruits per lineal centimeter of branch. Through this study it could be concluded that the greater interstem (30 cm) presented better indices with relation of vigor control. However, the number of fruits per lineal centimeter of branch with the interstem of 10 cm offered only significant superiority, when compared with the interstem of 30 cm. Using interstem technique allows to gather the benefits of the rootstock 'Marubakaido' and to control excessive vigour with the interstem EM-9.

INTRODUCTION

The obtention of a compact plant, with less vigor and high productivity, equivalent to a conventional plant, constitutes a strong tendency in the current horticulture, aiming at a raising of the fruit production at the same planted area. One of the techniques that have had success nowadays is the interstem use.

The existent interdependence between the cup and the rootstock being known, it is easily concluded that the characteristics of the rootstock will strongly influence the cultivar, therefore the choice of the adapted rootstock is fundamental for the success of the culture. In plantings in high density, the rootstocks "vigour-control" are those that fully reach the objective of reducing the load of the plant. However, it presents the inconvenience of a form of root system which is very superficial, which demands a support system for the plants, increasing the costs of implantation of the orchard.

For the culture of the apple tree in high density, the rootstock EM-9 is being used, however it presents weak root anchorage and is susceptibility to *Eriossoma lanigerum*.

A solution proposed to overcome the problem of weak anchorage is the interstock technique that has been used with success in pomes, particularly in the control of the growth of the apple tree. For the conditions of the South of Brazil, the alternative that is proposed is the use of the rootstock 'Marubakaido' with interstock of EM-9. 'Marubakaido' has good adaptation to acid soils, with great root anchorage, could also be used in shallow soils and the interstock technique with the rootstock "vigour control" allows to control excessive vigour.

Several authors (Nachtigal and Botton, 1998; Pereira, 1999;) recommend the use

of the interstock, however, the effect of the length of the interstock on the characteristics of the plant is still not completely elucidated.

The purpose of this work was to evaluate the vegetative and productive development of apple tree of the 'Imperial Gala' cultivar with different lengths of EM-9 interstem, on the rootstock 'Marubakaido'.

MATERIAL AND METHODS

This study was developed in a commercial orchard of Randon Agro Silvo Pastoril S.A. (RASIP), located in the Rio Grande do Sul state, Brazil. The treatments consisted of five interstem lengths: 10, 15, 20, 25, 30 cm. The orchard was installed in 1999 with spacing of 4,5×1,25 m. The seedlings were obtained through graft, so much in the EM-9 as for 'Imperial Gala'. The rootstock was obtained through vegetative propagation with hardwood cuttings.

In the seventh year of implantation the following parameters were evaluated: the height of the plant, the trunk diameter of the 'Imperial Gala' 5 cm above the second graft point, the tree canopy size (height, width and length), the number of bud per branch, and the number of fruits per lineal centimeter of branch.

A randomized block design was used and the data were submitted to analyses of regression.

RESULTS AND DISCUSSION

For the variable height of the plant, the length of the interstock influenced significant, presenting a lineal answer (Fig. 1.A). It may be observed that, proportionally, the larger the length of the interstock of EM-9 the smaller was the height of the plants.

The reduction of the growth of the plants when grafted on the rootstock EM-9 probably related to the reduction of the translocation of carbohydrate of the superior part of the plant. This reduction of the growth may be caused by a certain incompatibility, which results in possible strangulation in the graft point. The physiological base of the reduction of the growth is still not very defined. However, it is believed that it is related with the ascendancy transport of nutritious inorganic, restriction of the descending transport of photoassimilarity for the phloem and some physiological disturbance (Ryugo, 1993).

For the tree-canopy size (Fig. 1.B), it is observed that the size decreases to the point of the length of 28 cm interstock, characterizing the reduction in the energy of the plant in relation to the increase in the length of the filter. Rozpara et al. (1990) observed that the interstock modifies the tenors of nutrient minerals in the cup of the plants, especially the reduction in the tenor of K those plants can be the cause of the reduction of the vegetative growth.

The behavior of the variable superior diameter of the trunk presents a quadratic tendency (Fig. 1.C). In the curve, the point of smaller superior diameter was obtained with 26 cm of interstock length.

For variable length of the branch (Fig. 1.D) and number of buds per branch (Fig. 1.E), there is positive quadratic behavior, with the point of maximum 15 and 16 cm of the filter EM-9 for the length of branch and number of buds per branch respectively.

