Testing microbial inoculants and precrop effect on organic potato in Hungary

Orsolya Papp – Kristóf Bársony – Lili Barta – Szilvia Bence – Dóra Drexler
Hungarian Research Institute of Organic Agriculture (ÖMKI), Budapest
orsolya.papp@biokutatas.hu

Introduction
ÖMKI takes part in WP3 „Novel agroecosystem management strategies and tools“ of the Solace project, in which we examine the effects of rotation and inoculation treatments on organic potato under a combination of stress conditions. The same experiment is also performed by Agroscope in Switzerland, in a conventional farming system.

Location
The experiment is performed in Hungary (Budapest-Soroksár) at the Experimental and Research Farm of the Szent István University, under organic cultivation (Fig. 1). The size of the field is approx. 3900 m².

Materials and Methods

Rotation trial: Randomized complete block design is applied with 4 replications. The size of parcels is 12 m². 4 different potato genotypes are tested: Cara, Pentland Dell, Agria and Charlotte. Treatments: pre-crops (soybean and rye), irrigation (irrigated and non-irrigated parcels) and N supply (no N and sufficient N).

Inoculation trial: Randomized block design with 2 replications. The size of parcels: 22.5 m². 4 different potato genotypes are tested: Desirée, Sarpo Mira, Pentland Dell and Maris Piper. Treatments: microbial inoculants (three different consortia), irrigation (irrigated and non-irrigated parcels) and P supply (no P and sufficient P).

The following measurements were performed:
- Complete soil characterization before planting
- Phenological and plant height measurements
- Plant chlorophyll content (SPAD chlorophyll meter)
- Multispectral and thermal aerial imaging (Fig. 4)
- Stomatal conductivity (Licro instrument)
- Soil microbial activity measurements (conducted by AIT)
- Total yield per plot and per genotype
- Classical tuber size classification on total yield of parcels (Fig. 5) and number of tubers per plant
- Tuber starch (dry matter) content
- Tuber N (rotational trial) and P (inoculation trial) content
- Soil Nmin and P content after harvest

Statistical analyses was conducted using SPSS.

A meteorological station was installed at the trial site using the ’Metagro’ system to monitor rainfall and soil moisture, and to provide a precise calculation of necessary water quantities for optimal potato irrigation (Fig. 2, 3).

Discussion and Outlook
Yield differences between genotypes can partly be explained by the different vegetation lengths of varieties, as late harvest genotypes such as Sarpo Mira were harvested together with earlier cultivars. P level of soil was very high at the trial site, thus optimal P treatment effects were not detectable. Analyses of further data, such as tuber quality is in progress. Experiments will continue in 2020 in close cooperation with Agroscope in order to follow up precrop and inoculant effects.