C.Z.U.: 634.8.044

GRAPE CULTURE IN GREENHOUSES IN POLISSYA: OPORTUNITIES AND PROSPECTS

SHTIRBU ANDRII, SALIVON OLEKSANDR
National Scientific Center "V. Ye. Tairov Institute of Viticulture and Winemaking"
National Academy of Agrarian Sciences of Ukraine

Abstract. The main grape cultivation agricultural technology in protected ground in Polissya is set out. It is established that in unheated greenhouses, agro-climatic indicators change to levels sufficient for normal growth, development and fruiting of table grapes. In the future, the grape crop in greenhouses conditions of the natural and agricultural zone of Polissya may have social and economic importance, its development will create jobs, provide the local people with table grapes.

Key words: grapes, greenhouse, Polissya, table cultivar, yield.

The vineyard was founded on the territory of the natural and agricultural zone of Polissya and based on "Agrofirma Frutko" farm (Zhytomyr region, Radomyshl, Ukraine). Previously, Polissya regions were considered to be unsuitable for a grape crop due to their frost susceptibility, and mostly due to insufficient thermal resources.

The climate of the farm location region is characterized as continental with warm, humid and mild winters. The average annual temperature is +7,7 °C, the coldest months are January and February and the warmest ones are July and August. The absolute minimum temperature reaches –33 °C, and the average of absolute minimums is –14 °C. The highest maximum temperature reaches +36 °C, and the average of absolute maximums is +29 °C. Frosts begin, on the average, on October 3 on the soil surface and on October 6 at a height of 2 meters above the soil surface, and end on May 1 and April 27, respectively. In some years, autumn frosts are observed much earlier (in the second decade of September) and spring frosts later – in the second decade of May. According to the nearest meteorological station to the farm, the amount of annual rainfall is 613 mm/year. The highest amount

of rainfall accounts for the summer, and the least – for the spring. The indicated amount of rainfall may deviate significantly in one direction or another within the range from 507 mm to 781 mm (Adamenko, T.I., Kulbida, M.I., Prokopenko, A.L. 2019).

The biological characteristics of grapes require the creation of environmental conditions in protected ground similar to open ground crop conditions in the southern region. It is known that grape cultivation in unheated greenhouses can be introduced in regions where about 1000 °C of heat is not enough for the vegetation period in total (Perstnev, N.D. 2001).

According to agrometeorological indicators in 2021, the number of days with the temperature above 10 °C was 189. In unheated greenhouses, the duration of this indicator increases to 214 days. In comparison to open ground, in unheated greenhouses the average monthly temperature of the coldest month (January) increases from –2,5 °C to –1,8 °C, and of the warmest one (July) – from +23,5 °C to +30 °C. The sum of average daily temperatures above 10 °C in protected ground reached 2889 °C which is 433 °C more than in open ground. This effective heat sum is sufficient for groups of grape varieties from early to mid-ripening berries.

The varietal composition of grapes on the farm is following: the main varieties and forms of Arcadiya and Liviya table grapes, in smaller volumes – Kishmish Radiant, Veles, others. Berries ripening in protected ground conditions occurs in the third decade of August (Liviya) and in the first decade of September (Arkadiya).

Vineyards in protected ground are laid out in small plots of 360, 450 m^2. Arched greenhouses are used of the following dimensions: width – 10 m, length – 36 or 45 m. The area under plantings is 6300 m^2.

Grape planting scheme is following: row spacing – 3 m, distance in rows between grape plants – 2,2 m. There are four rows in each greenhouse. Annual lignified grafted seedlings were planted with a stem length of 40 cm, well-developed intact root system and well-ripened growth.

The fertilized system includes pre-planting humus application at a rate of 50 t/ha, planting humus application with ammonium nitrate phosphate fertilizer into the pits (16:16:16) – 5 kg + 0,15 kg, post-planting (annual) application of ammonium nitrate phosphate fertilizer (9:18:22) – 250 kg/ha. At the same time, soil moisture is maintained within 70-100 % of the field moisture capacity through drip irrigation.

The farm adopted a fan-shaped stemless form of grape plants on a vertical trellis. Pruning grapes is carried out on the fruit link. Pruning length is 8-10 buds. The final load rate of the grape plants is set when the green shoots are cut (Shtirbu, A. 2019).

During the vegetation period, shoots are tied up, pinched and topped. Periodically, measures are taken to protect plants from seasonal diseases as well as some non-specific pests (Corobka, V., Nicolaescu, G., Apruda, P. 2009).

The yield of grapes in an unheated greenhouse is 2,5-3 kg/m^2. The quality of berries is not inferior to the yield grown in open ground in southern regions which are traditional for the crop.

Technical and economic indicators for creating a vineyard in underheated greenhouses are characterized by the efficient use of resources and material and manufacturing base of the farm. Capital investment for the creation of a vineyard is higher than for traditional crop. However, an increased demand on fresh table grapes in Polissya contributes to a high level of profitability, that does not significantly increase the payback period of investments. The economic efficiency coefficient of growing grapes in protected ground in Polissya is higher than the normative values established for agriculture in general.

CONCLUSIONS

On the territory of Ukrainian Polissya in unheated greenhouses a microclimate that meets the biological requirement of the table grapes crop of early and mid-ripening berries is created. Growing grapes in protected ground is a relatively new and promising type of economic activity for the region which is characterized by high efficiency. Cultivation of table grapes in protected ground in Polissya makes it possible to provide people with local fresh grapes and create jobs.

ACKNOWLEDGMENTS

The publication contains the research work results of O. Salivon, postgraduate student, which were obtained under the guidance of A. Stirbu, PhD. The authors would like to thank Dr. I. Kovaleva for supporting research and giving valuable advice; O. Salivon, the head of the farm, for providing a base for research.

BIBLIOGRAPHICAL REFERENCES

1. Adamenko T.I., Kulbida M.I., Prokopenko A.L. (2019). Agroclimatic guide on the territory of Ukraine. Zhytomir: Polissya publishing house. 82 p. (in Ukrainian)
2. Perstnev N.D. (2001). Viticulture. Kishinev: Tipografia Centralna. 612 p. (in Russian)
3. Shtirbu A. (2019). Organizational and technological methods of grape cultivation: a practical guide. Kyiv: IA Infoindustry. 145 p. (in Ukrainian)
4. Corobca V., Nicolaescu G., Apruda P. (2019). Afaceri in viticultura. Chisinau. 140 p. (in Romanian)