



## REVIEW

on a thesis for obtaining the educational and scientific degree "**doctor**" in: professional direction 6.1. Crop production and scientific speciality "Fruit growing"

**Author of the thesis:** Mladen Nanev Petrov -full-time doctoral student in the Department of "Viticulture and Fruit Growing" at the Agricultural University - Plovdiv

**Title of the thesis:** "A study on GF 677 and GXN 15 (Garnem) clonal rootstocks grown in nursery and peach and plum orchards"

**Reviewer:** Prof. Dr. Valentin Iliev Lichev - Agricultural University-Plovdiv, area of higher education 6.0 Agricultural sciences and veterinary medicine, professional direction 6.1. Crop production, scientific specialty "Fruit growing", appointed as a member of the scientific jury by order No. RD 16 – 1125 / 10.10.2024 by Rektor of Agricultural University-Plovdiv

### 1. Brief introduction of the candidate.

Mladen Petrov was born on 29.04.1992. During the period 2007-2011 graduated from secondary education at the National Commercial High School in Plovdiv. Higher education, graduated with a bachelor's degree in 2014 at the Agricultural University in Plovdiv, specialty "Selection and seed production". He obtained his master's degree in 2016 also at the Agricultural University, speciality in "Plant Protection". From 2018 until now, he is a doctoral student in fruit growing at the Agricultural University.

Mladen Petrov began his work experience in 2016, which continues to the present moment in the company Tractor Invest EOOD, Karlovo. He deals with delivery and service of agricultural machinery and holds the position of "sales manager".

Colleague Petrov uses English and Russian languages at a good level, as well as Word, Excel and the Internet.

## **2. Actuality of the problem.**

The testing of newly introduced rootstocks in fruit species is a permanent task for many scientific teams around the world, including that of the fruit growing department at the Agrarian University in Plovdiv. Bearing in mind that the newly introduced rootstock GXN 15 (Garnem) for peach and plum, as well as the rootstock GF 677 for plum, have not been tested in Bulgaria, I consider that the topic of the thesis (which presents test results of these rootstock) is particularly relevant in view of the trends in the development of the mentioned cultures in our country.

## **3. Purpose, tasks, hypotheses and research methods.**

The purpose of the study is to obtain information about the growth characteristics of the GF 677 and GXN 15 (Garnem) rootstocks in a nursery and their influence on the vegetative and reproductive manifestations of three peach and plum varieties in a plantation under the specific soil and climate conditions of southern Bulgaria.

In order to fulfill the goal, the following tasks are set for achieving:

1. To study the growth characteristics of the rootstocks GXN15 (Garnem) and GF 677 in nursery production of peach and plum trees.
2. To determine the influence of GXN 15 (Garnem) and GF 677 on the growth and reproductive characteristics of modern peach and plum cultivars in a plantation.
3. To determine the influence of GXN 15 pads (Garnem) and GF 677 both on the timing of certain phenophases in contemporary orchard peach and plum varieties, as well as on the pulp composition and the accumulation of heavy metals in the fruits of these varieties.

#### **4. Transparency and presentation of the obtained results.**

The thesis is written on 136 typewritten pages and is illustrated with 51 figures, 25 tables and 28 photographs.

In the calculation of the individual indicators, the methodology generally accepted in our country for the study of plant resources in fruit growing was used. The experiments are methodically correctly set and carried out. The PhD student knows scientific terminology and uses it correctly. The obtained data were processed statistically by dispersion analysis, which allows reliable and justified conclusions to be made.

#### **5. Discussion of results and used literature.**

The structure of the dissertation meets the requirements for the educational and scientific degree "Doctor". In connection with the literature review and the discussion of the experimental results, the prepared very rich literature reference, including a total of 227 sources, of which 30 in Cyrillic and 197 in Latin, makes a pleasant impression. This shows that the PhD student is very knowledgeable about the issue.

The PhD student knows scientific terminology and uses it correctly. The data obtained as a result of the research are very well analyzed.

