Application and Economical Importance of Catch Crop in National Circumstances

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Abstract: The aim of soil tillage is twofold giving the best conditions for crop production and protecting environment as well. For the best product quality and quantity we must pay attention to the soil's physical and biological conditions. Successful environmental management is impossible in degraded and compacted soil. If the land is tilled in this way, it leads to expanded soil deterioration. This project will show the technology of the catch crop, which is a recent issue in Hungary. There are several missing parts of the exact examination at the research area, e.g. economical analyses, which has practical importance. The trial was set up in 1998 and the results show the importance of this system, as catch crop alleviates the risk of potential contamination of groundwater, moreover it improves the soil condition, and mitigates compaction. It is easy to adapt to the crop sequence. This technology is of high importance. An economic evaluation may have a utility, because without the proof of benefit, the application is unachievable in practice.

1 Subject

Plants have different biological requirements and have biological impacts as well. Soil use in arable land is qualified by production technology. To create harmony between habitat and production is feasible by proper land use only.

In arable land, the land use qualification is favourable if the crop is suitable for the habitat and for the economical circumstances, and during the crop production there are no damages in the soil and in the environment.

The Rural Development Policy of the European Union will support the environment protecting agricultural production systems, which are labelled as "agro-environmental management".

According to the EU and national environmental protection expectations, this research work is very actual because the soil textures improvement, and the establishment of the proper harmony between the production technologies and the environment are necessary and essential.

In this work, conclusion is drown about soil penetration resistance and soil moisture in different treatments.

2 Experimental materials and methodology

Long-term soil tillage trial was set up in 1998 at the experimental site of Szent István University Institute of Crop Production, to qualify the different soil tillage systems and catch crop effects on soil condition and to analyse the coherence between soil condition, yield and weed infestation.

The soil type of the experimental site is sandy loam soil. (chromic luvy soil) The trial is of split-plot design, with 4 replications.

Size of the plot: 20 m × 5 m= 100 m^2

The soil is nutrient deficiencies. The methods of the primary tillage are following:

a1: ploughing(22 cm —25 cm)

a2: loosening(35 cm —40 cm) + disking (16 cm —20 cm)

a3: cultivation(16 cm —20 cm)

a4: direct drilling

The "b" factor of the trial:

b1: minimal fertilisation: N= 80 kg/ha; P= 60 kg/ha; K= 60 kg/ha

b2: optimal fertilisation: N= 160 kg/ha; P= 120kg/ha;K 120kg/ha

The crop sequence is as follows:

1999: catch crop (white mustard) (1. picture)

1999/2000: wheat, catch crop (oil seed radish) (2. picture)

2001: maize

2002: pea (as mulch)

Soil condition test with penetration (depth: 0 cm —70 cm) with Daróczi- Lelkes type electronic instrument

Soil sample collection (method of Pürkhauer); samples evaluation in laboratory

Measurements: 1st of Aug. 2001. and 11th of Oct. 2001.

3 Results and discussion

The soil penetration resistance and soil moisture measurements were done in August and in October at the maize field.

According to the first picture, the ploughing as primary tillage and the undisturbed soil - the direct drilling-both did not give the best result in accordance with the soil moisture.

Some values exceed the favourable –1.5—2.5 MPa-range, and show harmful soil compaction already in the depth of 10 cm.

The 3 MPa soil penetration resistance in the depth of 22 cm is the result of the usual depth of tillage and its effect, which leads to the formation of compacted layers. In this depth the direct drilling of soil gives advantageous result. In the case of loosening + dis king primary tillage, the soil is sufficiently loose in deeper depths.

Due to the loosening effect of maize root, the measurement results are more favourable in October than in summer. As the soil has much more moisture, the values are smaller, but the tendency is the same as August. The loosening + disking gives similar values as in the pursuance of the summer measurement.

The curve of direct drilling is different from that of the 3 other primary tillage (at the layers in the depth of 10 cm —20 cm are more compacted), but it does not exceed the harmful 2.5 MPa.

Each primary tillage variant gets higher values in the soil moisture measurement in October, because of the autumn rain.

