

## **Effect of different management systems on soil CO<sub>2</sub> emission and plant growth in a maize field**

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In this study soil CO<sub>2</sub> emission was examined in a long-term tillage experiment along with observations of plant morphological parameters, arbuscular mycorrhizal fungal (AMF) root colonization, soil properties and soil hydrothermal regime on loamy clay soil (Józsefmajor, Hungary) sown with maize. The tillage experiment was set up in 2002 and we focused on measurements performed in 2016. Based on soil disturbance depths, we selected three different tillage types such as ploughing (26-32 cm), shallow cultivation (12-16 cm), and no tillage (0 cm) for the present study.

We examined CO<sub>2</sub> emissions in rows compared to between rows within the same treatment in order to estimate the CO<sub>2</sub> emission pattern in case of the different treatments. The measurements were carried out using the static chamber method in seven spatial replicates per treatment. For investigating plant morphological parameters of the maize we measured height of plants, leaf number and area, girth area of stem...etc.

The CO<sub>2</sub> data showed that the difference between ploughing and no tillage treatments was higher in the vegetation period of 2016 than during the dormant season. There were higher CO<sub>2</sub> emissions in case of chambers inserted in rows than between rows on average, moreover there were significant differences between certain chambers installed in rows and between rows according to statistical data. This phenomenon can be explained by the enhanced root respiration in the rows.

Based on plant morphology measurements we observed that plant development was slower in no tillage treatment than in ploughing. Depending on sampling date, height of plants data showed 1.1 to 1.5 higher values, while leaf area data showed 1.2 to 2.5 times higher areas in case of ploughing compared to no tillage treatment. This can be due to the different soil conditions and textures of the treatments. The AMF root colonization data showed minor differences between ploughing and no tillage treatments, the highest colonization rates were found in case of shallow cultivation.