The fertility index had increment values with the increase in the length of interstock EM-9 (Fig. 1.F). The increase in the length of the filter resulted, in the case in study, in increment in the fertility index. Such behaviour is due, probably, to the smallest vegetative growth of the plant that, consequently improves the swinging between the vegetative part and the reproductive, as answer the smallest ascending and descending translocation of photo assimilated (Hartmann et al., 1990) and for Richards et al. (1986) interstock has influences in the distribution and metabolism of the hormones in the plant, altering development.

CONCLUSIONS

1) The EM-9 interstock use on the rootstock 'Marubakaido' reduces the energy of the

plants.

2) The branch's form is different according to the length of interstock EM-9 (Fig. 2).

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Figures

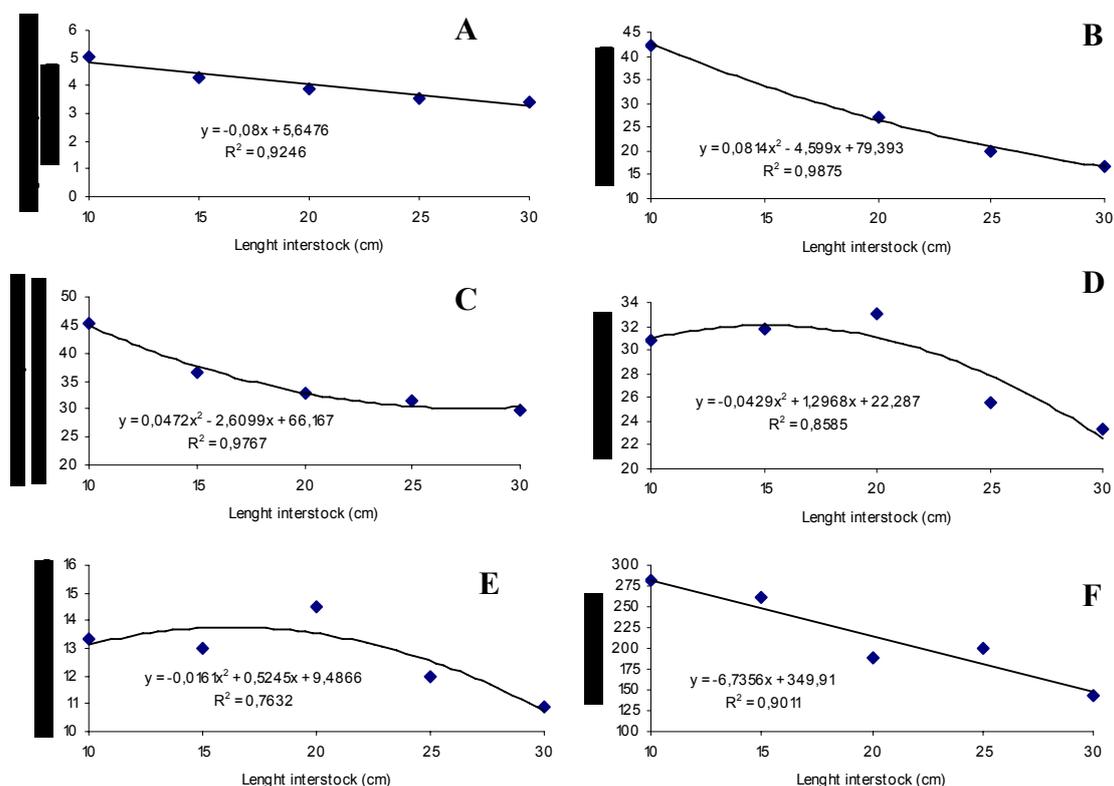


Fig. 1. Behavior of variables height of the plant (A), tree-canopy size (B), diameter of the 'Imperial Gala' 5 cm above the second graft point (C), length of branch (D), number of bud per branch (E) and fertility index (F) according to the filter length EM-9 on 'Marubakaido' in 'Imperial Gala' in the region of Vacaria - Rio Grande do Sul State. Lages, 2007.



Fig. 2. Branch's form according to the filter length EM-9 on 'Marubakaido' in 'Imperial Gala' in the region of Vacaria - Rio Grande do Sul State. Lages, 2007.