INFLUENCE OF THE BASE TILLAGE SOIL ON YIELD IN MAIZE IN THE CONDITIONS OF THE PRELUVOSOIL FROM ORADEA

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Abstract.

The paper is based on the researches carried aut in Oradea, on the preluvosoil during 2004-2008. The colloid clay content on Ap horizon is of 30,2%, and the researches emphasized the need of the ploughland of 25 cm depth in maize crop because in the variants with ploughland of 12 cm depth, with chisel and with roller disk only, very significant yield losses were registered in the all year. In the droughty years the yield losses were biggest.

Key words: ploughland, chisel, roller disk, maize yield

INTRODUCTION

Generally, the agriculture is characterized like sustainable when is profitable, ecological and when the resources are protected (Budoi Gh., Penescu A., 1996, Gus P. and all 1998). In the Romanian agriculture the maize together with wheat are the most important field crops. In the maize technology the soil tillage is a very important component. Regarding this probleme, the soil type has a big influence in the establishing of the equipment type for realization of the base soil tillage and after that, in the establishing of the plough land depth, and number of works for preparation of the germination bed (Munteanu L.S. and al 2003, 2008, Domuța C. 2006). The optimize a base soil tillage determines the decrease of the energy consumption and the most proper vegetation conditions for plants.

MATERIALS AND METHODS

The researches were carried in Oradea during 2004-2008 in the long term trial placed on preluvosoil in 1995. The colloid clay in the Ap horizon of the preluvosoil is of 30,2%.

The variant studied:

V_1 = plough land, 25 cm depth
V_2 = plough land, 12 cm depth
V_3 = work with chisel
V_4 = work with roller disk

The experiment was placed in randomized band. Number repetition: 4; the surface of the experiment plot was 2000 m^2. Crop rotation used:

maize-wheat. Fertilization system: N_{120} kg/ha a.s.; P_{90} kg/ha a.s. The hybrid use: Turda super. Density plants: 55000/hectar. The experiment data were calculated using the variance analysis.

RESULTS AND DISCUSSIONS

There is a multiannual average of rainfall in the maize vegetation period of 325,8 mm (Domuța C., 2005). The rainfall registered in the vegetation period of the maize were of 372,0 mm in 2004, of 419,3 mm in 2005, of 355,0 mm in 2006, of 381,2 mm in 2007 and of 310,0 mm in 2008. Only in 2008, the rainfall registered during the vegetation of the maize were smaller than the multiannual average, but the difference (-15,8 mm; -5%) is law. As consequence, the average on the studied period, the value of the rainfall felt during the maize vegetation period, 367,5 mm are bigger than multiannual average with 41,7 mm (13%) (table 1).

Table 1

Rainfall registered during the vegetation period of the maize, Oradea 2004-2008

Year	Rainfall		Difference	
	mm	%	mm	%
Multiannual average	325,8	100	-	-
2004	372,0	115	46,2	15
2005	419,3	129	93,5	29
2006	355,0	109	29,2	9
2007	381,2	117	55,4	17
2008	310,0	95	-15,8	-5
Average 2004-2008	367,5	113	41,7	13

In 2004, the biggest yield of maize was registered in the variant with plough land of 25 cm depth, 8260 kg/ha. The decrease of the plough land depth to 12 cm determined an yield loss of 2080 kg/ha (25,2%), very significant statistically. The use of the chisel for the base soil tillage determined a yield loss of 3300 kg/ha in comparison with the variant with plough land of 25 cm depth. The biggest yield loss in comparison with the plough land of 25 cm depth was registered in the variant with roller disk, 5390 kg/ha; the yield represents only 34,7% from yield of the variant with plough land of 25 cm depth. (table 2).

Table 2

Influence of the base soil tillage on maize yield, Oradea 2004

Variant	Yield		Diference		Statistically significant
	Kg/ha	%	Kg/ha	%	
1. Plough land 20 cm depth	8260	100	-	-	Mt
2. Plough land 12 cm depth	6180	74,7	-2080	-25,2	000
3. Work with chisel	4960	60,0	-3300	-40,0	000
4. Work with roller disk	2870	34,7	-5390	-65,3	000

LSD 5%= 176; LSD 1%= 398; LSD 0,1%= 620

The maize yield registered in 2005 in the variant with ploughland of 25 cm was of 9790 kg/ha. Yield losses were registered in the all other variants: 38,7% in the variant with ploughland of 12 cm, 48,2% in the variant with chisel and 59,1% in the variant with roller disk. (table 3).

