

SLOVAKIA

Farm's performance, restructuring & modernisation

Location

Marcelová

Programming period

2014 – 2020

Priority

P2 – Competitiveness

Measure

M04 – Investments in
physical assets

Funding (EUR)

Total budget 292 749.98

EAFRD 109 119.35

National/Regional 36 373.12

Private 147 257.51

Project duration

2019 – 2020

Project promoter

VITA - ZEL & company, spol.
s r.o.

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Rural Development Programme support was used for installing a water recycling system to further reduce costs of vegetable hydroponic production, and minimising waste water.

Summary

VITA-ZEL & Company Ltd. is the biggest producer of vegetables in Slovakia. The company grows vegetables on 80-100 hectares (ha), about 80 ha of which is used for growing field vegetables such as tubers, roots, onions etc. The company grows cucumbers and peppers hydroponically in 5.13 ha of polytunnels and needed to design a system for reducing irrigation costs. In addition, the company wanted to develop its capacity to produce its own seedlings.



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The project activities involved the setting up of the water recycling system and placing new hydroponic flood tables into six irrigation sections to produce the new seedlings.

Results

The implementation of the irrigation water recycling project and the modernisation of the irrigation system will result in a 33% savings in water consumption.

Also, by recycling water that contains nutrients necessary for plant nutrition, the company will save about 30% of the cost for fertilisers. In 2019, the company spent EUR 75 882 for fertilisers. With the new water recycling system, the company will be able to save EUR 22 765 per year.

The environmental benefit is that the excess water is recycled and then used to irrigate the plants. The water is kept in the production loop and it does not seep into the soil and subsequently into the groundwater.

Lessons & Recommendations

- ❑ The system introduced is not widespread in Slovakia as yet, so it was not possible for the beneficiaries to have the opportunity to benefit from the experiences of other farmers.
- ❑ A wide range of factors that influence the optimal growing conditions must be taken into account when setting the parameters for the operation of such an irrigation system and the subsequent recycling of drainage water.
- ❑ It is necessary to analyse the drainage water at the shortest possible time intervals, in order to mix the right formula for plant nutrition, depending on the plants' growth.
- ❑ In addition to the agronomic, biological, physical knowledge and experience involved, such technologies require producers to broaden their knowledge in complicated technical subjects (chemistry) and processes.

Context

VITA-ZEL & Company Ltd. is the biggest producer of vegetables in Slovakia. Since 2002, the company has contributed to Slovakia becoming more self-sufficient in fruits and vegetables. The company grows vegetables on 80-100 hectares (ha), about 80 ha of which is used for growing field vegetables such as tubers, roots, onions, etc.

The company's cucumbers and peppers are grown hydroponically in 5.13 ha of land. Hydroponics is a cultivation technique that does not use soil and it does not have limitations related to space and climate conditions. However, it was necessary to design a system for reducing irrigation costs. The company had an idea of a more efficient way to irrigate the crop by recycling the drainage water from the hydroponic cultivation.

The company also needed to develop its capacity to produce its own seedlings. Prior to the project, they sourced the seedlings for their production from Greek suppliers. In many cases, the quality of the supplied seedlings did not meet their requirements.

Therefore, they decided to solve several issues at once by building a system for recycling drainage water from the polytunnels and establishing a pre-growing covered area with hydroponic flood tables, suitable for the production of seedlings.

Objectives

The project objectives were to:

- Increase the efficiency of irrigation and water management by reducing water losses;
- Reduce operating costs for water consumption and fertiliser consumption by modernising the irrigation system;
- Increase the quantity and quality of vegetables produced;
- Reduce the environmental burden;
- Increase the company's sales; and
- Create employment in the region.

Activities

The new irrigation system would allow the excess irrigation water to be collected from the hydroponic flood tables through plastic outlets and then be transferred through the pipes to the underground 3 000 litre storage tank. A float pump, installed in this tank, would pump the water from the shaft to the smaller 50m³ central tank in one of the polytunnels. The water treatment plant would treat this water with UVC rays, and then store it in a second 50m³ tank. This water would then be pumped

back to another polytunnel through a flexible, plastic 90mm PN 10 HDPE pipe, purified through a 2-inch disc filter. Then, it would be used to irrigate six, approximately evenly sized areas, in the pre-growing covered area. The individual sections would be switched on and off via an electric valve, controlled by the 'PRIVA Connex' central control unit.

The project activities were implemented in two phases:

April 2019 – May 2019

- Construction of a pipeline and gutter system for the collection of drainage water in the polytunnels.
- Hydroponic flood tables were placed into six irrigation sections. The irrigation water was controlled by electric valves, which are switched on and off by a signal from the central control unit, extended with the necessary expansion module (hardware and software). The system includes a separate irrigation line from the irrigation room to a pre-growing covered area, a 90mm PN 10 HDPE pipe a central pump capable of pumping 8m³/h, a 2-inch disc filter, a central 50m³ tank for the collection of untreated drainage water and another 50m³ tank for the storage of treated drainage water.

July 2020

- Reconstruction of the irrigation system – as part of the modernisation, a new micro-irrigation system was installed in each cultivation row on an area of about 1.1 ha. The new micro-irrigation system ensures precise dosing of water and nutrients to each plant in the hydroponics.
- Construction of the water treatment system for processing the drainage water in the polytunnels and a pre-growing covered area. In order to allow the drainage water to be recycled to be used for irrigation, it is necessary to remove not only inorganic particles (by means of a filter), but also organic pollutants - viruses, bacteria and fungi, which can have a negative impact on the hydroponic cultivation. Without treatment, any disease would spread through the irrigation water directly to each plant. Therefore, it is not possible to use drainage water without treatment. A single UV device was installed into the irrigation system to remove fungal diseases, bacteria, worms, inactive viruses, but also aggressive viruses such as Pepino mosaic virus. UV rays disrupt the cellular structure, as the UVC radiation interferes with their DNA and RNA.

This kind of water treatment is simple. The device has low operating costs is the most commonly used in the world.

Main Results

The system has been in place since August 2020 and is still in its testing phase. The benefits are cost reductions and savings in irrigation water consumption in the company's cucumber cultivation.

The company uses its own water for irrigation, which is extracted from their own wells, but also from the irrigation system. The implementation of the irrigation water recycling project and the modernisation of the irrigation system will result in a 33% savings in water consumption.

Also, by recycling water that contains nutrients necessary for plant nutrition, the company will save about 30% of the cost for fertilisers. In 2019, the company spent EUR 75 882 for fertilisers. With the new water recycling system, the company will be able to save EUR 22 765.

The environmental benefit is that the excess water is recycled and then used to irrigate the plants. The water is kept in a production loop and it does not seep into the soil and subsequently into the groundwater.

Key lessons

Since the system introduced by the project is not widespread in Slovakia yet, it was not possible for the beneficiaries to have the opportunity to profit from the experiences of other farmers. A wide range of factors that influence the optimal growing conditions must be taken into account when setting the parameters for the operation of the irrigation system and the subsequent recycling of drainage water.

It is necessary to analyse the drainage water at the shortest possible time intervals in order to mix the right formula for plant nutrition at the actual growth stage.

In addition to the agronomic, biological, physical knowledge and experience involved, such technologies require producers to broaden their knowledge in complicated chemical information and processes.

Additional sources of information

www.facebook.com/vitzelcompany/