SOIL AND YIELD LOSSES UNDER THE INFLUENCE OF THE CROP SYSTEM ON APPLIED ON THE EROSIONED SOILS FROM NORTH-WESTERN ROMANIA

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Abstract

The researches were carried during 2009-2011 in the Agricultural Research and Development Station Oradea in the plots for check flow. The soil losses were determined every year; the biggest were registered in the variant with clean fallow, followed by the variants with maize seeded from top to valley, maize seeded on the level curves, wheat and pasture. The soil erosion had a bigger effect in the variant with maize seeded from top to valley in comparison with the variant with maize seeded on the level curves because bigger differences were registered between the yields from top of the hill in comparison with the yields registered at the base of the hill.

Key words: plot, check flow, erosion, crop system.

INTRODUCTION

Bihor County occupies an important part of the North-Western Romania. In the Bihor County, an area of 200,000 ha (38 % from the agricultural land) has lands with slopes bigger than 5 %, were erosion is possible. The researches regarding the erosion from this area started in 1983 by Colibaş and Mihuţ, in Hidişelu de Sus, and Pocola and researches regarding the soil management against erosion were made. After 1996, Domuţa started the researches in Pocola; during 1990-1994 the researches were carried out in Beiuş and after that in Oradea; the researches regarding the soil erosion determinations using the control plot and regarding the soil management (crop rotation, green manure, chemical fertilization) were made, as well, in Oradea (Domuţa, 1999, 2005, 2006).

MATERIAL AND METHODS

The researches were carried out during 2009-2011 in Oradea on a hill with 10% slope (Fig.1). The plots for the soil erosion measurement were placed in the 2000 year in the following variants: clean fallow, maize from top to valley, maize on the level curve direction, wheat, pasture. The plots' dimensions were 45x3.5 m and metal panels were placed at the base of the plots as well as soil dams between the plots on the hill.

Four repetitions were harvested in every variants with maize in the top and in the base of the hill. The yield data were calculated by variance analysis method.

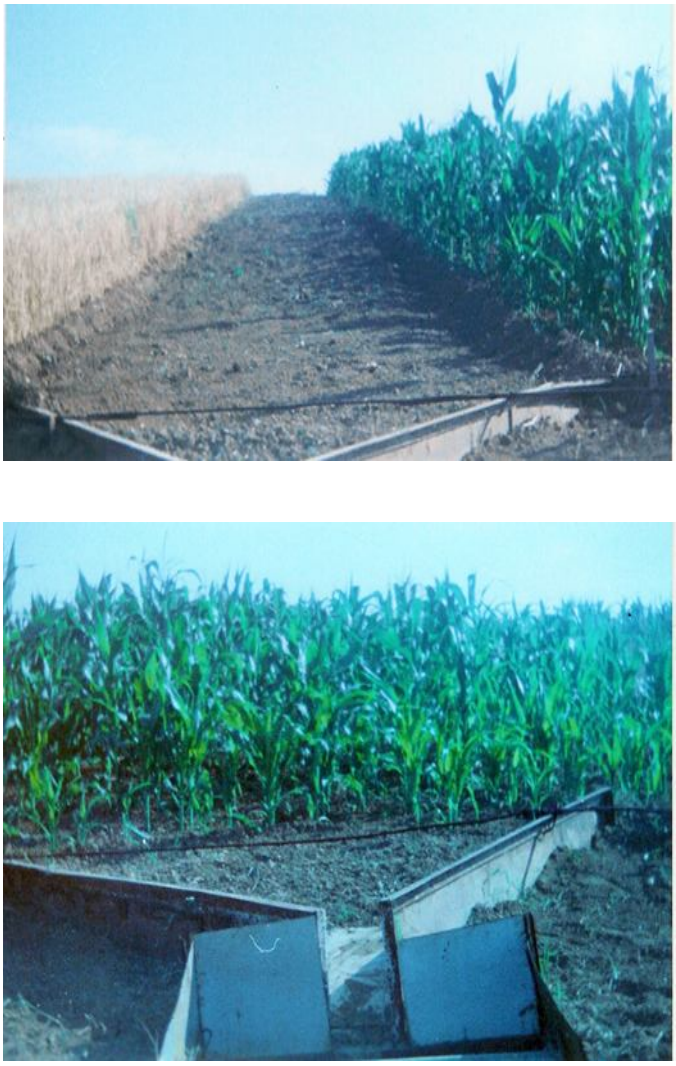

Fig.1 Plots for check flow on the erosioned soil from Oradea

RESULTS AND DISCUSSIONS

All the years. the smallest values of the soil losses were registered in pasture: 2.1 t/ha in 2009, 0.2 t/ha in 2010 and 1.7 t/ha in 2011. The wheat had a better protection than maize seeded on the level curves: 3.76 t/ha vs 6.04 t/ha in 2009, 1.9 t/ha vs 2.7 t/ha in 2010 and 3.6 t/ha vs 5.7 t/ha in 2011. In comparison with the maize seeded from top valley, the soil losses from the variant seeded on the level curves represented 28% in 2007, 31.3% in 2008 and 46% in 2009. The biggest soil losses were registered in the variant with clean fallow: 41.38 t/ha in 2009, 20.3 t/ha in 2010 and 29.6 t/ha in 2011 (table 3).

