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## SUMMARY

**Keywords:** graft, rootstock, grafting on table, omega, occultation, copulation, fruit tree growing.

In the production of fruit tree seedlings were developed a series of intensive methods aimed at improving quality, increasing production, reducing production cost and production out under the negative influence of natural environmental factors.

Fruit tree seedlings growing demand on the domestic market and competitive European prompted us to address the most modern production technology seedlings orchards, which is the theme of this thesis.

Experiences underlying thesis “*Research on the production of seedlings by grafting fruit trees in protected areas*”, were organized in 2011-2013 in the field of production of fruit tree seedlings belonging to SC Vinifruct Copou SRL. The research studied the influence of methods of grafting (after forcing in the nursery field I and II) on the yield of grafted trees produced varieties: apple-Romus 3, pear-Monica, plum-Stanley and cherry-Stella.

Knowing the importance of extending Nurseries sector in Romania, we have proposed to study the physiological aspects of the interaction of scion-rootstock grafting different methods to determine the biological bases for the optimization of production of fruit tree seedlings.

Starting from the premise that with the changing methods of grafting enhances the effect of rootstock on scion characteristics we have set the following objectives:

- Improving production technology seedlings by grafting fruit trees at the table, using grafting methods and new devices;
- Evaluating the success of the grafting the species apple, pear, plum and cherry trees grafted on rootstock pairs with different characteristics, the method of grafting in "T" (sleeping budd) by benchgrafting the "Ω" and "V"
- Study of the influence of grafting methods on the growth and development of the scion and rootstock in the nursery field I and II;
- Improving technology propagating trees and seedlings obtaining a qualitatively higher, responding to diverse needs of farmers;
- Improving the quality of fruit tree seedlings.



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Studies conducted targeted influence grafting methods on the quality of planting material obtained from different tree species in protected areas and behavior after forcing grafted seedlings in the nursery field I and II.

For this purpose two experiments were organized to better highlight the main features of quality planting material:

- Experience I - Influence of grafting methods on table about main characteristics on grafted fruit quality by forcing them in protected areas;
- Experience II - Influence of the main methods of grafting fruit quality characteristics in both grafted field I and II of the nursery.

The text of the thesis is presented on 168 pages, experimental data are presented in 48 tables, 16 figures, 21 original color photographs, conclusions and references which include 114 sources.

Part I summarizes the current state of the country and abroad in terms of modern methods of propagating fruit tree seedlings.

References of the researchers on the importance, trends and national and international guidelines to produce seedlings, are also presented in Chapter I and II.

Part II is represented by own researches which includes: characterization of natural, material and research methods, organization and description of the experimental protocol and results.

Ecopedological conditions that were conducted research are presented in Chapter III, this highlighting the fact that the area where is located the nursery meets in all respects to the requirements of production and cultivation of fruit trees fits in the favorability third species of cherry, sour cherry, apple and pear.

Chapter IV presents the biological material and research methods, observations, measurements and metrics proposed to assess the influence of grafting methods on the four studied varieties grafted on different rootstocks.

In the experiments conducted in the study were compared variants grafted field (witness) to "T" (V1), omega table grafted variants (V2) grafted variants ground in "V" (V3).

Biological material studied consisted of 4 varieties grafted on different rootstocks by 2 as follows:

- The apple species: the variety grafted on rootstocks vegetative Romus 3 MM106 and M9;



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- The pear species: Monica grafted on rootstock variety generative P. Franc Harbuzești and vegetative rootstock quince type A;

- The plum species: Stanley cultivar grafted on rootstock generative P.franc and P.cerasifera;

- The cherry species: Stella varieties grafted on rootstock vegetative IPC1 and generative rootstock P. mahaleb.

Studies conducted targeted influence grafting methods on the quality of planting material obtained from different species of trees grafted fruit and behavior II nursery field.

To this end, two experiments were organized to better highlight the main features of quality planting material:

Experience I - Control rootstock was to check the health status , physiological moisture and control the degree of maturation of the wood. Hydration of the rootstocks and disinfection of packages include the introduction of stock , stainless steel bar stock solution in tanks , in order to recover their hydration , up to 53-55 % of the moisture condition thereof. Waxing grafting was performed Ceraltin product .

All species studied were grafted on the same day, March 20, 2011. After grafting, the trees were paraffin Ceraltin product and stratified crates covered with geotextile and placed in the chamber forcing.

