

Research on the influence of minimum tillage on physical properties of soil, crop production and quality in winter wheat in Western Romania climate conditions

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Abstract Research was carried out between October 1, 2010 until September 31, 2011 and focused on the following aspects: influence of minimum tillage on soil physical properties in the experimental field, located in the village of Sag, where we have 4 different tillage variants : disc harrow, rotary harrow, total processing cultivator, and direct sowing. At the Monastery in the agricultural year 2010-2011 we had a humidity between 21% and 32% and a total of 573 plants sprung per m². Protein content was 12.5% and Zeleny had a record of 41%.

The Scarification made at Dig (2B) had a major influence on soil moisture ,between 15% and 33% and a total of 926 plants sprug per m²

Key words

minimum tillage, winter wheat, soil moisture, production, fertilization, , quality

Modernization of agriculture in last decades has come with a number of harmful effects on soil physical properties and to the environment. (4)

We have increasing levels of fertilization, especially the chemical ones, because we wanted to increase the amount of production and reduction of cultivated area.(8)

The product quality was also followed with great attention and therefore have only grown varieties who resist at the climatic conditions specific to cultivated area. (7)

The large number of soil tillage with tractors and agricultural machines has a harmful effect to soil characteristics, such as degradation of soil structure, compaction of surface and depth, low humus content, reduced biological activity, which ultimately leads to lower natural fertility of the soil .(3)

The conservation and maintaining the natural fertility of the soil was and it is promoted by researchers and specialists, with the current requirements for sustainable agriculture.(2)

It is not surprising that all the countries is lookin for extensive research in agronomic, technological, design and especially tillage techniques in the hope of finding new ways of saving energy and money. (4).

Material and Methods

The 4 types of minimum tillage used in Sag area, disc harrow, total processing cultivator, and direct sowing, change soil characteristics differently.

The most important component of conservative technological systems, as in the case of conventional tillage ,is the soil working variant , and the seed input method. (6).

For this, soil samples were taken from all 4 plots, where soil profiles were made loan at an average depth of 50 cm, to determine and compare, texture, soil structure, moisture soil porosity, degree of compaction, , etc..

After we have collected four soil samples each, from 10 to 10 cm to a depth of 50 cm on all 4 plots established specific weight of wet soil samples, then were hold for 10 hours at 102 degrees , and were again weighed using electronic balance.

To obtain accurate results, we used electronic balance to measure the soil moisture directly in the field.

Results

If we look at the amount of rainfalls in 2010, with an average of 768.90 mm, we can tell that it was a favorable year for wheat crop.

As can be seen in the following table according to tillage method, we have production and quality differences, considering that all four plots was cultivate with the same variety of wheat (Alex basis).

Table 1

Presentation of soil tillage work on experimental plots of the Sag locality

Work performed	Monastery (1A)	Dam (2B)	Farm Left Plot (3C)	Farm Right Plot (4D)
Seedbed preparation 2010	2X Disc Harrow 6,4, Rollers, Cutting and Sowing with KNEVERLAND Drills.	Scarification to a depth of 65 cm, with Maschio Gaspario, Artiglio 250, Direct Seeding with TERRAMIX Grower	2X Disc Harrow 6,4, TERRADISK 500, and Sowing with SUP 29	2X Disc Harrow 6,4, TERRADISK 500, Seeding with KNEVERLAND Drill
Plant precursory 2009	Sunflower	Wheat	Wheat	Wheat

Table 2

Soil humidity registered to 01. October. 2010 in 0-50 cm

Depth profile 01.10.2010	Monastery (1A)	Dam (2B)	Farm Left Plot (3C)	Farm Right Plot (4D)
0-10 CM	21%	15%	10%	21%
10-20CM	25%	18%	16%	22%
20-30 CM	28%	22%	21%	25%
30-40 CM	31%	25%	27%	29%
40-50 CM	32%	33%	30%	35%

