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THE POWER OF THE GRAPE ROOT SYSTEM DEPENDING THE NUTRITIONAL AREA ACCORDING TO THE INTENSITY OF SAP EMISSION

Roots have the ability to absorb water and mineral stuff. To determine the power of the root system, a physiological method based on the intensity of sap release was used. The experiment shows that the root system with a larger feeding area is more powerful. The activity of the root system was revealed by evaluation of the amount of sap emission for systems with vertical and free placement of shoots. Found that a larger feeding area provides more powerful development of the root system and more intensive sap release.

Keywords: planting scheme, feeding area, power of the root system, intensity of sap flow.

Introduction. When planting new vineyards, it is of utmost importance to correctly determine the bush's feeding area, which ensures better use of sunlight and good ventilation of the bushes, reduces the degree of damage by diseases and pests, and promotes sugar accumulation. Planting density is closely related to the biological characteristics of the variety, the mechanical composition of the soil, the terrain, the level of solar radiation and the moisture supply of the site. As the feeding area increases, the photosynthetic productivity of the bush also increases. Amirjanov (1980) provides data that in plantings with row spacing of 2.5 m² and vertical growth, the vineyard area is used by the above-ground part of the bush by 20%, while in wide-row, high-standard plantings this figure is almost 50%. In the conditions of the Central Coastal zone of Dagestan, an increase in the feeding area of bushes from 3 m² to 7.5 m² contributed to the preservation of buds in winter, an increase in the proportion of developed shoots from 62 to 72%, as well as an increase in bush yield from 5.6 to 7.9-11.1 kg. At the same time, vineyard productivity decreased from 18.7 to 17.6-18.4 and 15.9 t/ha (Magomedova, Karayev, 2021). In the mountainous zone of the Black Sea coast, an increase in the feeding area of one bush from 2.5 m² to 10 m² contributed to an increase in the number, length, and thickness of roots by 3-4 times (N.I. Boldyrev, G.V. Ogienko, 1976).

Back to the last century, researchers used sap flow to determine the development capacity of the root system of grapes. Moreover, it was found that the amount of sap released by the bush, within certain limits, follows the power of the root system (Tavadze, 1949). Grape roots have a great ability to absorb water and dilute soil solutions. Under the influence of incoming water, hydrostatic (root) pressure is formed in the xylem layer of the roots, facilitating the transport of xylem solution from the roots to the above-ground part of the grape plant, as a result of which intense sap flow (crying of the plant) is observed in the spring. Root pressure, determined by the height of the rise of the liquid released when the vine weeps, reaches 1.5 atmospheres (Rozhkova, Mazirov, 2022).

It should be noted that the intensity of sap flow, in addition to the power of the root system, is also influenced by soil conditions, pruning intensity, the watering, etc. (Rees, 2015; Robbins, Dinneny, 2015; Zhang, 2017; Torres et al., 2018; Martinson, 2019).

Materials and methods. Research was carried out in the Ganja-Gazakh and Absheron zones on the Rkatsiteli and Ag Shany varieties, respectively. There are used various methods to

study the effectiveness of root systems. Basically, scientists used the method of excavating and washing roots with further sorting.

To determine the power of the root system, we used a physiological method based on the intensity of sap release (ml/hour) based on the sum of five vessels. For comparison, the control (2.5 x 1.5 m) and experimental (3.5 x 2.0 m) options of feeding area were taken.

Results and discussion. In March there almost weren't any release of sap. And only from the beginning of April did the sap flow begin, because it became sharply warmer. On April 1, the vessels were hung, and from April 3, we began calculating the amount of sap released. As the data obtained show, the intensity of sap release in the experimental version is higher than in the control. On April 4-th and 5-th, there were no significant differences between the options. Later the differences become clearer. On April 5, the maximum sap release occurs in the experimental version between 12 and 15 hours, and on April 6 and 7 – between 9 and 12 hours (Fig.1).