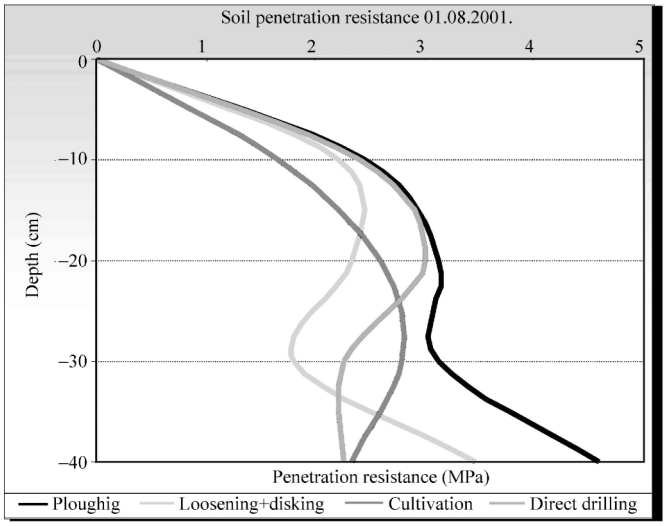
The ploughing is the most unfavourable for the soil moisture preservation. Measurements in summer and in autumn confirm this observation.

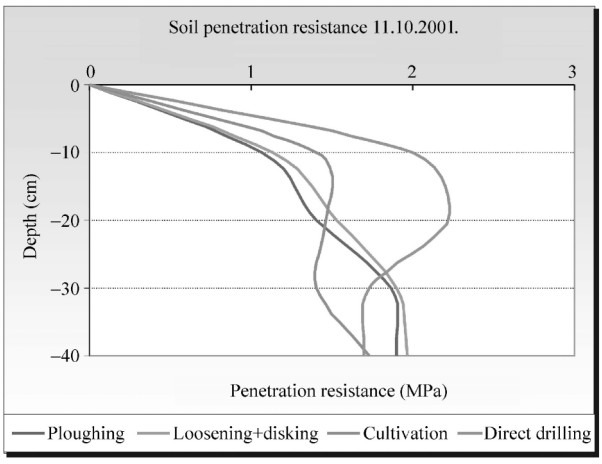
In drier condition the direct drilling is more advantageous for reducing the soil moisture losses.

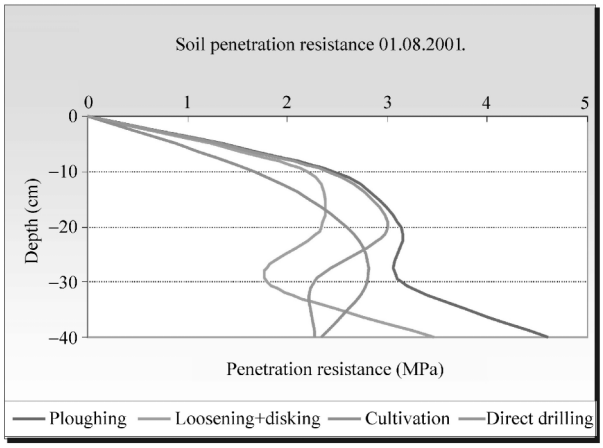
4 Major conclusion

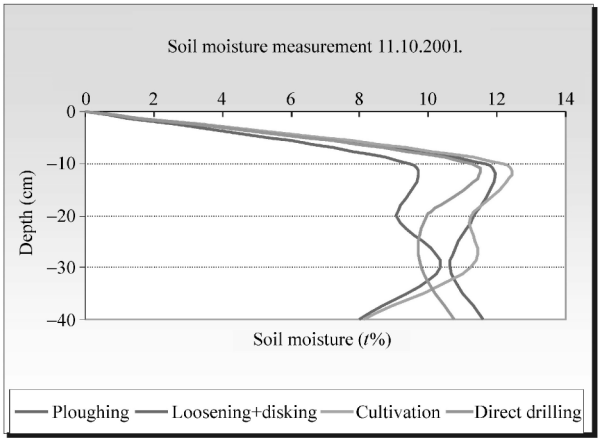
- According to the soil condition measurements, none of the 4 primary tillage variants are considerably favourable, because besides the effect of the soil tillage we must pay attention to the effect of the year and other modifying factors. Soil tillage systems can be ranked by soil condition and yield as well.
- After the harvesting of wheat, oil seed radish was produced as catch crop. Due to its soil loosening effect, the quality of the primary tillage under maize was improved, and higher yield was obtained in direct drilling applications.
- It has been verified that the soil with higher moisture is related with higher penetration resistance, independently from the type of the primary tillage. By applying catch crop, and

placing it in proper crop sequence can reduce the soil penetration resistance, and so improve the workability.









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