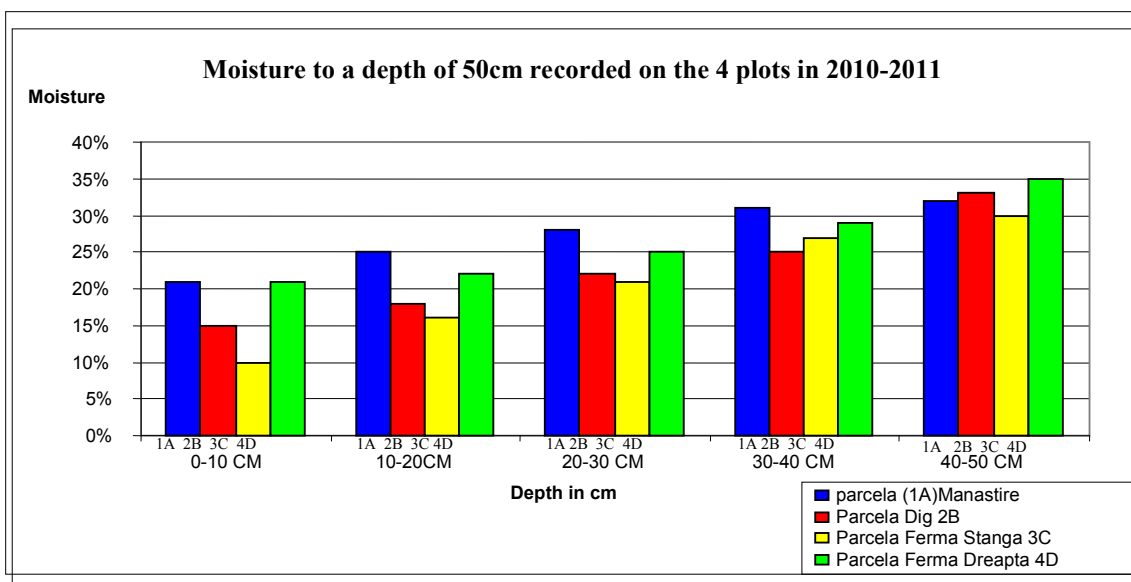


Table 3

Rising number of plants per square meter 2010-2011.

Repetition	2X Disc Harrow 6,4, Rollers, Kutting and Sowing with KNEVERLAND Drills. Monastery (1A)	Scarification to a depth of 65 cm, with Maschio Gaspardo, Artiglio 250, Direct Seeding with TERRAMIX Grower Dam (2B)	2X Disc Harrow 6,4, TERRADISK 500, and Sowing with SUP 29. Farm Left Plot (3C)	2X Disc Harrow 6,4, TERRADISK 500, Seeding with KNEVERLAND Drill Farm Right Plot (4D)
Repetition 1	608	880	500	636
Repetition 2	540	940	536	592
Repetition 3	572	960	472	624
Average	573	926	502	617