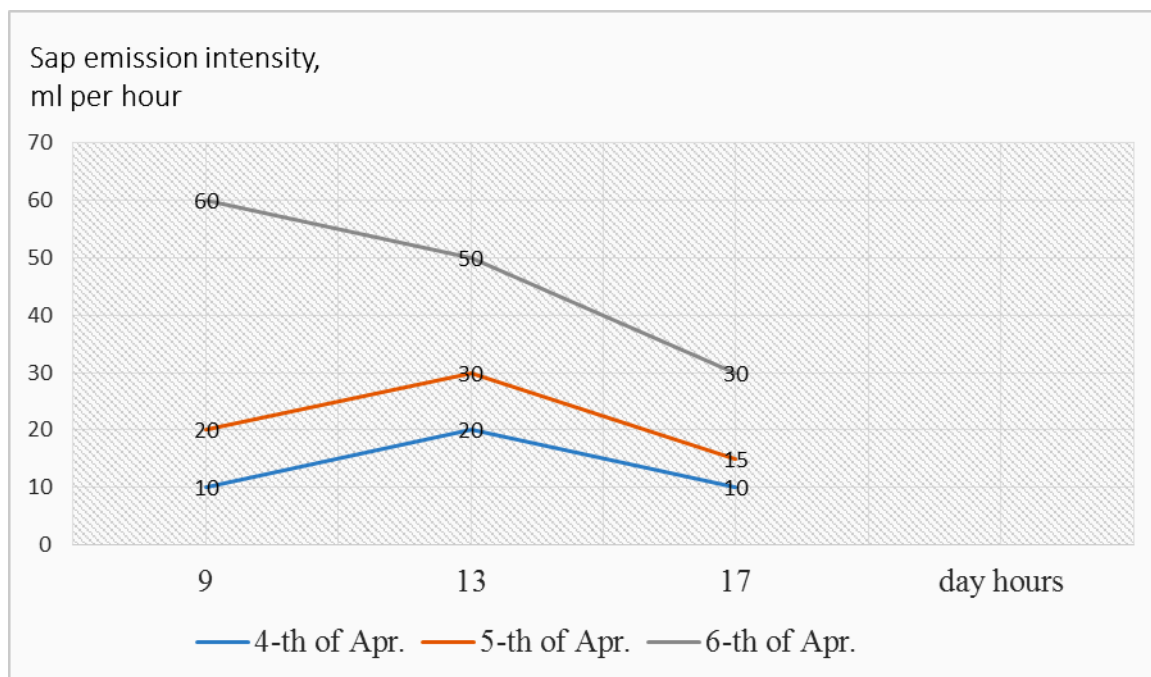


Figure 1. Intensity of sap emission (the Rkatsiteli variety, the Ganja-Gazakh region) by hours of the day

Experimental data show that the root system of grape plants per bush in a wide-row, high-trunk formation is more powerful and developed than in narrow-row plantings with a medium trunk.

It can be concluded that in the experimental variant, due to the relatively high intensity of sap release, the root system is more powerful than in the control variant.

We also carried out, under the conditions of the Absheron Peninsula, an accounting of the release of sap from the local variety Ag shany. Research shows that in Absheron, the duration of sap release was shorter compared to the Ganja-Gazakh region. It is explained, firstly, by the fact that no irrigation carried out in the Absheron vineyard. Secondly, the soils of the Absheron Peninsula are light, containing sand, where moisture is difficult to retain. In addition, strong winds blow on the peninsula, due to which, as a result of transpiration, the soil humidity decreases. Figure 2 shows the results of studies on the dependence of the intensity of sap release on the feeding area. As we can see, the value of this indicator is significantly higher with a larger feeding area (3.5x2 m), which correlates well with the development capacity of the root system under this planting scheme.

