

Saving Water Report



ORGANIZATIONS

EduPlus, SA
European Center for Quality
Magenta Consultoria
Chrudimi Centrum

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Table of Contents

03

About the Project

04

Statistics

05

Project Summary

07

Saving water in
livestock (Portugal)

08

Saving and keeping
water in nature
(Czech Republic)

09

Plant and animal
waste as a source of
energy (Spain)

11

Saving water in crop
production (Bulgaria)

12

Tools and Contacts

About the Project

WHY THIS PROJECT WAS BORN

As a result of global warming, each year there are increasing areas which suffer droughts and water lack and become limited for living. All people must be aware of the water crisis, receive water management training, and take individual action at all levels. People are leaving the arid regions of Africa as a result of the battle for water, which has already begun. Drought and high summer temperatures have already affected EU countries such as Spain, Bulgaria, Portugal and so on and are starting to hit Central European countries. It is necessary to begin solving this problem on all levels of our lives.

With this project we want to focus on adult education in agriculture, ecology and landscape creation in one of the sub-themes of the global problem of the world - water protection. We want to deal with water management in the field of crop production, livestock production, maintaining water in the landscape and using plant and animal residues and waste as an alternative source of energy.

- Water is the foundation of life and survival
- Since 2000 the average annual temperatures have risen but the rainfall is lower
- Since 2017, there has been a significant water shortage.
- Droughts are making it harder to produce feed by lowering the yield of mostly bulky feed.
- Less water in the soil causes rapid mineralization of organic matter and reduces the soil's capacity to retain water.
- High soil erosion as a result of torrential rains
- Common solution needs to be found, the problem is also reflected in other countries - other EU countries often solve these problems and have more experience
- For adequate food production for human nutrition, there must be an international interchange of good experience and knowledge.
- Respond more quickly to changing climate conditions by addressing global problems



About the Project

OBJECTIVES AND SCOPE

Project: 2020-1-CZ01-KA204-078269

Saving Water is an international project aimed to raise awareness of water consumption in agriculture and to find the best methods or technologies to improve efficiency in these sectors:

- Saving water in livestock (Portugal)
- Saving and keeping water in nature (Czech Republic)
- Saving water in crop production (Bulgaria)
- Using plant and animal residues and waste as an alternative source of energy (Spain)

The specific and diverse selection and representation of partners in the project is based on geographical location and different climatic areas which will be a great and valuable asset for gaining new information and exchanging experience in agriculture with an impact on saving water.



About the Project

PARTNERS

EDUPLUS, SA

Portuguese company specializing in the implementation of training programs, internships, apprenticeships, various types of scientific panels, language and cultural activities, methodological workshops organized under various EU structures and programmes, mainly under the Erasmus + operational program.



EUROPEAN CENTER FOR QUALITY

European Center for Quality Ltd. gives highly professional consultancy help to its clients thanks to its qualified and experienced employees and using the rich international experience and know-how of its partners. The consultancy services offered from ECQ Ltd., are flexible according the needs and requirements of the firm's clients.



MAGENTA CONSULTORIA

MAGENTA CONSULTANCY is a consulting firm specialized in the design, elaboration, management and implementation of European projects, mobilities, training and activities that contribute to the development of gender and equality policies, as well as social and intercultural mediation policies.



ASSOCIATION OF AGRICULTURAL SCHOOL IN CHRUDIM

Association of Graduates and Friends of Agricultural School in Chrudim was established in 1864. The activities are aimed at promoting the Secondary School of Agriculture, education of its members and general public in the form of expert discussions, meetings and exhibitions.

“Association” cooperates with organizations aimed at environment and landscape protection or supports the activities of other organizations.



Spolek absolventů a přátel zemědělské školy v Chrudimi z. o.

Saving water in livestock (Portugal)

Concept

Livestock is commonly defined as domesticated animals raised in an agricultural setting to produce labour and commodities such as meat, eggs, milk, fur, leather, and wool. Saving water in Livestock production plays an important role in Portugal.

The training programme will be focused on different methods used by various farmers and specialists to lower the consumptions of water on animal farms. It will also consist on topics such as usage and recycling of water in agriculture, using water for farm animals in welfare, way of education and consultancy, EU subsidies and taken governmental measures.



