

REDDISH PRELUVOSOILS FROM D.S. BANU MARACINE AND THEIR SUITABILITY FOR MAIZE CROP IN FUNCTION OF TILLAGE

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Abstract

Within the 2005-2007 period, on the reddish preluvosoil from Didactical Station Banu Maracine there was set up an experiment on tillage effect to physical features of the soil as well as maize yield. The present paper emphasizes the yield obtained during three years of trials. The conclusion is that, on the soils with a high clay content and rainfed, wide crops (maize) are not recommended with unconventional tillage system or no till.

MATERIAL AND METHODS

The reddish preluvosoil where the experiments were located is characterised by a soil profile as follows: Ao-AB-Bt₁-Bt₂-C.

The soil is compacted at the surface, the bulk density is 1.36 g/cm³ within Ao horizon, the total porosity is 49% and the penetration resistance is 32 kgf/cm². It has a middle humus content, of 2.52% within the first horizon and under 1.0% into the B horizons.

The total nitrogen content is 0.131% within the first horizon and it decreases to 0.056% into inferior horizons which indicates a middle to low humus supplying. The soil reaction. The soil reaction is low acid, the pH value being between 6.06 and 6.47.

Generally, it can be said that the reddish preluvosoil where the experiment took place is middle supplied by humus and nutrients.

The experiment was performed in the same place and has comprised the following variants: V₁ (control) - deep plow (21-25 cm) + disc harrow; V₂ - shallow plow (13-17 cm); V₃ - disc harrow (two tillages); V₄ - direct drill.

The maize hybrid was Florencia (*Zea mays*, conv. *dentiformis*). This hybrid is included into the FAO group 490 and it was homologated for the western and south-eastern zone. It is a simple hybrid with a high yielding potential of around 12-14 t/ha. The Florencia hybrid is known for its good results in stress conditions.

RESULTS AND DISCUSSION

As regard the rainfall, in 2005 there were enough rains for the maize crop. With the control variant that was deeply plowed at 21-25 cm the yield was 4,422 kg/ha (Table 1, Figure 1).

By reducing the depth of the plow to 13-17 cm the yield has decreased to 2.6%, of 4,309 kg/ha. In comparison with the control variant there is a 113 kg/ha shortage that is not significant.

Tabel 1

Influence of tillage system on the maize crop yield on the reddish preluvo soil (2005)

Variant	Tillage	Yield			Sign.
		kg/ha	%	± Ctrl.	
V ₁	Deep plow 21-25 cm	4,422	100	-	-
V ₂	Shallow plow 13-17 cm	4,309	97.4	- 113	-
V ₃	Disc two times	4,145	93.5	- 277	0
V ₄	Direct drill	4,027	91.1	- 395	00

DL_{5%}=170.9 kg/ha

DL_{1%}=279.1 kg/ha

DL_{0.1%}=438.7 kg/ha

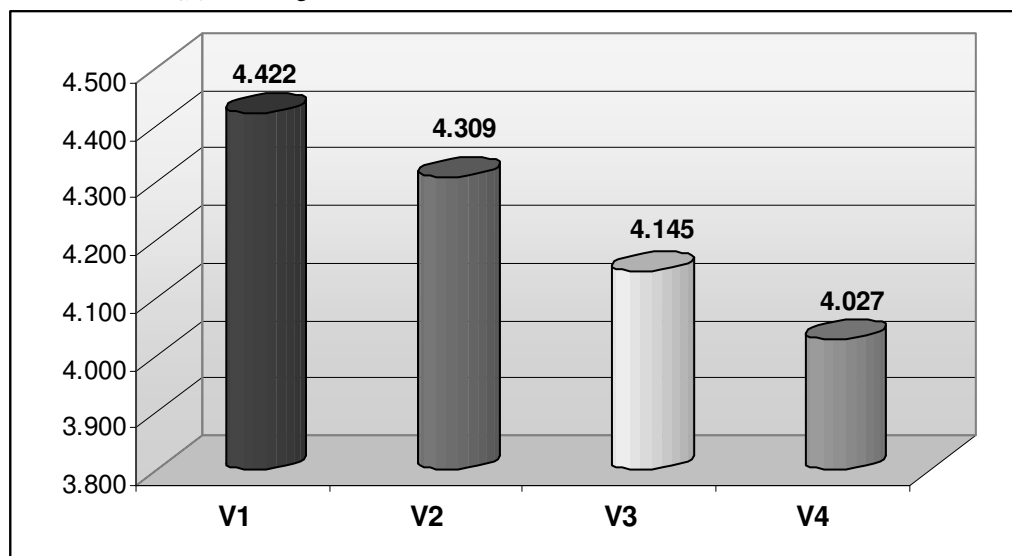


Fig. 1. Influence of tillage system on the maize crop yield in 2005

The 2006 year has more favorable during the vegetation period. The maize yield was between 4,098 kg/ha with no tillage and 4,750 kg/ha with deep plow control.

