

# **Project Improving C-balances on livestock free organic farms for the sequestration of atmospheric carbon**

*Study trip report – 12<sup>th</sup> and 13<sup>th</sup> of May 2022*

## **Introduction**

The study trip of the EUKI (European Climate Initiative) project on the improvement of humus balances in organic arable farms with low livestock numbers took us to the farms of the Jugovits family in Schachendorf, Austria and the Büki family in Sukoro, Hungary on 12 and 13 May 2022. In addition to the staff of the project partners, the state institutes in Slovenia and Serbia, demonstration farmers, two representatives of ÖMKI, the Hungarian Research Institute of Organic Agriculture, also took part.

### **1. Jugovits Farm, Austria**

At the Jugovits family we were able to see a whole range of good and innovative methods for building up humus. These were wintering catch crops, cut and carry, strip tillage, and own composting. The fields of the Jugovits family are easy to find due to their darker color.

Josef Jugovits converted the farm to organic in 2007 and now farms around 100 ha. His past as a mechanical engineer is clearly visible in various machines he has developed. In 2020, 21 crops were grown, including wheat, soya, fennel, caraway, coriander, winter barley, spelt, sunflowers, pumpkin, Pannonian vetch, camelina, poppy, winter rape, winter rye, oats, naked oats, potatoes, chickpeas, durum, einkorn, and some field vegetables for direct sales. No crop is grown more frequently than every 7 years. The proportion of lucerne clover grass is 15 - 20%. The mixture consists of 40% lucerne, 30% red clover, 5% white clover and 25% grasses like of timothy, golden oat, and cocksfoot. Mr. Jugovits prefers mixtures to pure lucerne seeding. The first cut is used to cut and carry, the second and third cuts are composted. Another method of growing small-grain legumes is seed multiplication. 4 kg of lucerne, 12 kg of white clover and 10 kg of gold of pleasure are sown together. In the first year the camelina is threshed, in the second year the lucerne. On the heavy clay soils with high magnesium content, the farm does not use a plough, even when ploughing up the lucerne-clover grass. Here, tillage is done in summer, followed by a catch crop. In the first step, tillage is done with a blunt cultivator, then with a wing share cultivator. For this type of tillage, it is advantageous to use a mixture instead of a pure lucerne seed. The farm manager cites the occurrence of the weed ragweed as a serious problem in the region.



Picture 1: Discussion with Josef Jugovits at his soya field, *Werner Vogt-Kaute*

## 1.1 Overwintering Intercrops and strip tillage

The "normal" time for sowing intercrops right after the grain harvest no longer works because it is too hot and too dry at that time. Only heat-tolerant weeds and sorghum/Sudan grass would grow. Therefore, Mr. Jugovits prefers overwintering intercrops before soybean, maize, and sunflower, which are sown later. A mixture can, for example, consist of Pannonian winter vetch, winter rye and winter turnip. For tillage, the mixture is undercut flat over the entire surface. Only the strips on which the seed is sown are deeply loosened and the straw is cleared away. The mulch sowing method has not proved successful because the soil has not warmed up. With RTK, sowing is then done exactly in this loosened row with a special seeder. The plant roots can quickly penetrate the depth. In the loosened strip, not only the crop but also the weeds develop very quickly. "The method is not suitable for pumpkin, as it only roots shallowly," Mr. Jugovits explains the limitations of the system.

## 1.2 Cut and Carry

The first cut of lucerne grass is driven into crops such as maize or sunflowers, which then have a growth height of about 20 cm. The lucerne clover grass is chopped short. The yield is 70 - 80 tons per ha, which corresponds to about 80 kg N. The receiving area is about the same size as the donor area. Mr. Jugovits calculates the cost of the method at € 400. The most important effect of the mulch cover is evaporation protection.



Picture 2: Compost turning machine, *Werner Vogt-Kaute*

### 1.3 Composting

Mr. Jugovits produces 1300 m<sup>3</sup> of compost per year. The compost consists of manure, mowing of nature conservation areas, clover grass, clean-out from a grain processor and wood chippings. He is authorized to produce compost on an area in certain rotation. The heaps are set up and mixed throughout the year as the material accumulates. The compost is only spread in the stands in spring. Here, too, the effect of evaporation protection is used. Mr. Jugovits has also experimented with MC compost but was not satisfied with it. He says it is because of too dry conditions in the region.



Picture 3: Special machine for direct drilling, Werner Vogt-Kaute

## 2. Büki Farm, Hungary

Jozsef Büke leased and bought the land in 2015 to start farming organically. In the meantime, he has reached 400 ha, which he considers a reasonable size for an organic arable farm in his area. Compared to Mr. Jugovits' many innovative ideas, the farm seems quite "normal". Nevertheless, he has a fundamental difference from most livestock-less arable farms in Southeast Europe. He also grows maize, soya, cereals (wheat, spelt, winter barley) and sunflowers as a crop rotation. In addition, however, he grows lucerne for two years. The lucerne has so far been sold to Austria as lucerne hay, as there is no market for lucerne in Hungary. He turns the lucerne gently with a belt rake and dries the bales in a bale dryer to preserve the leaves. Mr. Büki is planning to purchase a pelleting plant to become more flexible in marketing. In 2022, long-straw winter peas will be grown in a mixture with wheat for the first time. Jozsef Büki likes this crop well and he will also include it in the crop rotation as a subsequent crop after sunflowers. This will be followed by another cereal crop. This extension of the crop rotation would allow him to leave the lucerne for three years instead of two. The lucerne is sown under green oat cover crop. White clover was under sown in cereals for the first time, as intercrops in midsummer do not succeed safely here either. As fertilizer, Jozsef Büki has so far been able to use cattle manure from a neighboring conventional farm, in addition to potassium and sunflower cake.



Picture 4: Wheat at Büki farm, Werner Vogt-Kaute

## Conclusion

The participants were pleased with the many suggestions that the two farm managers were able to successfully practice organic livestock-free arable farming with a positive humus balance.

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*Project partner:*



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