Saving water in livestock (Portugal)

Prados de Melgaço

As part of a project to exchange good experience and practice, we had the opportunity to visit an organic goat farm Prados de Melgaco. There are kept 240 female goats, 2 male goats and 1 donkey on this family farm. Goats are housed in the stable freely in various groups. Animal welfare is maximally ensured in the stable. According to the owner, a subsidy from the European Union was used to meet all the conditions for goat welfare. The hutches are equipped with drinking water drinkers, scratchers and hay cribs. Into the trough, goats receive complete core feed in granular form, which is purchased from the production of feed mixtures in the area. Hay owners also buy from farmers on the border with Spain. Thus, all feed is provided from purchased sources. Mineral nutrition of goats is carried out in the form of mineral licks placed in each hutch.

There are no grazing conditions in the given locality, and therefore the goats are closed in the stable all year round. Classical music plays from the speaker for more animal comfort. Thanks to the provision of clean bedding and a good climate in the stables, goats produce milk of a good quality without any negative odors that could pass into the milk if the environmental conditions are not met.



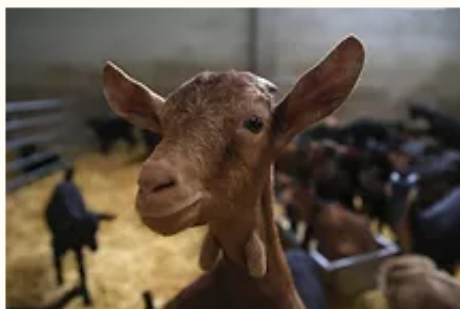
Saving water in livestock (Portugal)

Prados de Melgaço

Milking of goats is performed on a modern parallel milking parlor for 2 x 10 goats, with 10 milking parlors common for both sides of milking. This milking parlor is from the DeLaval brand. To motivate goats to milk, grain is added to the milking parlor in the form of whole barley.

After milking, the milk is transferred to cooling tanks, from where it is pumped for processing to a farm dairy, where mainly French-type cheeses are produced. This dairy was built with the support of the European Union. Due to high hygiene rules, it was not possible to see the dairy physically. The process of milk processing in the dairy was performed in the form of a video, where it was possible to see the process of processing the milk produced. Subsequently, the cheeses produced were tasted. In addition to fresh cheese, we also tasted ripened cheeses that ripen for 30 days and cheeses flavored with spices and wine after 40 days of ripening.

The owner explained how she uses water resources on the farm. The goats are fed in the form of drinkers with drinking tap water. Utility (rain) water is used on the farm mainly for rinsing and cleaning in the milking parlor and stable and for irrigation of vineyards (drip irrigation), which line all the surroundings of the farm and dairy.



Saving water in livestock (Portugal)

Quinta de Pregal

The last breeding visited was the Quinta de Pregal farm, which deals with the breeding of Barroso beef cattle, kept in a clean line. The owner of this farm comes from an agricultural family. He studied agricultural school and after returning from studies in 2018, he decided to resume beef cattle breeding and meat production. This farmer farms only 10 hectares of land and despite this small volume of land is profitable. The animals are found outside on the pasture all year round, where calves are also born. The feed base of the cattle is mainly pasture rich in herbs, followed by corn silage and hay grown only on their own land. Animal welfare is taken care of in breeding.

After fattening, the farmer has the young cuts slaughtered and sells the meat directly from the farm in 10 kg packages. Its customers are also more luxurious hotels.

When it comes to water and water management, surface water is used there. This water is cleaned of impurities with the help of plants and then led through a riverbed around the pasture. The water is of high quality despite the fact that it is surface. Cows go to drink in the riverbed, as it is the only available source of water for the herd. Despite the fact that it is surface water, thanks to these channels there is a continuous movement of water and thus the safety of water.



Saving and keeping water in nature (Czechia)

Concept

The mobility in the Czech Republic of the European Project #Savingwater took place in several organizations and farms from Chrudim and Prague from the 7th until 13th of November. Participants from Portugal, Spain and Bulgaria shared their ideas and knowledge to learn about saving and keeping water in nature.



Saving and keeping water in nature (Czechia)

Hydroponics in science and research at KARP

According to the project program, the mobility started with a seminar on "Hydroponics in science and research at KARP". The topic was presented by Mr. Petr Zábbranský (Czech University of Life Sciences, Department of Agroecology and Plant Production). The participants got to know that in early 1860 the scientist Julius Von Sachs compiled the world's first recipe for a nutrient solution, after which it was possible to grow plants without soil substrate. Despite that and unfortunately hydroponics is a new way of producing many plants in agriculture in Czech as well as in Bulgaria, and especially rarely used in the field of growing ornamental plants. The lecture was very detailed and supported by lots of photos. It was very useful that the lecturer showed us what kind of equipment he used.

