The effect of soil carbon dioxide emission on the food security – practical aspects of soil cultivation methods

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Introduction

Living in Europe we have not too much understanding or impressions of not satisfactory food security. We have more concerns regarding the quality, than the quantity of our food. We don't have to be worry just because of the fact not to get enough food. But to our south, mainly in Africa, because of the impact of global warming, that of the wars and of not appropriate farming all together made the importance of this is problem very vital (Juhász, 2012). It's proven by the practice of decades that the humanitarian food aid projects cannot provide a long term solution, so we have to orient ourselves in another new direction in order to find the most appropriate solution (Juhasz − Kanizsay, 2008). The definition of "food security" has been evolving since the '70s in accordance with the actual trends (CLAY, 2002; HEIDHUES ET AL., 2004). Regarding the Food and Agriculture Organisation of the United Nations (FAO): *"Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life".* (World Food Summit, 1996). This definition, agreed at the Summit is nowadays widespread, and includes such elements as access, availability, utilization and stability. This subsistence targeted approach has been preferably used since that time in relevant studies and by international organisations conducting development projects (STAMOULIS − ZEZZA, 2003; CLAY, 2002). The 1996 World Summit on Food Security declared that *"food should not be used as an instrument for political and economic pressure*". The World Health Organisation (WHO) states that there are three pillars that determine food security: food availability, food access, and food use and misuse. The FAO adds a fourth pillar: the stability of the first three dimensions of food security over time. In 2009, the World Summit on Food Security emphasized again that the "four pillars of food security are availability, access, utilization, and stability". Since the concentration of carbon dioxide in the soil is one of the aspects of global warming, which has an important impact on that process, I've devoted my research to this topic.

Materials and methods

My research was targeted to study and measure the level of carbon dioxide emission by examining the impact of different tillage methods. My experiments were set up and carried out at the Látókép experimental site, in the scope of the soil cultivation experiment, where I've examined the difference between three different soil cultivation methods: ploughing, strip tillage and loosening. Measurements were performed randomly placed and with five minutes of incubation period, recording the initial and post-incubation emission values. The cylinders that were placed onto the ground had unique internal ventilation and they also had the same diameter (118 * 250 mm). Once the measurements were finished, the

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sampling cylinders were prepared for the next measurement by cleaning and aerating them. The measurements were carried out using a TESTO 535 measuring device, which is a CO_2 concentration meter, which operates via infrared absorption.

Results and discussion

During the examination, we analysed the effect of tillage on carbon dioxide emissions. The already gained results confirmed our hypothesis that less carbon dioxide is emitted into the atmosphere from less disturbed soils in comparison to the traditional soil cultivation methods.

Conclusions

Our results have proven our hypothesis regarding the link between the level of emission of carbon dioxide from the soil and the used tillage methods. In order to decrease and mitigate the impact of global warming, which has a very negative impact on food security especially in areas where farming is insufficient already, we have to decrease the level of carbon dioxide emission from the soil. The way to do it could be to improve the awareness of farmers, to increase the sufficiency of agricultural activities in the most problematic areas by using soil cultivation methods that less disturbs the soil. At the first glance it can be difficult, maybe too expensive, however, if one is assiduous, the work can bring very good results: less emission can help in the fight against the global change of climate, which will result in a better food security of people.

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