EXPERIMENTS RELATED TO PRESERVATIVE TECHNOLOGIES OF SOIL WORKS MECHANIZATION FOR MAIZE GRAIN, EFFECTUATED AT EZĂRENI FARM OF THE AGRONOMICAL UNIVERSITY FROM IAŞI

EXPERIMENTĂRI PRIVIND TEHNOLOGIILE CONSERVATIVE DE MECANIZARE A LUCRĂRILOR SOLULUI LA PORUMBUL PENTRU BOABE, REALIZATE LA FERMA EZĂRENI A UNIVERSITĂŢII AGRONOMICE DIN IAŞI

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Abstract. *In the countries with a transition economy, as it is Romania, the problems regarding the sustainable development of the agricultural exploitation are much more connected with poverty and lack of productive technologies rather then the application of some polluting technologies and the high leves of consumption as therein the developed countries. Must be know the fact that if the farmers will produce sustainable and organic, will obtain a smaller production. So they must recover the expenses and the unfinished production by products price, fact that leads us to the question if Romania are prepared to support these high prices*

Key words: works for grains, conventional tillage, minimum tillage, no-till, soil tillage.

Rezuma*t. În ţările cu o economie în tranziţie, cum este România, problemele legate de dezvoltarea durabilă a exploatării agricole sunt mult mai legate de sărăcia şi lipsa de tehnologii de producţie, mai degrabă decât aplicarea unor tehnologii poluante şi de consum faţă de ţările dezvoltate. Trebuie să fie cunoscut faptul că în cazul în care agricultorii vor produce durabil şi ecologic, vor obtine o producţie mai mică. Deci, acestea trebuie să recupereze diferenţa de producţie, fapt care ne conduce la întrebarea dacă Romania este pregatită pentru a sprijini aceste preţuri mai ridicate.*

Cuvinte cheie: porumb pentru boabe, tehnologii convenţionale, minimum de lucrări, fără lucrări, lucrările solului

INTRODUCTION

At world level important funds are given to research for promoting agricultural development financed research activities, providing services and other forms of help, stimulating production by giving subventions. This fact permit a four time increase of the agricultural production till the start of the century, contributing to the development of society in general, but, in the time, agricultural pollution increase and the quality of a certain number of landscapes was deteriorated (Guş P., Rusu T., 2005).

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Advocates of sustainable agriculture establish unconventional systems for soil works which are better than the classical ones, telling that it is necessary to apply those variants which correspond to the local specific conditions. At the actual stage of knowledge, it is considered that direct drill represent the most advanced technology which could be apply in agriculture. No other technology is not so close to an effective stoppage of soil erosion and to achievement a durable agriculture (Jităreanu G. et al., 2007).

MATERIAL AND METHOD

Research took place at Ezăreni Farm, Iaşi, belonging to "Ion Ionescu de la Brad" University of Agricultural Sciences and Veterinary Medicine, in years 2008 and 2009, on a mezocalcaric cambic chernozem weak, with a „loamy clay" texture, reaction is weak acid to weal alkaline, it is a soil with a useful edaphic volume quite great and a good air-hydric regime. Soil is relatively refined; exception is under-tillage layer which is low compacted.

Experience is mono-factorial, the crop is represented by maize grain, and the aim is to track the influence of different mechanization technologies on soil, yield, energetic and qualitative indexes. Placement method of experiment is a linear one in 5 variants each of them with 3 repetitions.

Experimental factors:

Variant V1 - (control), conventional technology. In autumn, tillage with unit Valtra T-190 tractor + Opal 140 reversible mouldboard plough. In spring, prepare germinating bed by two passes with unit U-650 tractor + GD-3.2 disk harrow and sowing with the aggregate tractor U-650 + SPC-8 sowing machine. Weeding two times with aggregate U-650 tractor + CPU-8 cultivator.

Variant V2 - In autumn, tillage with unit Valtra T-190 tractor + Opal 140 reversible mouldboard plough. Preparing germinating bed with aggregate Valtra T-190 tractor + BS 400 A combinator (kompaktor) and sowing with unit U-650 tractor + SPC-8 sowing machine. Weeding two times with aggregate U-650 tractor + CPU-8 cultivator.

Variant V3 - In autumn, tillage with aggregate Valtra T-190 tractor + Opal 140 reversible mouldboard plough. In spring, preparing germinating bed with aggregate Valtra T-190 + FRB-3 vertical rotary hoe (540 rpm at tractors' PTO) and sowing with unit U-650 tractor + SPC-8 sowing machine. Weeding two times with aggregate U-650 tractor + CPU-8 cultivator.