Table 3

Influence of the base soil tillage on maize yield, Oradea 2005

Variant	Yield		Difference		Statistically significant
	Kg/ha	%	Kg/ha	%	
1. Plough land 20 cm depth	9790	100	-	-	Mt
2. Plough land 12 cm depth	6000	61,3	-3790	-38,7	000
3. Work with chisel	5080	51,8	-4710	-48,2	000
4. Work with roller disk	4010	40,9	-5780	-59,1	000

LSD 5% =210; LSD 1%= 370; LSD 0,1%= 660

The relative differences registered in 2006 in comparison with the variant with ploughland of 25 cm were of 26% in the variant with ploughland of 12 cm, 50% in the variant with chisel and of 62% in the variant with roller disk. (table 4)

Table 4

Influence of the base soil tillage on maize yield, Oradea 2006

Variant	Yield		Difference		Statistically significant
	Kg/ha	%	Kg/ha	%	
1. Plough land 20 cm depth	8400	100	-	-	Mt
2. Plough land 12 cm depth	6200	74	-2200	-26	000
3. Work with chisel	4200	50	-4200	-50	000
4. Work with roller disk	3150	38	-5250	-62	000

LSD 5%= 180; LSD 1%= 370; LSD 0,1%= 760

The lowest yields maize were registered in 2007 and the biggest yield losses comparison with the variant with ploughland of 25 cm (5100 kg/ha) were registered too: 51% in the variant with ploughland of 12 cm, 61,6% in the variant with chisel and 72% in the variant with roller disk. (table 5)

Table 5

Influence of the base soil tillage on maize yield, Oradea 2007

Variant	Yield		Diference		Statistically significant
	Kg/ha	%	Kg/ha	%	
1. Plough land 20 cm depth	5100	100	-	-	Mt
2. Plough land 12 cm depth	2500	49	-2600	-51	000
3. Work with chisel	1990	39	-3110	-61	000
4. Work with roller disk	1430	28	-3670	-72	000

LSD 5%= 210; LSD 1%= 390; LSD 0,1%= 670

The year 2008 was an year with good yields of maize. In comparison with the yield registered in the variant with plough land of 25 cm, the yield

losses were registered in the all other variants: 29,2% in the variant with ploughland of 12 cm, 35,9% in the variant with chisel and 60,8% in the variant with roller disk. (table 6)

Table 6

Influence of the base soil tillage on maize yield, Oradea 2008

Variant	Yield		Diference		Statistically significant
	Kg/ha	%	Kg/ha	%	
1. Plough land 20 cm depth	8520	100	-	-	Mt
2. Plough land 12 cm depth	6040	70,8	-2480	-39,2	000
3. Work with chisel	5490	64,4	-3030	-35,9	000
4. Work with roller disk	3340	39,2	-5180	-60,8	000

LSD 5%= 290; LSD 1%= 470; LSD 0,1%= 720

CONCLUSIONS

The researches emphasized the need of the ploughland of 25 cm depth for maize crop in the conditions of the preluvosoil from Oradea charaterized by 30,2% colloid clay in the Ap horizon. The yield maize registered during 2004-2008 were between 5100 kg/ha (in 2007) and 9790 kg/ha (in 2005).

There were yield losses in all other studied variants, in comparison with the variant with ploughland of 25 cm depth. The variation interval of the negative relative differences had the following values:

- 25,2% (in 2004) – 51% (in 2007) in the variant with ploughland of 12 cm depth;
- 35,9% (in 2008) – 61% (in 2007) in the variant with chisel
- 59,1% (in 2005) – 72% (in 2007) in the variant with roller disk.

REFERENCES

1. Budoi Gh., Penescu A., 1996 – Agrotehnica. Ed. Ceres Bucureşti., p. 70-180
2. Domuța C., 2006 – Agrotehnica diferențiată,. Ed. Universității din Oradea, p. 91-132
3. Guş P. şi colab., 1998 – Agrotehnica. Ed. Risoprint Cluj Napoca, p.61-135
4. Muntean L.S. and al, 2003 - Fitotehnie. Ed. Ion Ionescu de la Brad Iasi, p. 160-189
5. Muntean L.S. and al, 2008 - Fitotehnie. Ed. Risoprint, p. 130-190