#### **6. Contributions of the dissertation work.**

The main contributions are as follows:

##### **Scientific contributions**

1. As a result of the study, for the first time in Bulgaria, detailed information was obtained on the development and influence of the rootstocks GF 677 and GxN15 (Garnem) on the growth characteristics of modern peach and plum varieties in a nursery

2. For the first time in Bulgaria, extensive information was obtained on the influence of the rootstocks GF 677 and GxN15 (Garnem) on the growth and reproductive manifestations of modern peach and plum varieties in a

plantation.

3. As a result of the study, for the first time in Bulgaria, detailed information was obtained on the influence of the rootstocks GF 677 and GxN15, both on the course of some phenophases of modern peach and plum varieties in a plantation, and on the chemical composition of the fruits of these varieties.

### **Scientific and applied contributions**

1. Rootstocks GF 677 and GxN15 (Garnem) were found to exhibit good affinity with the plum and peach cultivars tested.

2. The rootstocks GF 677 and GxN15 (Garnem) do not form shoots in the plum plantations, in contrast to the widely used in practice seeded wild plum (*P. cerasifera*).

3. In plum plantations, rootstocks GF 677 and GxN15 (Garnem) were found to induce higher yields per unit area in the grafted cultivars compared to the traditional seeded wild plum.

4. The rootstock GF 677 provides higher yields per unit area in the plantations of the tested peach and plum cultivars compared to the newly introduced GxN15 (Garnem).

5. The information obtained from the study shows that in plum production, the GF677 rootstock is more promising than the widely used seeded wild plum in our country. It provides better early fruiting and fertility per unit area, as a result of which the efficiency of growing the plum crop is also improved.

### **7. Critical Notes and Questions.**

- I consider that the comparison made on page 12 about the fertility of apple varieties grafted on clonal and seeded rootstocks is redundant and not related to the topic of the dissertation.

- On pages 14 and 15, detailed information about the Saint-Julien A rootstock is presented without, however, indicating the author and the literary source.

- In the "material and methods" section, a detailed methodology for reporting the indexes is presented: extraction and content of polyphenols and anthocyanins, sugars and organic acids, content of heavy metals, macro and micro elements in the pulp. Bearing in mind that colleague Petrov is a candidate for obtaining a doctorate in the scientific specialty "Fruit growing" and not in chemistry, I consider that it is sufficient just to mention each of these indicators by which method was studied.

- The text on pictures 1, 2, 3, 4, 5 and 6 (presented on pages 30, 31, 32, 33, 34 and 35 respectively) could be more precisely presented, namely, "Fruits of a variety", ,,,,,,,,,, " instead of the written "Sort ....."".

- Figures 50 and 51 (on page 51) relating to the lead content of the leaves of three plum rootstock-variety combinations do not indicate which years the data refer to.

- Since there is no more detailed information about the method of reporting the frost, my question is from what place in the crown were flower buds taken for analysis and from which twig?

- What is the reason for the formation of double fruits in plum varieties and can this negative phenomenon be reduced?

## **8. Published articles and citations.**

In connection with the thesis, the doctoral student has collectively published three scientific articles in peer-reviewed scientific journals.

The presented abstract reflects objectively the structure and content of the dissertation work.

## **9. Personal impressions of the doctoral student.**

I know Mladen Petrov in connection with his work as a doctoral student

in the Department of Viticulture and Fruit growing at the Agrarian University in Plovdiv. Right from the beginning, he impressed me with his curiosity, ambition, ability to work and willingness to improve himself. Based on my observations, I can assure you that colleague Petrov is a precise researcher, ethical and hardworking. He has the necessary training to solve complex tasks. He can definitely be counted on.

### **CONCLUSION:**

Based on the various research methods learned and applied by the doctoral student, the correctly performed experiments, the generalizations and conclusions made, I believe that the presented thesis meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Rules for its Application of the Agricultural University, which gives me grounds to evaluate it **POSITIVELY**. I allow myself to proposing to the honorable Scientific Jury also to vote positively and award Mladen Nanev Petrov the educational and scientific degree "Doctor" in the scientific specialty "Fruit Growing".

**Date:** 11.11.2024.

Plovdiv

**Reviewer:** .....

(Prof. Dr Valentin Lichev)