We learned about some highly practical techniques for growing plants for attractive vertical green walls as well as for adopting water-saving measures that can be applied in the participating nations of this project. We learned about the new projects examining the distribution of the root system and the size of the leaf area and considered the current topic of the use of intermediate crops in field crops. The lecture finished with a practical visit to the greenhouses at the university, where we saw the hydroponic systems and discussed issues that arose during the presentation. The findings of Petr Zábbransk's efforts looking at the dispersion of the root system will be extremely helpful to us in our own future similar experiments.



Saving and keeping water in nature (Czechia)

Hydroponics in science and research at KARP

The various instances of soil erosion and runoff in the Czech Republic were introduced in Petr Harata's presentation. The processes also transfers plant nutrients (Nitrogen, Phosphorus) and pesticides (PPPs). Entries of PPP can also be significantly reduced to acceptable levels with appropriate mitigation measures. Thanks to the lecture we confirmed and widen our usual list of measures other ones in the scope of land management of soil erosion for example: establish hedges and artificial wetlands/ponds, build bunds and terraces with retention structures; optimized irrigation and the size of the land blocks; changing crops; controlling patterns/ working across the slope, etc.

For the mitigation of PPP with the water the following measures were discussed and these may have best implementation effect in our country: moving to organic farming of appr. $\frac{1}{4}$ of the cultivated or farm areas; better awareness when using fertilizers; different ways of controlling drifts like nozzles size, boom height and others; proper technical and spraying adjustment, maintenance and cleaning of machines, safety instructions when transporting PPP, etc. – all this is included in educational events for farmers twice a month in the Czech Republic. The legal framework for water protection in the EU includes surface, groundwater, and marine waters, as well as the regulation of plant products.



Using plant and animal residues and waste as an alternative source of energy (Spain)

Lombriastur - Gijon, Asturias

The use of plant and animal residues and waste as an alternative source of energy was another partial topic to be addressed in our project as examples of good practice. The Spanish partner organization Magenta Consultoría Proyectos S.L.U, which prepared a very interesting and very beneficial program on the topic, undertook this task very well. The first organization visited, was Lombriastur (Grao), which specializes in the production of organic fertilizer, the transformation of composted livestock manure into humus using California earthworms. Earthworms perfectly process organic residues, which they convert into organic matter rich in humic acids and cytokinins, so they have a very positive effect on soil fertility.

Lombriastur is one of the only organizations in Asturias that has been targeting California earthworms for over 30 years. On an area of 1.5 hectares, there are 41 belts with a water-permeable foil. To obtain 300 tons of humus, it is necessary to process 1000 tons of manure. The processed organic mass is dried in a greenhouse so that the water content of the humus does not exceed 40 %. This process takes about 5 days in summer time and up to 3 weeks in winter time. The final drying takes place using a dryer, which artificially dries the humus. The temperature of this last stage of production does not exceed 60 degrees, so as not to disturb the natural microbiology of humus. Humus can be stored for a maximum of one year in a shady place.

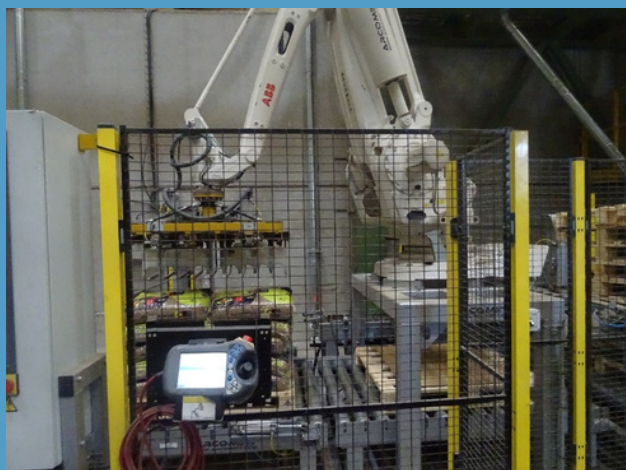


Thanks to the incorporation of such a good quality humus into the soil, its physical, chemical and biological properties are affected and improve its properties and form its structure suitable for plant growth, their protection against the effects of toxic substances. Humus also maintains a stable water and a temperature regime of the soils, thus allowing the development and positive impact of edaphon. Sufficient humus in the soil ensures the desired water absorption and especially along floodplains, it can reduce the risk of flooding residential areas.

