

## BETAMIKRO – *Beta vulgaris* microbiome and its interactions with the plant.

Sugar beet is one of more important crops, it is the main source of sugar in Poland and many other countries. Sugar beet plantations are frequently affected by drought in recent years, which leads to decrease of harvest and, in consequence, economic problems for farmers as well as increase of sugar prices.

Research planned in the BETAMIKRO project are aimed at increasing sugar beet drought resistance by the use of microorganisms coming from its wild and drought-resistant ancestor *Beta vulgaris* ssp. *maritima*.

To date, single culturable strains of microorganisms were used for improving crops (bioaugmentation). However, as 99% of microorganisms cannot be cultured, yet they may exert beneficial influence on plants, in our project we will use all organisms, regardless of their ability to grow in culture (the so called 'microbiome').

During the project a methodology of microbiome transplantation will be devised. We will also obtain sugar beet plants devoid of endophytes, which will serve as recipients of prepared microbiome. This will allow studying direct influence of exogenous microbiome on the plants. Dynamics of plants colonization by microorganisms added to soil will be assessed. We will use modern methods of mass sequencing of marker gene fragments, i.e. genes, whose sequences differ in different organisms. Then, sugar beet plants colonized by wild beet microbiome will be grown under drought stress conditions. The influence of drought on the plants will be assessed at the level of physiology (weight, water and chlorophyll content), as well as by molecular methods. We will check if the microbiome influences sugar beet gene expression pattern using RNASeq technology. We will study influence of bioaugmented microbiome on autochthonic (native) soil and endophytic microbiome.

The results of the project should help in devising methodology of obtaining novel inoculates, which will increase plant drought resistance, and in consequence will have beneficial effect on agriculture and food industry.