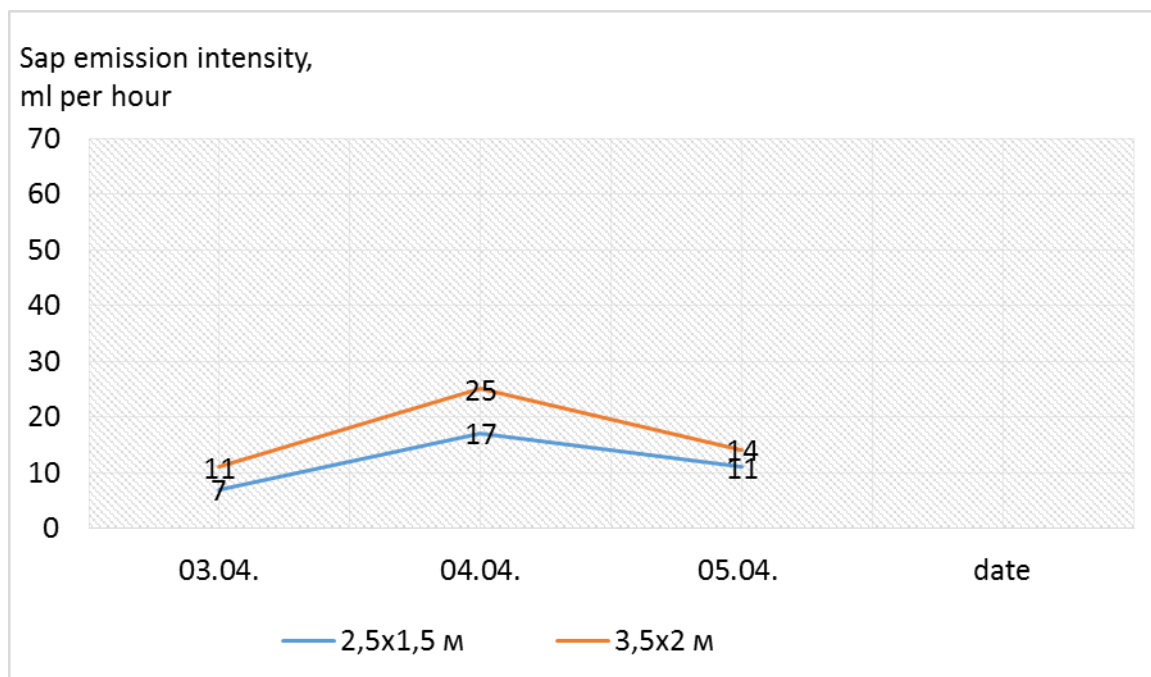


Figure 2. Intensity of sap emission (the Ag Shany variety, the Absheron region) depending on feeding area

On the Absheron Peninsula, with good watering, grape bushes develop well. The climate of the peninsula is dry, subtropical. The soils are sandy, calcareous, covered with sparse vegetation, characteristic of a semi-desert. The soil types of the Ganja-Kazakh zone are light chestnut with a heavier mechanical composition and retain soil moisture well. Therefore, the duration of sap flow in the Ganja-Kazakh zone amounted to 9-10 days. And for the Ag shany variety on the Absheron Peninsula, sap flow lasts for 4-5 days.

Thus, we can conclude that with a larger feeding area per bush, the root system develops more powerfully, and, accordingly, the intensity of sap release increases.

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ЗАЛЕЖНІСТЬ ПОТУЖНОСТІ КОРЕНЕВОЇ СИСТЕМИ ВІД ПЛОЩІ ЖИВЛЕННЯ ЗА ПОКАЗНИКОМ ІНТЕНСИВНОСТІ ВИДІЛЕННЯ СОКУ

Коріння має здатність поглинати воду та мінеральні речовини. Для визначення потужності кореневої системи використовували фізіологічний метод, заснований на інтенсивності соковиділення. Дослід показав, що коренева система з більшою площею живлення є більш потужною. Активність кореневої системи виявляли шляхом оцінки кількості соковиділення для систем з вертикальним та вільним розміщенням пагонів. Встановлено, що більша площа живлення забезпечує потужніший розвиток кореневої системи та інтенсивніше виділення соку.

Ключові слова: схема посадки, площа живлення, потужність кореневої системи, інтенсивність виділення соку.