By forcing means the process by which the grafted trees are subjected to the action of environmental factors, temperature, moisture, aeration, to transition from the sleep state to the active life of both partners to stimulate callus formation and welding and boot and root bud graft.

After forcing and acclimatization of grafted trees on the table, their reception was made two versions, measurements were:

Experience II - was set in a plot of field nursery Răducăneni in 2011, the stock of the species were planted apple, pear, plum and cherry, spaced 90-20 cm for alternative sleeping eye grafting (grafting "T") and in spring 2012, the material grafted mass two splice variants that were previously forced.

Given that the study was focused on knowledge influences grafting methods on biometric features, physiological and biological settled following activities.

To reach the targets were established following research divided into two directions:

### **1. Observations, measurements and biometric measurements during and after forcing trees grafted on table**

- The percentage of callus and callus thickness;



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- Percentage and now starting to bud graft vegetation and extent of growth of shoots;
- The level of rooting and diameter of adventitious root;
- Classification trees grafted.

## **2. Observations, measurements and biometric measurements in the field I and II of the nursery and tree removal**

- Increase the force of the trees of the tree height and the length of the graft, the diameter of the tree, and the ratio of the diameter of the scion and rootstock diameter, cross sectional area of the tree;
- Identifying the root system: the number, diameter and length of the main roots;
- Behavior trees in the nursery field I and II: number of buds and internodes length Alto, average number of leaves per shoot and average number of shoots per tree anticipate, the average area of a leaf;
- Yield of fruit trees STAS.

Within the Chapter V presents the results of research conducted to fulfill the objectives.

In the measurements variety apple scion in room forcing, increases were different depending on the method of combining the two partners and the type of rootstock.

Analyzing interaction grafting rootstock x method is confirmed in this case that the potential rhizogene be found in the gene pool of each rootstock, is a strong genetic character and manifest the same trend regardless of other factors.

Grafting method used has a significant influence in the callus. In this sense, the values obtained on the influence of the type of bonding of the two symbionts on the degree of callus, it appears that benchgrafting facilitated a better percentage pome species.

After visual evaluation of alternatives, apple and pear trees fall into Category I on the percentage of callus. A weaker degree of callus and percentage improperly, they recorded species plum and cherry, with a poorly formed callus and uneven.

The proportion of starting growth is indicative, at least as important as the above, (the percentage of callus). Start congruence vessels leading to graft and rootstock occurs only after coming into contact and libero-generating areas for connecting wood from the two partners.

The two types of combination of scion with rootstock, decisively influenced callus formation, thus grafting on table ,method omega determined to achieve the best results, due to larger contact surface areas of the two generative symbionts, resulting from sectioning. Vascularization process and tissue regeneration was achieved easily covering the entire joint area.



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Differences between species, interaction scion- rootstock and grafting used variations on the average diameter of roots per plant, showing expression rhizogene capacity of each rootstock under the influence of grafting methods.

Within species, both rootstock and grafting method influenced obtain a higher percentage of Class I fruit grafting method gave ground in omega best quality grafted fruit yield I.

The favorable balance of indicators trees growing in field after forcing two of the nursery was in the version omega grafting on table.

Regarding the influence of the two types of grafting on the opening bud graft vegetation species and varieties studied, it is noted that the omega grafting induced earliness on this character.

Omega grafting buds favored early start forcing room, this having consequences economically beneficial (reducing energy costs, labor ,etc.). But also in terms of quality of fruit tree seedlings in this way, trees to yield the well-formed shoots .

With increasing number of branches for all varieties studied is characteristic decrease internodes length and increasing the number of buds. The effect of reducing the vigor of growth and the emergence of vegetative and fruit formation since II nursery field, facilitates the formation of crowns earlier economic results after the first year of planting orchards.

Higher values of leaf area of a tree, according to the varieties studied and photosynthetic potential of annual shoots were obtained for grafted trees at the table, in the second field of the nursery after omega grafting method.

Depending on the varieties and rootstocks under study during the research period, return standard topping trees produced by grafting on table, have dimensions that conform trees in force for one year.

The last part of the thesis are presented conclusions and recommendations providing research results on the use of omega benchgrafting as the best method of grafting in protected areas in relation to the subsequent development of fruit trees.

Using methods of grafting on table shelter achieves a lower cost price and a higher profit rate especially species of pome (apple and pear).