The use of Albit in the technology of growing grafted seedlings of technical grape variety

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Abstract. In 2014-2016 were laid 2 experiments: 1. Processing during the stratification period; 2. Processing during the growing season in the nursery garden, the purpose of which was to determine the effectiveness of including foliar fertilizing (Albit) in the conditions of the Lower Don region in the technology for the production of grafted planting material for industrial grapes. The treatment of vaccinations during the stratification period has a positive effect on their yield, which increases to 65.6-92.2%, which is 5.6-32.2% more than the control, with a positive correlation to an increase in concentration. The final yield in this experimental variants varied from 32.2 to 48.9%, significantly exceeding the control by 14.4-31.1%. Treatment of grafts during the growing season in a nursery garden with a solution of Albit in a similar concentration contributed to the aerial parts, roots, increasing the survival rate to 50.3-64.6% (increase to control 2.1-16.4%) and the final yield up to 33.3-57.2% (increase to control 10.0-33.9%), with a positive correlation to an increase in concentration. Foliar treatment during the growing season in a nursery garden with a solution of the Albit preparation provided the formation of a more powerful annual growth with increased quality indicators compared to the control.

1 Introduction

At present, in Russia there is a high need to provide agricultural producers with their own planting material for grapes of modern highly productive, classic and autochthonous varieties. Due to the widespread distribution of phylloxera, the current grape nursery is forced to switch to a labor-intensive grafted grape culture [1]. The output of grafted seedlings, depending on the affinity of the scion-rootstock combination and production technology, is low. Often, the low final yield of seedlings from the nursery garden is associated with insufficient fusion of the grafting components during the stratification period and a deficiency of nutrients during the growing season in the nursery garden, which can be provided by foliar application of phytohormones or modern fertilizers and complex growth stimulants [2-8].

The use of fertilizers and growth stimulants in agricultural practice has become widespread due to the high efficiency of increasing crop yields and reducing external stress

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factors [9-10]. On the example of grape nursery, such stress factors during the fusion of the graft components during the stratification period are increased room humidity (in the absence of good ventilation, mold appears), excessively high or low air temperature, which makes it difficult for the graft components to grow together and form roots. After the planting of vaccinations in the school, stress factors are the lack of nutrients and moisture, low temperatures, and during the active growing season, on the contrary, high air temperatures. The use of growth regulators helps to minimize the negative impact of external factors, enhance plant immunity and stimulate growth processes, which also make it easier for plants to tolerate abiotic factors [6–12].

In the practice of viticulture, growth stimulants are used mainly as foliar feeding of young plantations and fruit-bearing vineyards [13]. The use of regulators and growth stimulants at present in the production of planting material has been poorly studied, which indicates the relevance and demand for research.

2 Materials and methods

The purpose of the research is to determine the effectiveness of including foliar fertilizing with growth regulator Albit in the conditions of the Lower Don region in the technology for the production of grafted planting material for industrial grapes.

The studies were carried out in 2014-2016 on the experimental fields of ARRIV&W – Branch of the FSBSI FRARC (Novocherkassk). There were two experiments: Experiment 1. Effect of foliar feeding in a stratification chamber with Albit on the yield of planting material; 2. Influence of foliar feeding in nursery garden with Albit on growth strength and quality of seedlings. The experiment was carried out in three repetitions of 30 plants. Foliar treatment was carried out according to the scheme: option 1 - control (without fertilizers); options 2-6 – treatment with Albit solution at concentrations of 0.02-0.10% in increments of 0.02% with a manual sprayer. The number of treatments in the experiments is the same, twice during the period of stratification and vegetation. For the production of grafted planting material, the following varieties were used in the experiment: scion - technical grape variety Crystal, rootstock - phylloxera-resistant grape variety Kober 5 BB. Vaccination - machine, omega-shaped cut.

The drug Albit, TPS (hereinafter referred to as Albit), used in the experiment, has found wide application in agricultural practice, on cereals, oilseeds, fodder crops, vegetables and fruit plants. In viticulture, the drug has proven itself as an effective growth stimulator, providing a significant increase in yield with good fungicidal properties. Active ingredients of the drug: (NH₂)₂CO - 181.5 g / kg; KNO₃ - 91.2 g/kg; K₂HPO₄ - 91.1 g/kg; MgSO⁴ - 29.8 g / kg; C₄H₈O₃ - 6.2 g/kg; a complex of basic macro- and microelements that enhance the action of basic substances.

3 Results and Discussion

The main indicator of the efficiency of the production of grafted grape seedlings during the stratification period is the circular callus formation. In our studies, the use of Albit had a positive effect on the regenerative processes of grafting (callus formation). When using foliar feeding, options 2-6 were distinguished by a more complete accretion of the graft components, in comparison with the control variant. The significant effect of the treatment is clearly shown in figure 1. An increase in the yield of grafts in the field of stratification was observed with a gradual increase in the concentration of Albit, which indicates a positive responsiveness of the grafts to the applied fertilizer. The output of inoculations
from the stratification chamber of the experimental variants exceeded the control by 5.6-
32.2%, which is significant.

