

## 19.6. BIODIVERSITY

*Forty participants attended Kilpiä farm in June to discuss how a farmer can enhance biodiversity. The four observation points gave a concrete insight into what can be found in the fields.*

### Land Use Optimization tool evaluates the field parcels

Research Professor Pirjo Peltonen-Sainio (Natural Resources Institute) told about the Land Use Optimization tool, which will be available to all farmers this year through the Economy Doctor portal. The idea behind the tool is to evaluate fields based on their productivity and other features in order to place them in three categories: sustainable intensification, extensification and afforestation. Extensified parcels are well suited for providing environmental benefits but they can also be used to improve the soil health so that they can later be reintroduced into food production.

### Pollination services will increase crops

Eeva-Liisa Korpela (Finnish Association of Beekeepers) told about pollinators. About 75 % of food crops require insect pollination. The most important of the wild pollinators are the bumblebees. Honeybee is important, for example, in pollinating oilseeds and buckwheat. The efficiency of pollination is usually improved when different pollinators are working together. Natural pollinators are characterized by annual fluctuations of the population. Beekeepers provide an important pollination service when moving beehives in the proximity of fields. For natural pollinators, it is important to have enough suitable hibernation sites such as stumps and ditches.

### Useful and harmful buzzing in the field

The crops have many common pests. For instance aphids cause damage to cereals. The silver Y moth became more abundant than usual last year. It does not overwinter in Finland; therefore its occurrence depends on migration. Rarer pests also occur and they may be locally important. Typical to all of pests is the large annual variations in populations. Research scientist Erja Huusela-Veistola (Natural Resources Institute) introduced pests and their natural enemies. One of the best-known natural enemies of insect pests is the ladybird which keeps the number of aphids under control. Spiders, beetles etc. also contribute to controlling pest populations. Natural enemies can be favored by reducing harmful cultivation practices and by maintaining suitable feeding and wintering sites. Field edges and perennial crops are important.

### Microbes hidden in the root system

Research scientist Ansa Palojärvi (Natural Resources Institute) discussed about roots and microbes. The majority of microbes are found on the surface of the roots as they get sugars through the roots. They are also involved in nutrient cycling, for example up to 100 kg/ha of

nitrogen in microbes. Diverse crops with different root systems are beneficial to microbes. The area under the shoe has over a million micro-organisms - a lot of buzz even though we cannot see it.

### Cover crops increase diversity

Research scientist and farmer Tuomas Mattila told about cover crops. First of all it is important to ask yourself the main purpose for growing cover crops. What is the aim? The answer then depends on what is possibly the best mixture. Suitable seed quantities can then be calculated. After sowing, the success of the work should be observed. The emerged plants are counted and the achieved density is compared with the desired one.

### Finally about birds

Research scientists Juha Tiainen and Tuomas Seimola (Natural Resources Institute) took us to the world of birds. Birds are also both beneficial and detrimental to farms. Birds spread seeds and control weeds and pests. On the other hand, they cause crop damage, eat seeds or weaken pest control. The effect depends on the abundance of key species and the structure of the bird community. For birds, the habitats outside the fields are most valuable. In addition birds benefit from the winter vegetation cover. Small parcels, abundance of field edges and diverse cultivation ensure the abundance of breeding species in the area.

## 8.8. PEATLANDS

*At the beginning of August a field day about peatlands was organized in Siikalatva. Nearly 50 participants gathered at Mankila village house and Rabinä farm to discuss the topic. We organized the event in co-operation with Rabinä farm and projects from the Natural Resources Institute and ProAgria Oulu.*

### The characteristics of peatlands

Professor Laura Alakukku from the University of Helsinki and Research Professor Kristiina Regina from the Natural Resources Institute highlighted the characteristics of peatlands and their effects on the climate. The positive aspects of cultivated organic soils are that they are flat, easy to tillage and require little nitrogen fertilization. On the other hand, inferior properties in terms of cultivation include acidity, wetness, coldness and weak carrying capacity. The amount of usable water in the surface and subsoil is clearly higher than in mineral soils. Peatlands cover only a few percent of the worldwide land area, but they are still the most important carbon storages. One cm of peat contains about 10-20 tons of carbon. In Finland cultivated organic soils accounts for 11% or 250 000 ha of arable land.