Pellets Asturias - Teneo

Pellets are a universal fuel that you can use to heat various types of buildings, such as family houses, cottages, apartment buildings, guesthouses, restaurants and other facilities. Pellets are compressed sawdust that is compressed and heat bonded. Pellets are produced by pressing waste sawdust therefore they are ecological. The best quality pellets are made of sawdust, which is stripped of bark. In Spain, in the region of Asturias, the firm "Pellets Asturias, S.L." is only one with 6 employees in 3 working shifts, 1 a technician and an administrative worker. The entire production process is fully automated.

From an ecological point of view, the process of pellet production leads to the maximum possible use of tree biomass and it is prevented to the unused biological waste. It was very interesting to monitor the whole automated process directly thanks to the director's explanation. We were able to follow the entire production of pellets in detail and from different angles, which illustrated the view of this beneficial production activity.



Visit to eMULA project (Cabrales)

The management in the Picos de Europa National Park was very interesting for the project. The company eMULA was created for the improvement of composting in which they have tested the use of forest biomass as a structure element to facilitate composting, using manure produced by cows, goats and breeding sheep. A representative of the company introduced us to their project, which is based on the traditional use and treatment of manure to its final compost form. The company collects manure from 30 suppliers on a regular basis. It also uses wood residues from forest mining for composting, which increases the absorption capacity. Cattle usually graze freely in the wild, where they unfortunately face an increase in the number of wild wolves, causing considerable losses to farmers.



Dairy cattle are based on the traditional rotation of pastures near the farm. The actual production of composted manure consists in mixing all types of manure from cows, goats and sheep, so that the customer always obtains the same quality and the absorption capacity of composted manure was in maximum.



In this beautiful area, we also had the opportunity to visit a local farmer who is involved in this project.

SAVING WATER REPORT

With the breeding of goats and sheep, he contributes as a manure supplier to the production of quality organic compost. It was also beneficial for us to see the production of goat and sheep cheeses in - queseria "El Cabriteru Arena de Cabrales" and the local museum of cheese production in the traditional way.

The herd at "El Cabriter" consists of about 150 Murcian goats and 250 Lacaune sheep. Their diet is carefully maintained, consisting essentially of dry fodder, mostly alfalfa and some cereals. Their food is carefully maintained, consisting essentially of dry fodder, mostly lucerne and some cereal. Animal welfare is a concern of the owners, allowing them to obtain superior quality milk with which they make their cheeses. The cheese dairy "El Cabriteru" started making cheese in 2016. After a decade as sheep and goat milk producers, they decided to take the leap and transform the milk of their goats and sheep into their own cheeses.



Being located in the region of Asturias, a region known for its variety of blue cheeses, the cheese dairy "El Cabriteru" did not limit itself to making DOP cheeses but went further by creating 3 signature cheeses, internationally awarded in 2016 (beginning of cheese production) and again in 2021 in the blue cheeses category of the "world cheese awards" contest, all its cheeses are produced with raw milk from its herd, having three different varieties: raw sheep's milk cheese, raw goat's milk cheese and cheese of raw sheep and goat milk.

SAVING WATER REPORT

The group was received and accompanied by the owner who, during the visit, carefully explained the whole process of raising the animals as well as the manufacture of the products, and processing of the produced manure in connection with the eMULA project.

The local museum of blue cheese, carables, goat's, cow's and sheep's milk has given us a comprehensive idea of the historical way of making this traditional cheese. In Spain, there is a greater harmony in nature, and thus greater biodiversity, and we were in the northern industrial areas of the country.

Jardin Botanico de Gijon

The visit of the botanical garden "Jardín Botánico de Gijón" was very beneficial for us. Here we could see typical plants and woody plants common to the region of Asturias, which are used as one of the components for the production of quality compost and biomass. The close connection to the local University with a scientific focus, who use the garden for their research and knowledge, was also excellent.



Museo de la Sidra

The visit to the "Cider Museum" was quite an experience. We not only had the opportunity to learn about the history of production and the technology involved in this traditional and world-renowned juice, but also the ways of treating the vegetable residues caused by the processing of the apple. The traditional production of this drink through historically invariable processes accompanied by historical-cultural "events" reinforces the relationship of people with the place and its landscape.

Both human activities favor intergenerational ties and, therefore, the transfer of traditional agriculture to the landscape, which is smoother than in the case of conventional production. The widely managed landscape, in which there are orchards dedicated to the production of cider apples, creates ideal conditions for ecologically demanding plant and animal species.



