

SCIENTIFIC OPINION



on a dissertation for obtaining a PhD degree based on the area of higher education, classified as code - 6. Agricultural Sciences and Veterinary Medicine, professional direction - 6.1 Plant Production, scientific specialty of "Fruit growing"

Author of the dissertation thesis:

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Title of the dissertation thesis:

"Study of some rootstock-variety combinations for plums and apricots"

Prepared by:

Opinion prepared by: Associated Professor PhD Galya Stoeva Ivanova (Dobrevska), Department of Viticulture and Fruit Growing at the Agricultural University - Plovdiv; area of higher education, classified as code 6. Agricultural sciences and veterinary medicine, professional field code 6.1. Plant production, scientific specialty "Fruit Growing", appointed as a member of the scientific committee with order No. RD 16-777/23.06.2026

1. Relevance of the Problem

Plum (*Prunus domestica* L.) is the most widely cultivated fruit species in Bulgaria, occupying an area of 12,316 ha, while apricot (*Prunus armeniaca* L.) is cultivated on approximately 3,500 ha. Nevertheless, the existing fruit orchards are predominantly extensive, with low planting density and low productivity.

A major problem is the use of seedling plum (*Prunus cerasifera*) as a rootstock, which results in considerable plant heterogeneity and the formation of root suckers. In this regard, the dissertation thesis focuses on the study of alternative vegetatively propagated rootstocks – Wavit, Ishtara, GF 677 and Garnem – as well as interstocks, with the aim of increasing the productivity and profitability of plum and apricot production in Bulgaria.

2. Aim, Objectives, Hypotheses and Research Methods

The aim of the dissertation thesis is to investigate the influence of the Wavit and Ishtara rootstocks on plum cultivars, as well as that of the GF 677 and GXN15 (Garnem) rootstocks with the "Stanley" interstock on the apricot cultivar "Hargrand", both in the nursery and in the orchard.

The studies were conducted during the period 2022–2024 in a commercial nursery and fruit orchards in the Plovdiv region.

Four experiments were conducted using a randomized block design without a standard control, with 4–6 replications. Biometric parameters, graft-take percentage, yields, phenological phases and plant physiological activity were recorded.

The experimental data obtained were processed using analysis of variance (ANOVA) and Student's test at a 5% level of statistical significance.

3. Presentation and Visualization of the Results Obtained

The dissertation thesis is well structured and comprises 148 pages. The required volume and a good balance among the individual structural sections have been maintained.

The results obtained are systematically presented for each of the experiments conducted, summarized and extensively illustrated by 28 tables, 36 figures and 7 photographs. The presentation of the experimental results is clear and allows the studied parameters to be followed and compared among the individual cultivar–rootstock combinations.

4. Discussion of the Results and Literature Review

The results obtained show that, in the plum orchard, the highest cumulative yield per tree for all three cultivars studied was obtained when seedling plum (*Prunus cerasifera*) was used as a rootstock.

The highest efficiency coefficient, calculated in relation to canopy volume, was established for the cultivars “Stanley” and “Čačanska Lepotica” when Ishtara and seedling plum (*Prunus cerasifera*) were used as rootstocks, whereas with the Wavit rootstock, the highest efficiency was recorded for the cultivar “Yoyo”. Regarding the efficiency coefficient calculated in relation to trunk cross-sectional area, the highest values were established for seedling plum (*Prunus cerasifera*) in combination with the cultivars “Stanley” and “Čačanska Lepotica”, while for the cultivar “Yoyo”, the highest value was recorded with the Wavit rootstock.

Under the conditions of the experiment, the rootstocks did not have a significant effect on fruit size in any of the three plum cultivars studied. It was also established that the rootstocks Ishtara, Wavit and seedling plum (*Prunus cerasifera*) did not affect the timing of flowering in the cultivars studied.

Seedling plum (*Prunus cerasifera*) induced stronger vegetative growth in all three plum cultivars, expressed by a greater trunk cross-sectional area and larger canopy volume of the trees. In contrast, the Ishtara and Wavit rootstocks did not produce suckers in combination with the cultivars studied. With regard to the influence of the rootstocks on photosynthetic intensity, no clearly defined unidirectional trend was established.

A high graft-take percentage – above 90% – was established for all three plum cultivars when seedling plum and Ishtara rootstocks were used. With the Wavit rootstock, the graft-take percentage was lower – below 80%.

In the nursery, the Ishtara and Wavit rootstocks induced the formation of a greater number of premature shoots, whereas the use of seedling plum (*Prunus cerasifera*) resulted in taller plants.

In the apricot cultivar “Hargrand”, the peach–almond hybrids GF 677 and GXN15 (Garnem) with the “Stanley” interstock induced higher productivity compared with the traditionally used seedling plum (*Prunus cerasifera*) rootstock, both with and without an interstock. The combination GF 677 + “Stanley” interstock + “Hargrand” was characterized by the highest values of the efficiency coefficients.

The use of the peach–almond hybrids GF 677 and GXN15 (Garnem) with the “Stanley” interstock resulted in a significant increase in fruit size in the cultivar “Hargrand”.