Cultivation modifies the natural properties of peat, for example fertilization increases nutrient content. The chemical, physical and biological properties of peat are changing. Due

to drying the peat becomes oxidized and decomposition begins. As the peat decomposes the water conductivity and the soil level decreases. The need to renew drainage is increasing, so slowing down degradation is important for farming practices. The following three factors play a key role in cultivated peat fields: vegetation cover, raising level of groundwater and reduction of tillage.

### **Possibilities of wetland cultivation**

Research scientist Hanna Kekkonen (Natural Resources Institute) told about wetland cultivation. This is a very new term that is defined as active cultivation of peatlands under wet conditions. Wetland farming preserves the natural characteristics of peatlands. It is especially suitable for peatlands with thick layer of peat. Groundwater levels are kept at natural high altitudes which is an effective way of reducing agricultural greenhouse gas emissions. Currently there are field trials with willow, reed canary grass and grasslands since the knowledge about wetland crops suitable for Finnish conditions is insufficient.

## **27.9. SOIL STRUCTURE AND WATER MANAGEMENT**

*About 30 participants gathered in Inkoo on a beautiful sunny day at the end of September to discuss issues related to soil structure and water management. The presentations were heard in Västankvarn and in the afternoon participants moved to the nearby field and wetlands. We organized the event in co-operation with Forsman farm and projects of WWF and Natural Resources Institute.*

### **Importance of Soil Organic Matter**

Leading research scientist Tapio Salo from Natural Resources Institute told about the importance of the soil organic matter for crop production. Only 10 % of the soils organic matter is living (fungi etc.). The remaining 90 % is dead and degradable such as humus and plant residues. Organic material can be classified on the basis of size and durability. Its rate of degradation varies from minutes to thousands of years. Humus and persistent material are often protected inside soil particles (clays). Organic matter acts as a nutrient storage and improves water retention. Together with clay and calcium it forms durable crumbs. If the carbon (C) content of the soil is to be determined, multiply the organic matter content by 0.58. Luke's ORANKI-project evaluated the yield impact of organic matter. The spring cereal yields per hectare increased by 230-390 kg when the soil organic matter content increased by one percentage point. The benefits of ditching and liming can neither be underestimated. Weak water management lowers yields.

### **Drones in the evaluation of field parcels**

Research scientist Roope Näsi (National Land Survey of Finland) told about the use of drone images in the evaluation of fields. Since 2016 in some OPAL Life pilot farms drones have

been used to scan field parcels. For example, weed colonies and old drains are distinguished in orthophotos. Monitoring of the grass crop has shown that the crop doubles between mid-June and the end of the month within a week period. Satellite images are relatively indicative but drone images are of a different accuracy. Satellite images look at the field at ten meter scale while the drone reaches 10 cm. The vegetation index values (NDVI) determined on the basis of satellite images represent the growth potential of the field. Particularly around midsummer the images correlated well with the yield level of the parcel.

### **Drainage from the perspective of water law**

The Water Act regulates the implementation of water management projects and the management and use of water resources and the aquatic environment. Lawyer Anna-Rosa Asikainen (MTK) talked about drainage from the water law perspective. The Water Act has its own definitions of drainage and ditch maintenance which is not always obvious. The difference is worth recognizing because of different regulations.

### **Wetlands in water protection**

Winter rainfall is predicted to increase due to climate change. Thus more attention must be paid to water management in fields. In order to improve water management it is necessary to increase the number of water retention areas. One alternative is the construction of a wetland which has many benefits: leveling flood peaks, acting as a reservoir and increasing biodiversity, recreational use and landscape values. Conservation expert Jenny Jyrkänkallio-Mikkola (WWF) explained in more detail the importance of wetlands. She reminded that improving the status of inland waters will also affect the state of the Baltic Sea. The wetland itself should be 0.5 - 1.0 % of the size of the upper catchment area. Non-cultivated, already humidified areas are particularly well suited for wetlands. At the end of the day we got the chance to visit WWF's new wetland destination in Inkoo. It was built on the premises of Västankvarn farm in August 2019.