Grape seedlings growth and development using a preparation based on the fungus p Chaetomium sp

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Abstract. In the study of the possible growth-stimulating effect p. Chaetomium sp on the grape seedlings survival and development, it was found that all varieties' survival rate exceeded the control variant. It turned out to be the best in the Dostoyny variety. Seedlings the best growth and development is noted in the variant with the microorganisms used. Thus, the Kubanets shoot in variants 1 and 2 average lengths exceeded the control one by 15.1 cm and 13.3 cm, respectively. In the Gordiy variety, the difference between the control variant and the variants with the microorganisms use was 12.8 and 16.5 cm. The smallest difference between the control variant and variants using microorganisms on the growth average length is noted in the grade Dostoyny. The seedlings root system growth features to study in variants with the drug introduction based on the fungus p. Chaetomium sp. showed that the roots total number in the Worthy variety increases statistically. In the Kubanets variety, a significant difference is noted only between option 1 and the control. The Gordiy variety did not have a reliable difference in the experience options. Thus, the seedlings output that meets the quality standard, invariants with the drug use based on microorganisms p. Chaetomium sp. in the Dostoyny and Kubanets varieties, compared to the control option, was the greatest, which in the vaccinated seedlings' production industrial technology will give a significant economic effect.

1. Introduction

Soil microflora is any agrophytosenosis mandatory component, where interactions are made between plants and microorganisms. At the same time, microorganisms can directly stimulate plant growth by inducting resistance to phytopathogens, reducing ethylene levels, growth regulators synthesis, etc. [1]. The biological methods use for optimizing plant growth, including grape seedlings, is of great interest, since it involves the soil microflora self-regulation maximum. The producer organisms use is the plant protection using the biological method most common ways against diseases caused by fungi. In many countries, including Russia, a search for such microorganisms is being conducted, their tests are being carried out, which results show such studies prospects [2-9]. So, according to E G Yurchenko, Z S Politovoy (2016) Trichoderma viride, Glomus intraradices, Azospirilium brasiliense, Gliocladium roseum grape seedlings roots inoculation has a stable stimulating effect on the rhizogenesis intensity, and roots inoculation with the strain RCAM02146 Glomus intraradices increases grape yields by 19 compared with the spontaneous inoculation control variant [10, 11]. It is known that fungi of the Chaetomium genus are usually found in soil, organic compost, are able to decompose cellulose and other...
organic substances, and exhibit antagonistic properties to various soil microorganisms [12, 13]. This is also mentioned in the researchers works Gao et al. (2005), Fogle et al. (2007, 2008), Kapoor et al. (2010) [14-17]. According to M A Linnik (2012) fungi of the Chaetomium genus are promising for the pathogens' control, and can also be a new metabolites source in the pharmaceutical industry and agriculture [18]. In this regard, the goal was set to study the drug growth-stimulating effect based on p. Chaetomium sp. on the survival rate and grape seedlings development in the nursery-garden.

2. Material and research methods
The research was carried out in the South of Russia Black Sea zone agro-ecological conditions. The research objects were technical grape varieties cuttings and seedlings: Dostoyny, Kubanets, Gordiy (K-II-17-10) and preparation based on the mushroom p. Chaetomium sp., G - 1×10⁶ CFU/g. The cuttings for the experiments corresponded to the following parameters: diameter 7-13 mm, length 40 ± 2 cm. Before planting, the selected cuttings were soaked in water for a day, dried, and waxed 2/3 of the length. The experience is repeated three times. The drug introduction was carried out by a grape nursery-garden single watering 7 days after planting with a flow rate according to the experiment scheme (table 1).

| Variety          | A preparation based on the mushroom p. Chaetomium sp. | Control (c) |
|------------------|-------------------------------------------------------|-------------|
|                  | option 1 (b1)                                        | option 2 (b2) |            |
| Dostoyny         | 100 ml/m²                                             | 200 ml/m²   | water      |
| Kubanets         | 100 ml/m²                                             | 200 ml/m²   | water      |
| Gordiy (K-II-17-10) | 100 ml/m²                          | 200 ml/m²   | water      |

The seedlings' development records and observations were carried out according to the methods generally accepted in viticulture [19, 20]. The seedlings' compliance with the quality standard was determined according to GOST 31783-2012 "Grape planting material (seedlings)" [21].

3. Research results
In the study of the possible growth-stimulating effect of p. Chaetomium sp. on the grape seedlings survival and development in a grape nursery-garden, it was found that all varieties' survival rate exceeded the control variant. It turned out to be the best in the Dostoyny variety; the difference between the control option and option 2 with the highest concentration was 18.1%. The grape cuttings survival rate in the grape nursery-garden by options is shown in figure 1.

During the seedlings growing season in the grape nursery-garden, observations were made of their growth dynamics. Reliable data have been obtained, which indicate that the best seedlings growth and development was noted in the variant with the microorganisms use (figure 2). The grape seedlings growth average length in all varieties variants with the preparation exceeded the control variant use. Thus, the Kubanets shoot in variants 1 and 2 average length exceeded the control one by 15.1 cm and 13.3 cm, respectively. In the Gordiy variety, the difference between the control variant and the variants with the microorganisms use was 12.8 and 16.5 cm. The smallest difference between the control variant and variants using microorganisms on the growth average length is noted in the grade Dostoyny.
The most objective and important indicator reflecting the seedlings' development is the standard seedlings output from the grape nursery-garden. Thus, the seedlings output that meets the quality standard, invariants with the drug use based on microorganisms p. Chaetomium sp. the varieties Dostoyny and Kubanets, in comparison with the control variant, turned out to be the highest. The Dostoinny variety stood out especially, the standard seedlings output in variant 2 with the rate of preparation application 200 ml/m² was 89%, this is 2 times higher than in the control variant (figure 3).

In industrial technology for the grafted seedlings' production, this will give a significant economic effect.

The seedlings root system growth features to study in variants with the drug introduction based on the fungus p. Chaetomium sp. showed that the roots total number in the Dostoyny variety increases statistically table 2. In the Kubanets variety, a significant difference is noted only between option 1 and the control. The Gordiy variety did not have a reliable difference in the experience options.
Figure 3. The standard grape seedlings output from the grape nursery-garden in %, (2019).

Table 2. Seedlings root system development by experience options, 2019.

| Option     | Roots number, pcs | Total roots, pcs. |
|------------|-------------------|-------------------|
|            | thickness > 2mm   | thickness < 2mm   |                    |
| Dostoyny b1| 8.7               | 9.6               | 18.3              |
| Dostoyny b2| 5.8               | 10.8              | 16.6              |
| SSD_05     |                   |                   | 2.4               |
| Dostoyny to| 5.8               | 7.3               | 13.1              |
| Kubanets b1| 8.7               | 10.1              | 18.8              |
| Kubanets b2| 8.2               | 8.5               | 16.8              |
| SSD_05     |                   |                   | 2.2               |
| Kubanets to| 9.0               | 7.4               | 16.4              |
| Gordiy b1  | 5.8               | 5.8               | 11.6              |
| Gordiy b2  | 4.5               | 6.4               | 10.5              |
| SSD_05     |                   |                   | 2.1               |
| Gordiy to  | 5.5               | 7                 | 12.2              |

4. Conclusion
Thus, a drug introduction based on p. Chaetomium sp. by watering the planted grape cuttings in a grape nursery-garden contributes to a more powerful seedlings' development. According to the indicators' totality, the varieties Kubanets and Dostoyny were the most responsive to the studied drug use.

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