Variant V4 - In autumn, tillage with aggregate Valtra T-190 tractor + Opal 140 reversible mouldboard plough. In spring, preparing germinating bed with aggregate U-650 tractor + FDL-1.3 unbalanced rotary hoe for orchard (540 rpm at tractors' PTO) and sowing with unit U-650 tractor + SPC-8 sowing machine. Weeding two times with aggregate U-650 tractor + CPU-8 cultivator.

Variant V5 - In autumn, tillage with aggregate Valtra T-190 tractor + Opal 140 reversible mouldboard plough. In spring, preparing germinating bed in stripes and sowing with aggregate U-650 tractor + complex unit compound of FPL-4 weeding rotary hoe for vegetables and SPC-4 sowing machine. Weeding two times with aggregate U-650 tractor + CPU-8 cultivator.

RESULTS AND DISCUSSIONS

The influence of different mechanization technologies on soil by determination on each variant of soil's penetration resistance was measured with electronic penetrometer and analysed by comparing the six obtained means (graph below). Agro-technical norms establish that in the case of penetration resistance up to 2.5 MPa plants' roots have a normal growing. When the penetration resistance is between 2.6 – 10.0 MPa exist a partial limitation of roots growing.

Table 1

Soil penetration resistance (maize grain)

Year	Variants of tillage and sowing	Average soil penetration resistance, 0-30 cm		Difference (MPa)	Significance
		MPa	% to witness		
Media 2008-2009	V_1	0,36	100,0	0	martor
	V_2	0,37	102,8	0,01	-
	V_3	0,39	108,3	0,03	-
	V_4	0,68	188,9	0,32	xxx
	V_5	0,87	241,7	0,51	xxx

The values of weighted average diameter of soils' structure elements are presented in figure 1.

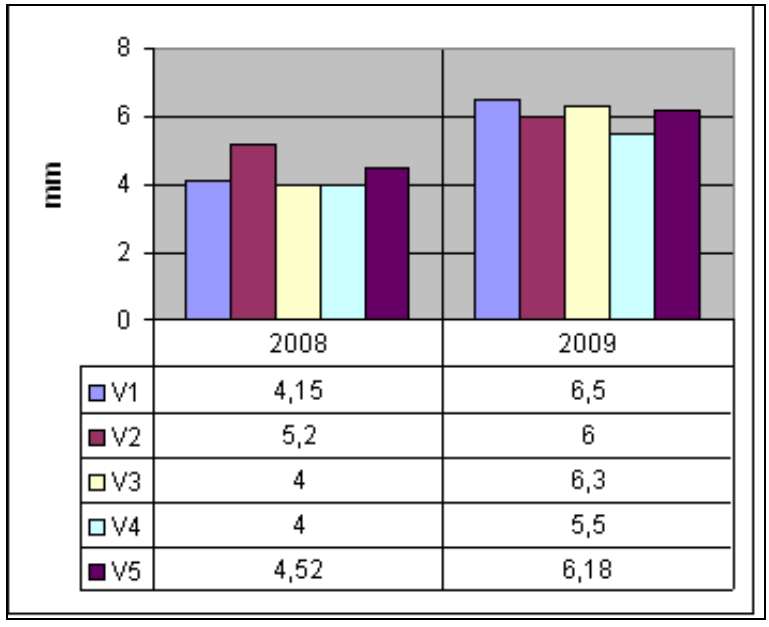

Fig. 1 - Weighted average diameter (mm)

For 0 – 30 cm depth could be considered that the weighted average diameter of soils' structure elements is corresponding (from agronomic point of view, particles with diameter of 2 – 5 mm most interested).

Since the fluid stability of the structure exceeds 60% (figure 2), it falls in the "extremely high".

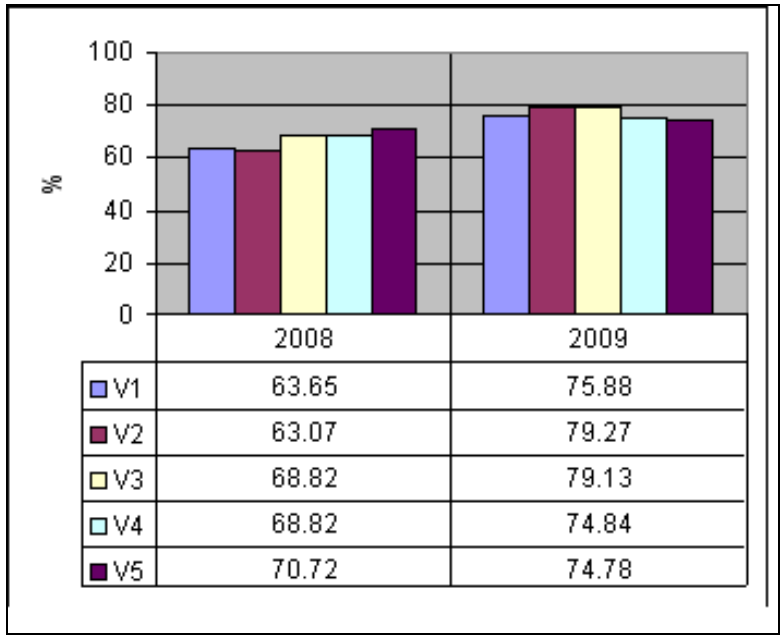

Fig. 2 – Fluid stability (%)