With the case of shallow plow the yield was 4,582 kg/ha and with two discing the yield was of 4,363 kg/ha (Table 2, Figure 2). In comparison with the control variant the yield minuses have varied between 3.5% (V₂) and 13.7% (V₄) while the yield loss have been of 168 kg/ha that is not significant with V₂, of 387 kg/ha with V₃ which is significant and 652 kg/ha with V₄ which is very significant.

Table 2

Influence of tillage system on the maize crop yield on the reddish preluvosoil (2006)

Variant	Tillage	Yield			Sign.
		Kg/ha	%	± Ctrl.	
V ₁	Deep plow 21-25 cm	4,750	100	-	-
V ₂	Shallow plow 13-17 cm	4,582	96.5	- 168	-
V ₃	Disc two times	4,363	91.9	- 387	00
V ₄	Direct drill	4,098	86.3	- 652	000

DL_{5%}=226.1 kg/ha
 DL_{1%}=342.4 kg/ha
 DL_{0.1%}=550.0 kg/ha

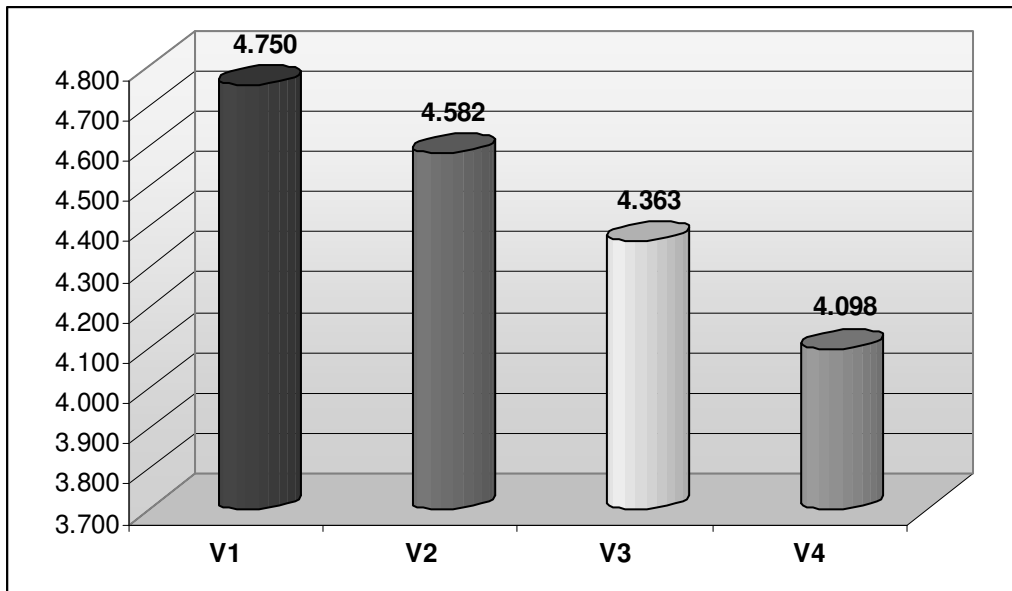


Fig. 2. Influence of tillage system on the maize crop yield in 2006

The 2007 year has been not favorable because of drought. This why the maize yields have been low (under 2 t/ha). With the first variant that was deeply plowed there were obtained 1,915 kg/ha. With the shallow plowed variant the yield has been of 1,711 kg/ha, 10.7% lower than control, 204 kg/ha (significantly negative). Preparing the seedbed by two disc tillage there were given 1,506 kg/ha. The percent loss was of 21.4% and the yield one of 409 kg/ha (Table 3, Figure 3).