Table 3

Soil losses registered in different crops, Oradea 2009-2011

Crop	Soil losses					
	t/ha	%	%	%	%	%
2009						
1. Pasture	2.1	100	10	35	56	5
2. Maize from top to valley	21.32	1015	100	352	567	52
3. Maize on the level curves	6.04	288	28	100	161	15
4. Wheat	3.76	179	18	62	100	9
5. Clean fallow	41.38	1970	194	194	1100	100
2010						
1. Pasture	0.2	100	2.3	7.4	10.5	1.0
2. Maize from top to valley	8.6	4300	100	319.1	45.3	42.4
3. Maize on the level curves	2.7	1300	31.3	100	142.1	13.3
4. Wheat	1.9	950	22.1	70.3	100	9.3
5. Clean fallow	20.3	6770	236.0	752	9.3	100
2011						
1. Pasture	1.7	100	14	30	47	6
2. Maize from top to valley	12.3	723	100	215	342	42
3. Maize on the level curves	5.7	335	46	100	158	19
4. Wheat	3.6	212	63	63	100	12
5. Clean fallow	29.6	1741	519	519	822	100
Average 2009-2011						
1. Pasture	1.33	100	9	27	43	4
2. Maize from top to valley	14.07	1057	100	292	456	46
3. Maize on the level curves	4.81	361	34	100	156	15
4. Wheat	3.08	231	21	64	100	10
5. Clean fallow	30.42	2287	216	632	988	100

The erosion determined the bigger differences between the yields obtained in the top of the hill in comparison with the base of the hill. As consequence in the maize seeded from top to valley the differences yields registered in the base in comparison with the top of the hill were of 46% in 2009, of 43% in 2010 and of 52% in 2011; in the variant with the maize seeded on the level curves the differences were of 16% in 2009, of 20% in 2010 and of 12% in 2011. In average on the studied period, the difference between the yield registered in the base of the hill in comparison with the top of the hill was of 45% in the maize seeded from top to valley and of 16% in the maize seeded on the level curves (table 4, 5,6,7,8).

Table 4

Yield maize registered in the top and base of the plots for check flow, Oradea 2009

Variant	Position on the hill	Yield kg/ha	Difference		Statistically significant
			kg/ha	%	
From top to valley	Top	4720	-	-	Control
	Base	6610	1890	40	xxx
		$LSD_{5\%}$ 210 $LSD_{1\%}$ 390 $LSD_{0.1\%}$ 610			
On the level curves	Top	5680	-	-	Control
	Base	6590	910	16	xxx
		$LSD_{5\%}$ 170 $LSD_{1\%}$ 290 $LSD_{0.1\%}$ 574			

Table 5

Yield maize registered in the top and base of the plots for check flow, Oradea 2010

From top to valley	Top	3020	-	-	Control
	Base	4320	1320	43	xxx
		$LSD_{5\%}$ 210 $LSD_{1\%}$ 390 $LSD_{0.1\%}$ 540			
On the level curves	Top	4250	-	-	Control
	Base	5110	860	20	xxx
		$LSD_{5\%}$ 190 $LSD_{1\%}$ 330 $LSD_{0.1\%}$ 524			

Table 6

Yield maize registered in the top and base of the plots for check flow, Oradea 2011

From top to valley	Top	4010	-	-	Control
	Base	6100	2090	52	xxx
		$LSD_{5\%}$ 180 $LSD_{1\%}$ 310 $LSD_{0.1\%}$ 580			
On the level curves	Top	5370	-	-	Control
	Base	6020	650	12	xxx
		$LSD_{5\%}$ 190 $LSD_{1\%}$ 330 $LSD_{0.1\%}$ 660			

Table 7

Yield maize registered in the top and base of the plots for check flow, Oradea 2009-2011

From top to valley	Top	3920	-	-	Control
	Base	5680	1760	145	xxx
		$LSD_{5\%}$ 210 $LSD_{1\%}$ 450 $LSD_{0.1\%}$ 680			
On the level curves	Top	5100	-	-	Control
	Base	5906	806	16	xxx
		$LSD_{5\%}$ 195 $LSD_{1\%}$ 310 $LSD_{0.1\%}$ 460			

CONCLUSIONS

The researches carried out during 2009-2011 at the Agricultural Research and Development Station Oradea in the plots for flow check placed on the hill with 10% slope determined the following conclusions:

- The soil losses were determined every year in the all variants: clean fallow, maize seeded from top to valley, maize seeded on the level curves, wheat and pasture. The biggest soil losses were registered in the clean fallow followed by the maize seeded from top to valley, maize seeded on the level curves, wheat and pasture. The soil losses

from clean fallow and maize seeded from top to valley are bigger than the tolerance limites.

- The seeding of the maize from top to valley determined the bigger differences between the yields obtained in the top of the hill in comparison with base of the hill comparing the yields obtained in the top of the hill and in the base of the hill from the variant with maize seeded on the level curves.
- In the variant with maize seeded on the level curves the yields were bigger than the yields obtained in the variant with maize seeded from top to valley both in the top and in the base of the hill.

The results researches emphasized the importance of the crop choice for the land with slope and the need of the maize seeding on the level curves.

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