Conclusion

Asturias is an area of Spain where there is a relatively high amount of precipitation throughout the year due to the relatively high mountains of the Picos de Europa National Park and the proximity of the sea. In this area, the land is used mainly for livestock breeding, so the processing of manure is one of the usable commodities for the processing of quality compost and its export, especially to other areas of Spain. Given the current climate change, it is desirable for manure processing technologies to spread beyond Asturias. Quality compost obtained from animal waste products can help tackle climate change, in particular by helping to retain water on farmland.



Saving Water in the crop production (Bulgaria)

ONDO Company

ONDO is a smart farming solution created by farmers for farmers. The company's team of agricultural experts and agronomists have very good experience in the building and integration of solutions for automated drip irrigation, precise plant nutrition and climate control for greenhouses and open fields. Together with a skilled team of experienced software and hardware specialists, they worked to create a reliable technology solution that meets the needs of farmers while keeping it easy to use. The ONDO irrigation system is an automatic system. It consists of a water source (underground or surface), a pump, a control unit, pipes and nozzles. Equipment for the application of liquid fertilizers can also be connected to the system. This irrigation system can be used indoors (greenhouses) or outdoors (fields or gardens). It is used for row planting of vegetables, small fruits and flowers. Compared to the conventional irrigation systems used in Bulgaria, this system can save up to 30 % of water, reduce fertilizer consumption by up to 20 % and increase yields by up to 20 %. The system also delivered abroad eg. Greece, Romania, North Macedonia, Turkey and Serbia. The company is constantly developing and improving the system. The current system is already the 3rd generation.



The Botanical Garden Borika

The Botanical Garden Borika was established in 2016 in the village of Borika. After graduating from the Department of Landscape Science and Environmental Protection at the Faculty of Geology and Geography, Sofia University "St. Kliment Ohridski ", its founder, Mr. Yassen Ivanov, succeeded in making true his dream to create a place that promotes the environmental protection and let everyone learn new about nature, see rare plant species from Bulgaria and other parts of the world.

The owner of the botanical garden also showed us weeds that are invasive and unpleasant for farmers for weeds in fields and other green areas such as Japanese knotweed (*Reynoutria japonica*).



Paisii Hilendarsiky University

Nowadays the faculty of biology has more than 50 years of history. Annually over 1000 students study at the faculty in several bachelor courses –Biology, Biology and Chemistry, Ecology and preservation of the environment, Molecular biology and Bioinformatics, Ecology and biotechnological production and Medical biology, Biology and Physics. There is a separate laboratory for genetic engineering, within the department of plant physiology and molecular biology. Hundreds of publications (also including treatises) in Bulgaria and many other countries testify to the scientific research of the highly qualified faculty staff.

There we met a team of educators who showed interest in our project and also presented their water protection project focused on water contamination and its impact on aquatic animals. At the same time, they showed interest in cooperating and building the new ecological project. The exchange of experiences and ideas was very beneficial for both parties.

Institute of Plant Genetic Resources

Preservation of plant genetic resources, part of the Bulgarian cultural heritage, is the main duty of the Institute for Plant Genetic Resources „K. Malkov“ based located in the town of Sadovo, Central South Bulgaria, situated 15 km away from Plovdiv. The area has a typical continental climate – warm summers and cold winters.

The IPGR manage 270 ha arable land, 155 ha of which are experimental fields and 115 ha be seed base. The IPGR has a National Seed Genebank, botanical garden, herbarium, computer center and specialized laboratories: seed-investigation, plant protection, biochemistry, plant physiology, agricultural chemistry, plant biotechnology and quality of grain. The Institute for Plant Genetic Resources is accredited to educate regular and part-time PhD students in scientific discipline: „Breeding and Seed Production of crops“. IPGR has qualified scientific personnel and good facilities for teaching practices and internships to students and manual for graduates and postgraduates in different directions in agricultural science.



Maritsa Institute

Maritsa Vegetable Crops Research Institute, Plovdiv is a national research center for scientific, scientific-applied activities and extension service in the field of the vegetable crops and potato breeding, the technologies for vegetable crops growing. The Institute is situated in the Thracian valley – the biggest vegetable production region in the Republic of Bulgaria. This institute is a research unit in the structure of the Agricultural Academy. The achievements of the scientists in the MVCRI are well known abroad that making them competitive partners in research studies in the field of vegetable production. The lecture on the new variety of "pink tomato", which is briefly introduced on the market as a new vegetable varieties, was very interesting. The institute also researches legumes and their nutritional values, which are measured in laboratories. We had the opportunity to visit both laboratories and greenhouses, where new and existing varieties are retested.