Table 3

Influence of tillage system on the maize crop yield on the reddish preluvosoil (2007)

Variant	Tillage	Yield			Sign.
		kg/ha	%	± Ctrl.	
V ₁	Deep plow 21-25 cm	1,915	100	-	-
V ₂	Shallow plow 13-17 cm	1,711	89.3	- 204	0
V ₃	Disc two times	1,506	78.6	- 409	00
V ₄	Direct drill	1,185	61.9	- 730	000

DL_{5%}=201.6 kg/ha
 DL_{1%}=305.3 kg/ha
 DL_{0.1%}=490.4 kg/ha

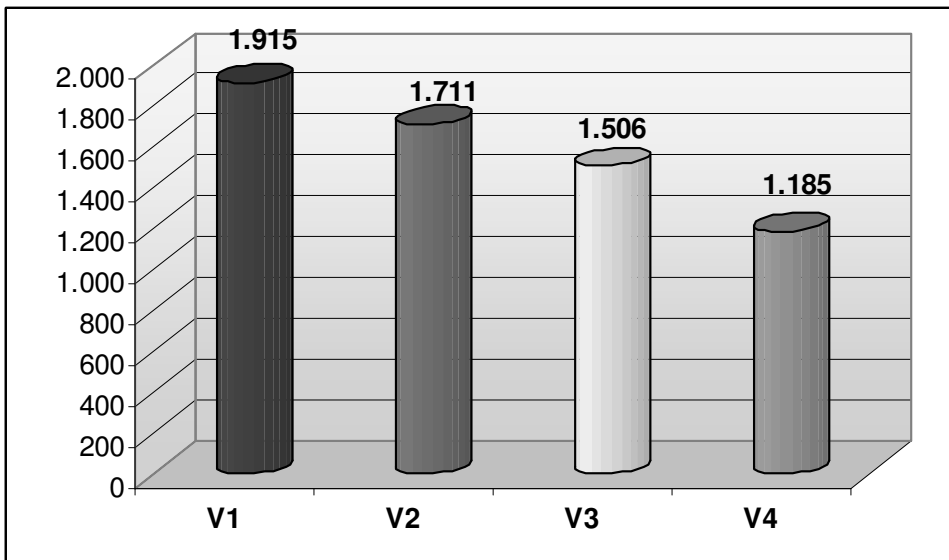


Fig. 3. Influence of tillage system on the maize crop yield in 2007

With the direct drilled variant there was recorded a yield of 1,185 kg/ha, 32.2% less than control. The yield shortage is significant, of 730 kg/ha. Calculating the maize average yield during the three years of experiment we have obtained the following results:

- with the control variant where there was performed a deep plow the maize yield was of 3,696 kg/ha (Table 4, Figure 4);
- with the shallow plowed variant the yield was of 3,534 kg/ha with a shortage of 162 kg/ha which means 4.4% (not significant);
- by replacing the plowing with two disc tillages made when preparing the seedbed the yield was of 3,338 kg, 9.7% less than control or 358 kg/ha minus (distinct significant)
- with the direct drilling the yield has been the least, of only 3,103 kg/ha, 16% less than control. The yield shortage was very significant, of 593 kg/ha.

In conclusion, the best results were given by the control variant which was plowed annually at 21-25 cm depth. The shallow plowing has determined not significantly yield shortage or significantly yet the disc tillage two times on a not plowed soil has determined significant, distinct significant and very significant losses. Direct drilling has determined negative distinct significant differences only in 2005 and very significant in other years. The level of yields was correlated with the rainfall in 2007 which was a dry year with decreasing effect on yield. With the condition of silty clayey or clayey texture the crop has positively reacted to deep tillage when the water and air regime were improved.

Table 4

Influence of tillage system on the maize crop yield on the reddish preluvosoil (2005-2007)

Variant	Tillage	Yield			Sign.
		kg/ha	%	± Ctrl.	
V ₁	Deep plow 21-25 cm	3,696	100	-	-
V ₂	Shallow plow 13-17 cm	3,534	95.6	- 162	-
V ₃	Disc two times	3,338	90.3	- 358	00
V ₄	Direct drill	3,103	84.0	- 593	000

DL_{5%}=199.5 kg/ha

DL_{1%}=308.9 kg/ha

DL_{0.1%}=493.0 kg/ha

CONCLUSIONS

1. Due to the texture of the reddish preluvosoil and the impossibility of irrigating these soils, the maize crop is not recommended to be cultivated without tillage.

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