



AgriTech Solutions: Innovating VET for Sustainable Agriculture

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2024-1-RS01-KA210-VET-000244168

EXPERT CONSULTATIONS

Use of technology in agriculture

Experts/organizations: ZZ "STUBA", TD DZP KLECHOVCE DOOEL, ADUT GVN, AG FUTURA Technologies, „KAV KOMERC AND AGRO KAV KOMERC", COMPANY „STOJCHEVI and WINERY ARBESKA", INDIVIDUAL FARMER MARJAN TANCHEV, LISA – KOM KAVADARCI, INDIVIDUAL FARMER STEFAN STOJCHEV, AGRIJA DOOEL, Individual farmers groups and individuals, IZ Branko Atanasov, Livestock farm

Engaged teachers: Stefanovski Saso, Milosheva Zaklina, Jovanova Kristina, Doncheva Milica, Nikolov Efremcho, Slavkovic Sonja

Location: Kumanovo, Sveti Nikole, Skopje, Strumica, Kavadarci, Valandovo, Veles

Short description

Agricultural cooperative "STUBA" from the village of Studena Bara near Kumanovo is engaged in the production of vegetables, primarily tomatoes and peppers, on its own land, as well as the sale and distribution of seed materials, fertilizers and plant protection products and other necessary equipment for the needs of individual agricultural producers and agricultural holdings. Modern agriculture uses various technologies in order to increase productivity, improve quality and reduce costs and environmental impact. In

For the production of tomatoes and peppers, it is desirable to apply the following technologies:

Greenhouses and greenhouses with controlled conditions

Which means automated control of temperature, humidity and light, ventilation and CO₂ enrichment systems, and continuous production regardless of external climatic conditions.

Precision irrigation (drop by drop)

Efficient use of water with minimal losses. Can be combined with fertigation (nutrient input through the irrigation system).

Sensors and digital monitoring

Soil, moisture, pH, temperature and light sensors, digital platforms and applications for real-time data monitoring and analysis that helps in timely decision-making decisions on the application of appropriate measures.

Automated mechanization

Soil processing, planting and packaging machines.

LED grow lights

They are used in indoor or greenhouse conditions to extend photosynthesis on days with low light.

Biological protection and intelligent pest management



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Using natural predators, biopesticides and early warning systems, combined with cameras and software for disease or pest recognition.

Drones and GPS technology

For plant health assessment, field monitoring and nutrient management, which would help in mapping and planning interventions.

Stefan Stojchev, is a registered individual farmer from the village of Sopot, about 6 km from Kavadarci, he is engaged in the production of wine and table grapes, cereals sown with barley and wheat, and also has a family mini winery. Stefan, noted that he has a large area of wine grape varieties over 30 ha or 300 decares and over 20 ha or 200 decares of cereals.

From this harvest, in order to reduce harvesting costs, achieve greater profits and be faster and more efficient in harvesting wine grape varieties, Stefan this year purchased an Automatic Grape Picker or Combine Harvester for harvesting wine grape varieties and used new technology in agriculture. The question arises, what new technologies are desirable to apply in the production of wine grape varieties? **For wine grape varieties**

- Precision irrigation,
- Soil and moisture sensors,
- Drones for monitoring conditions and diseases,
- GPS/GIS mapping of vineyards,
- Automated weather stations for disease forecasting,
- Mechanized pruning and harvesting with a grape harvester where possible,
- Fermentation control with digital systems.

For table grape varieties -

- Installation of a modern drip irrigation system for vineyards with fertigation,
- Anti-hail nets for protection against excessive UV radiation, or solar radiation light, protection from natural disasters, hail, etc.,
- Humidity and growth sensors,
- Drones for visual control, -
- Technologies for sorting and packaging grapes in eco-friendly packaging,
- Precise growth control (bioregulators for the application of soil and trellis)

For cereals (wheat, barley) - Precision agriculture

- GPS management of tractors,
- Drones for monitoring,
- GIS mapping of plots / fields,

Soil and fertilization

- Soil moisture sensors, - Precise fertilizer application,
- Soil analysis

Irrigation and water





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- Drop by drop or sprayers where application is required,
- Weather stations to determine the optimal time for irrigation,

Plant protection

- Digital systems for disease prediction,
- Drones or smart sprinklers,

Harvest

- Combine with sensors and GPS,
- Automatic yield measurement, etc.

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The livestock farm emphasized that modernization in agricultural technology is increasingly being applied and needed, both in terms of monitoring water and fertilizer needs, as well as measures to detect and monitor attacks by diseases and pests on plants, information platforms and applications, sensors that will constantly send data on conditions, and specially trained and educated people are needed who will enable and



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help in the use of such modern technologies, which will enable, through education, to deal with any type of obstacle or problem in the reception and use of them.

Conclusion

The application of technologies in tomato and pepper production enables higher yields, better quality, optimal use of resources and more ecological agriculture. The integration of these solutions, even in small farms, significantly improves the efficiency and sustainability of production.

The application of technologies in grape and grain agriculture enables higher yields, better quality, optimal use of resources and more ecological agriculture. The integration of these solutions, even in small farms, significantly improves the efficiency and sustainability of production.

The application of technologies in flower production enables higher yields, better quality, and optimal use of resources. The integration of these solutions significantly improves the efficiency and sustainability of production.

Education should emphasize the application of technologies in agriculture. Which application would refer to special software for the use of such modern technologies in agriculture. Since modernization in technology in agriculture is increasingly being used and needed, both in the area of monitoring the needs for the amount of water and fertilizer, as well as measures for detecting and monitoring attacks by diseases and pests on plants, information platforms and applications, sensors that will constantly send data on conditions, it is necessary to have specially trained and educated people who will enable and assist in the use of such modern technologies, who will enable through education to deal with any type of obstacle or problem in the area of receiving and using them. Curricula in the area of modern technology should be included in every sector of agriculture, which curricula would help to facilitate the application of the same, and would allow generations to emerge who will apply the knowledge, and with that, there will be greater use of technology in agriculture.



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