Rose Fields and Destillery

40 km from Plovdiv, in the Brezovo village of Zelenikovo, the largest rose brewery on the Balkan Peninsula has been built. The distillery is 93 years old and at the time was among the most modern in this part of the world - a distillation system using French technology for the extraction of rose oil. The great experience, knowledge and striving for perfection of the owners of the then company "Shishkov and co", representing the largest producers and traders of rose oil in Bulgaria in the period from the 19th century to the mid-40s of the 20th century, were invested in its construction. century. After the nationalization, the rose brewery is managed by the former state company "Bulgarian Rose" Currently, this is the only fully preserved and authentic rosary in Bulgaria, declared a cultural monument as an architectural and technological value. There are rose fields to the destillery.

The plants bloom for two months from half of May to half of July. Rose leaves are collected early in the morning from 4 to 5 o'clock and until the air temperature reaches 20 degrees C, then the oil from the leaves begins to evaporate. 3 tons of rose leaves are needed to produce one liter of rose oil. Simple atmospheric distillation is used for the distillation of rose oil, whereby heat is obtained by burning fuel oil and water to coolers for condensation of water with oil droplets is obtained from an underground well. Subsequently, the heated water is freely discharged through the storage tank back into nature.



Botanical Garden Sofia

The University Botanic garden - Sofia was founded in 1892 by the first professor in botany Dr. Stefan Georgiev. On the inauguration day Bulgarian King Ferdinand I planted an oak (Quercus robur L.) lying a golden coin in its roots. Today the oak tree with its powerful trunk and crown gives cool shade reminding the vast oak forests covering Sofia region in the past. Its Global Strategy for Plant Conservation mission statement "is a catalyst for working together at all levels - local, national, regional and global - to understand, conserve and use sustainably the world's immense wealth of plant diversity. The international co-operation across EU boundaries throughout a strategic partnership involving high education institutions, conservation and research organizations (botanic gardens, gene banks, universities, research institutes, non-governmental organizations) may meaningfully contribute to create a better understanding of plant diversity problems and their possible solutions. Botanical garden implement HEI PLADI project relays on a constructive cooperation and integration between five Universities, research institute and organization all providing strong expertise in the field of plant biodiversity characterization, management and conservation and in lifelong learning.



Summary

The last mobility in Bulgaria has integrated the aims and objectives of our project "Saving water" very well. In this beautiful part of Bulgaria, we had the opportunity to compare approaches and technologies of organic farming, we learned about the possibilities of using arid crops and their use in the food industry. Rose plantations and their subsequent use in the pharmaceutical and cosmetic industries were a real experience for the participants, because Bulgaria has a historical tradition and value in this area. Very kind and nice mentors willingly shared their experiences and answered questions. Mutual exchange of experience is always mutually beneficial.

Conclusion

During two years, experts from the partner countries of Czech Republic, Bulgaria, Portugal and Spain exchanged experiences of the good practise in the field of agriculture, namely in the topics of saving water in the field of crop and livestock production, water retention in the landscape and the last topic was the use of plant and animal remains and waste as an alternative source of energy.

The Czech Republic has a well-established plan and projects for retaining water in the landscape, which will eliminate poor water management in the 90s. In its research program, Bulgaria has set plans for the development of non-traditional drought-loving crops such as sugar sorghum, and also monitors yields depending on the amount of water in sunflower, corn or noble new varieties of vegetables. The northern part of Portugal does not have problems with a lack of water, but with its retention in the landscape, where a lot of water flows into rivers during periods of torrential rains. In animal production, they try to use natural resources as much as possible for watering farm animals, and farmers try to circulate water on their farm and make the most of it. A visited region of Spain, Asturias struggle with the management of national parks and a high increase in the number of wolves. For the maximum use of agricultural biological waste, they use historically proven procedures based on, for example, mixing sawdust into composts for better water retention and thus the decomposition of biological substances usable for fertilizing.

Exchange of experience and mutual education is always beneficial for agricultural practice. A total of 16 active experts of the various organizations with different agricultural specializations, who went through weekly internships in order to develop their professional knowledge and competences, were involved and supported in the project.

Questions? Contact us.



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