After stratification, the grafted seedlings were planted in a school, where during the
growing season the growing technology was the same, however, a prolonged effect of foliar
feeding in the stratification chamber was observed. Thus, the survival rate varied from
34.4% in the control to 64.4% when treated with Albit concentration of 0.1%. The excess to
the control amounted to a minimum of +12.3% at a concentration of 0.04%, a maximum of
+30.0% at a concentration of 0.1%, which is 1.4-1.9 times more than the control.

The final yield of seedlings varied from 17.8% in the control to 48.9% when treated
with Albit 0.1%. The excess of the experimental variants to the control was minimally
+14.4% at a concentration of 0.02%, maximum +31.1% at a concentration of 0.1%, which
is significantly more than the control by 1.9-2.7 times, respectively. Despite a significant
decrease in the survival rate, and, consequently, an increase in the feeding area, seedlings of
the control variant were distinguished by a poor development of the root system and leaf
apparatus.

Despite the smaller effect of treatment during the growing season compared to treatment
in a stratification chamber on survival, the difference in the final yield of seedlings was
significant. So, in the control, the yield of seedlings was 23.3%, and with foliar feeding during the growing season, it increased to 33.3-57.2%, which is more than the control variant by 10.0-33.9% or 1.5-2.5 times respectively.

The introduction of the growth stimulator Albit during the growing season contributed to better growth and development of plants, due to the acceleration of growth processes and increased absorption of water and nutrients from the soil by an already developed root system, while when treated in a stratification chamber, the root system was just beginning to form. All of the above contributed to the improvement of the development of the root system, the intensity of the development of the annual shoot and the area of the leaf surface (table 1).

Table 1. The development of one-year growth of grafted grape seedlings of the Crystal variety under the influence of foliar feeding with Albit during the growing season of grapes (average 2015-2016)

<table>
<thead>
<tr>
<th>Experience Variant</th>
<th>Length of one year growth</th>
<th>Annual growth diameter, cm</th>
<th>Leaf area, cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>total, cm</td>
<td>mature, cm</td>
<td>aging, %</td>
</tr>
<tr>
<td>Control</td>
<td>72</td>
<td>42</td>
<td>58.3</td>
</tr>
<tr>
<td>Albite 0.02%</td>
<td>89</td>
<td>58</td>
<td>65.2</td>
</tr>
<tr>
<td>Albite 0.04%</td>
<td>133</td>
<td>86</td>
<td>64.7</td>
</tr>
<tr>
<td>Albite 0.06%</td>
<td>115</td>
<td>74</td>
<td>64.3</td>
</tr>
<tr>
<td>Albite 0.08%</td>
<td>133</td>
<td>84</td>
<td>63.2</td>
</tr>
<tr>
<td>Albite 0.10%</td>
<td>126</td>
<td>87</td>
<td>69.0</td>
</tr>
</tbody>
</table>

The seedlings of the control variant had the lowest indicators, namely: the average growth length (72 cm), the length of the matured part (42 cm), the percentage of ripening (58.3%), the diameter of the annual growth (0.5 cm) and the leaf area (1139.7 cm²). The length of the one-year shoot of seedlings when treated with Albit varied from 89 to 133 cm, with the length of the matured part from 58 to 87 cm, which ranged from 63.2 to 69% of ripening with a diameter of one-year growth of 0.6-0.7 mm.

4 Conclusion

Based on the results of the studies, it can be concluded that reducing the load of mother In the course of the research, it was found that the use of Albit as a foliar treatment of grafted grape seedlings during the post-grafting period (stratification) and after planting (vegetation period) is a highly effective technique. Spraying the grafts during the stratification period with a solution of Albit at a concentration of 0.02 to 0.10% increases their yield to 65.6-92.2%, which is 5.6-32.2% more than the control, with a positive correlation at increasing concentration. The aftereffect of the intake was noted on the survival rate of plants in the school, which varied from 46.7 to 64.4%, which is significantly more than the control equal to 34.4% and the final yield of seedlings, which significantly exceeded the control 17.8%, by 14.4-31.1%. Spraying of grafts during the growing season in a school with a solution of Albit at a concentration of 0.02 to 0.10% contributes to more intensive nutrition due to increased growth processes, which positively affected their survival rates (from 50.3 to 64.6%) and the final yield (from 33.3 to 57.2%), which is more than the control by 2.1-16.4% and 10.0-33.9%, respectively, with a positive correlation with increasing concentration. Grafted grape plants, due to spraying with a solution of the Albit preparation at a concentration of 0.02 to 0.10%, formed a more powerful annual growth with increased quality indicators compared to the control. The average shoot length varied from 89 to 133 cm, the length of the mature part of the shoot varied from 58 to 87 cm, the leaf area varied

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from 1263.0 to 1633.2 cm², which is 23.6-84.7% more than the control; 38.1-107.11%; 10.8-43.3%, respectively, in terms of indicators, and is significant.

Based on the results of the studies, it can be concluded that the double treatment of grafted plants of the industrial grape variety Crystal with a solution of Albit at a concentration of 0.02 to 0.10% as a foliar treatment during the stratification period (after grafting) and during the growing season in nursery garden (after planting) contributes to an increase in the yield of grafted seedlings and a significant improvement in their quality indicators.

References
2. P. Zamanidi, H. Pashkalidiz, O. Vorobieva, I. Pankratova, A. Kondratieva, EurasianUnionScientists, 3, 4-13 (2021)