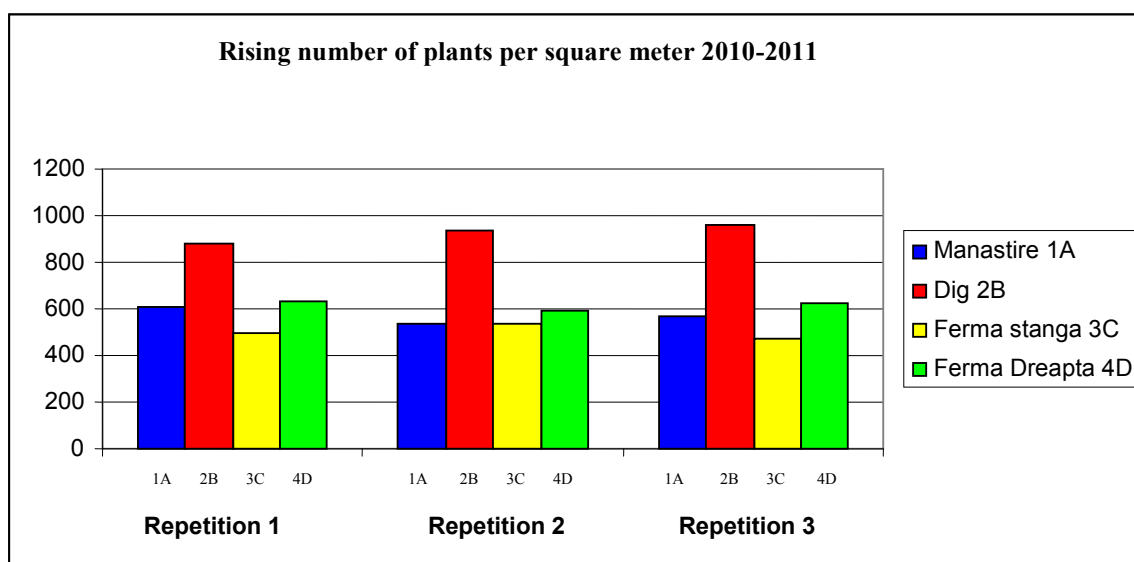


Table 4

Influence of soil tillage on wheat grain weight in 2010-2011

Repetition	2X Disc Harrow 6,4, Rollers, Kutting and Sowing with KNEVERLAND Drills. Monastery (1A)	Scarification to a depth of 65 cm, with Maschio Gaspardo, Artiglio 250, Direct Seeding with TERRAMIX Grower Dam (2B)	2X Disc Harrow 6,4, TERRADISK 500, and Sowing with SUP 29. Farm Left Plot (3C)	2X Disc Harrow 6,4, TERRADISK 500, Seeding with KNEVERLAND Drill Farm Right Plot (4D)
1	2,54 g	1,25 g	0,89 g	1,47 g
2	2,42 g	1,29 g	1,20 g	2,10 g
3	1,95 g	0,25 g	1,35 g	1,31 g
4	2,40 g	2,10 g	1,28 g	1,49 g
5	2,05 g	1,10 g	1,80 g	1,86 g
6	2,20 g	1,08 g	1,20 g	1,06 g
7	2,39 g	1,75 g	1,56 g	2,04 g
8	1,55 g	1,21 g	1,06 g	1,50 g
9	0,87 g	1,11 g	1,15 g	1,71 g
10	2,04 g	1,24 g	1,05 g	1,60 g
Average	2.041g	1.238g	1.254g	1.614g

Table 5

Influence of soil tillage on wheat straw weight in 2010-2011

Repetition	2X Disc Harrow 6,4, Rollers, Kutting and Sowing with KNEVERLAND Drills. Monastery (1A)	Scarification to a depth of 65 cm, with Maschio Gaspardo, Artiglio 250, Direct Seeding with TERRAMIX Grower Dam (2B)	2X Disc Harrow 6,4, TERRADISK 500, and Sowing with SUP 29. Farm Left Plot (3C)	2X Disc Harrow 6,4, TERRADISK 500, Seeding with KNEVERLAND Drill Farm Right Plot (4D)
1	2.04	1.4	0.84	1.33
2	1.78	1.58	0.99	1.6
3	2.17	1.03	1.25	1.07
4	2	2.06	1.25	1.29
5	1.56	1.2	1.44	1.24
6	1.25	1.12	1.25	1.43
7	1.76	1.6	1.19	1.95
8	1.97	2.19	0.94	1.25
9	0.69	1.45	0.99	1.17
10	1.44	1.75	0.93	1.17
Average	1.666g	1.538g	1.107g	1.350g

Table 6

Influence of soil tillage on wheat quality in 2010-2011

Quality Parameters	2X Disc Harrow 6,4, Rollers, Kutting and Sowing with KNEVERLAND Drills. Monastery (1A)	Scarification to a depth of 65 cm, with Maschio Gaspardo, Artiglio 250, Direct Seeding with TERRAMIX Grower Dam (2B)	2X Disc Harrow 6,4, TERRADISK 500, and Sowing with SUP 29. Farm Left Plot (3C)	2X Disc Harrow 6,4, TERRADISK 500, Seeding with KNEVERLAND Drill Farm Right Plot (4D)
Humidity (%)	13,9 %	12,5%	14%	13,5%
Specific Weight (Kg/hl)	76,5 Kg/hl	79,85 Kg/hl	77,5 Kg/hl	77,7 Kg/hl
Temperature (°C)	26,5 °C	26,7 °C	26,2°C	25,4°C

The following table presents qualitative evidence to the culture of wheat on the 4 plots, results obtained with the device (GRANOMAT).

Table 7

Influence of soil tillage on wheat quality in 2010-2011

Quality Parameters	2X Disc Harrow 6,4, Rollers, Kutting and Sowing with KNEVERLAND Drills. Monastery (1A)	Scarification to a depth of 65 cm, with Maschio Gaspardo, Artiglio 250, Direct Seeding with TERRAMIX Grower Dam (2B)	2X Disc Harrow 6,4, TERRADISK 500, and Sowing with SUP 29. Farm Left Plot (3C)	2X Disc Harrow 6,4, TERRADISK 500, Seeding with KNEVERLAND Drill Farm Right Plot (4D)
Protein content	12,5%	13,1%	10,7%	10,5%
Humidity	13,6%	12,1%	13,5%	13,6%
Gluten content	20%	21%	13%	12%
Zeleny	41%	38%	17%	17%

The following table presents qualitative evidence to the culture of wheat on the 4 plots, results obtained with the device OMEGA ANALIZER in 2010-2011.

Conclusions

- 1.As can be seen in Table 3, the depth of soil scarification, positively influenced the number of plants rises, with an average of 926 in plot Dig 2B.
- 2.If we look at the amount of rainfalls in 2010, with an average of 768.90 mm, we can tell that it was a favorable year for wheat crop.
- 3.At the Monastery in the agricultural year 2010-2011 we had a humidity between 21% and 32% and a total of 573 plants sprung per m².
- 4.The Scarification made at Dig (2B) had a major influence on soil moisture, between 15% and 33% and a total of 926 plants sprug per m².
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