An influence of the rootstocks on the timing of flowering was established in the cultivar “Hargrand”. Earlier flowering was observed when the peach–almond hybrids GF 677 and GXN15 (Garnem) with the “Stanley” interstock were used.

In the orchard, the peach–almond hybrids GF 677 and GXN15 (Garnem) with the “Stanley” interstock induced stronger vegetative growth in the cultivar “Hargrand” compared with seedling plum (*Prunus cerasifera*). Suckers were produced only by the seedling plum. The peach–almond hybrids GF 677 and GXN15 (Garnem) with the “Stanley” interstock, grafted with the apricot cultivar “Hargrand”, did not produce suckers.

Trees of the apricot cultivar "Hargrand" grafted onto GF 677 and Garnem with the "Stanley" interstock were characterized by higher photosynthetic and transpiration rates compared with those grafted onto seedling plum (*Prunus cerasifera*) with the "Stanley" interstock.

In the production of planting material, the peach–almond hybrids GF 677 and GXN15 (Garnem) with the "Stanley" interstock induced stronger growth and better branching of the scion.

In the nursery, the cultivar "Hargrand", grafted by English copulation, showed a higher graft-take percentage when GF 677 and GXN15 (Garnem) with the "Stanley" interstock were used, compared with seedling plum (*Prunus cerasifera*) and seedling plum with the "Stanley" interstock.

Overall, the results obtained have been logically interpreted and discussed in the context of the aim and objectives of the dissertation thesis. They demonstrate the importance of selecting appropriate rootstocks and interstocks for regulating the growth, productivity, physiological activity and quality characteristics of fruit plants.

The literature review is comprehensive and presents the current state of the problem. It is developed on the basis of 342 literary sources, of which 321 are in Latin and 21 in Cyrillic. The literature review, as well as the conclusions drawn from it, demonstrate the good theoretical preparation of the doctoral student on the problems directly related to the object of the study.

5. Contributions of the Dissertation Thesis

The dissertation thesis makes significant scientific and scientific-applied contributions to the development of Bulgarian fruit growing and offers alternative possibilities for intensifying plum and apricot production.

The following contributions have been formulated:

Scientific Contribution

New information has been obtained on the influence of the GF 677 and Garnem rootstocks with the "Stanley" interstock on the growth and reproductive characteristics, the phenological flowering phase and the physiological parameters of plants of the apricot cultivar "Hargrand".

Scientific-Applied Contributions

The GF 677 and Garnem rootstocks with the "Stanley" interstock ensure good compatibility with the apricot cultivar "Hargrand";

The studied Wavit and Ishtara rootstocks demonstrate good compatibility with the plum cultivars investigated;

The GF 677 and Garnem rootstocks with the "Stanley" interstock induce higher productivity in the apricot cultivar "Hargrand" compared with seedling plum without an interstock;

The GF 677 and Garnem rootstocks with the "Stanley" interstock, in combination with the apricot cultivar "Hargrand", as well as the Ishtara and Wavit rootstocks in combination with the plum cultivars studied, do not produce suckers, unlike the traditionally used seedling plum;

The use of the GF 677 and Garnem rootstocks with the "Stanley" interstock is recommended for apricot fruit production as a good alternative to seedling plum (*Prunus cerasifera*).

6. Critical Comments and Recommendations

I have the following recommendations for the PhD student:

To continue the research with the aim of conducting a long-term assessment of the sustainability and productivity of the cultivar–rootstock combinations studied;

To assess the influence of climate change on the results obtained and on the performance of the cultivar–rootstock combinations studied;

To investigate the influence of rootstocks on fruit quality;

To expand the study by including a larger number of cultivars, which would allow a more comprehensive assessment of compatibility among cultivars, rootstocks and interstocks.

The recommendations presented above do not diminish the scientific value of the dissertation thesis; rather, they outline opportunities for future development and further in-depth research in this field.

7. Published Articles and Citations

Three co-authored scientific publications directly related to the subject matter and results of the dissertation research have been submitted as part of the dissertation thesis.

The PhD student has fulfilled the requirements for the required total number of points, in accordance with the requirements of the National Centre for Information and Documentation (NACID), thereby meeting the minimum scientometric requirements for the acquisition of the educational and scientific degree “Doctor”, in accordance with the Law on the Development of the Academic Staff in the Republic of Bulgaria.

The submitted abstract of the dissertation thesis objectively reflects its structure, content and main results.

CONCLUSION

Based on the various research methods applied by the PhD student, the properly conducted experiments, the results obtained, the summaries made and the conclusions formulated, I consider that the presented dissertation thesis meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB) for the acquisition of the educational and scientific degree “Doctor”.

The dissertation thesis contains scientific and scientific-applied results contributing to the development of modern fruit growing and offers practically applicable solutions for the selection of appropriate rootstocks and interstocks in plum and apricot production.

On the basis of the above, I give the dissertation thesis a POSITIVE ASSESSMENT.

I recommend that the esteemed Scientific Jury also vote positively and award Todor Donkov Donkov the educational and scientific degree “Doctor” in the scientific specialty “Horticulture”.

Date: 9.09.2026

Plovdiv

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