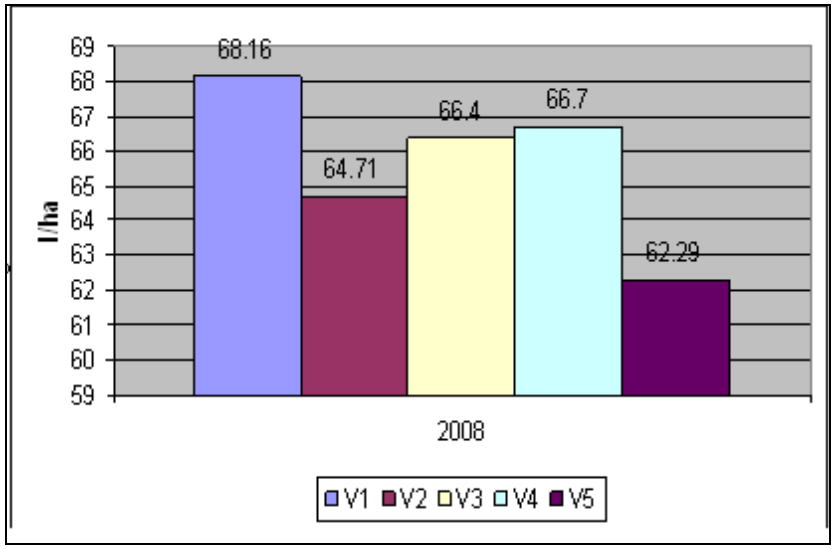

Fig. 3 - Diesel consumption (l / ha)

Was calculated the total quantity of consumed diesel for maize grain, by summing the quantities consumed at all the realised works, from fertilization, tillage till harvest (figure 3).

Seed yield obtained at an agricultural crop depends on many factors, such as the quality of soil works and sowing (figure 4).

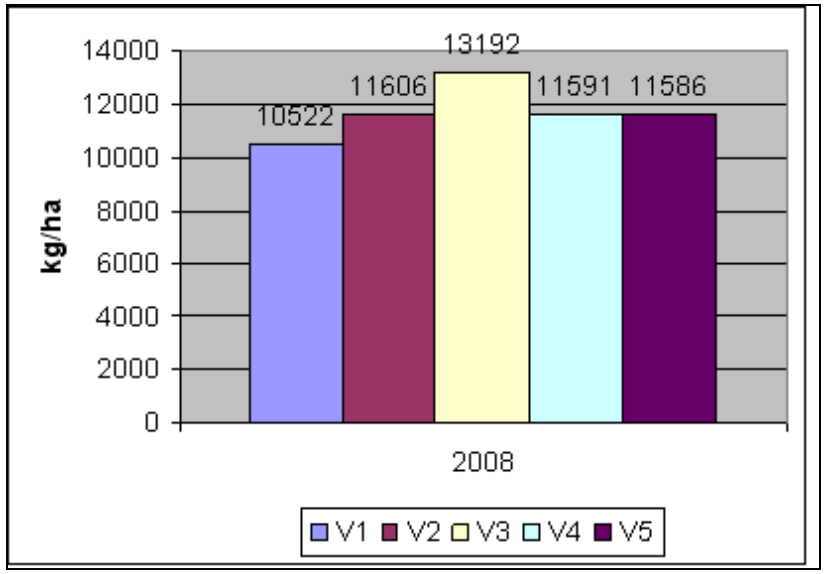

Fig. 4 – Maize grain yields (kg/ha)

CONCLUSIONS

1. At variants at which the soil was processed with mouldboard plough and spherical disk harrow, soil layer 0 – 9 cm is refined, with a medium glomerular structure, but also exist compacted lumps, which are resistant to breaking up.

2. In the case of the soil processed with rotary hoes, soil structure is glomerular, dominating structural elements having small dimensions, fact that favours an accentuated compaction of soil during vegetation period.

3. At the effectuated tests we observe that soils' penetration resistance had, in general corresponding values. Not notified an increase of penetration resistance due to the usage of some units.

4. Must be mention the fact that, however, after a number of years, due to misuse of equipment, soil degradation will appear, soil will be compacted, will take place fragmentation of structural elements, will be produce an accentuated mineralization of organic matter, humus etc. For these reasons must be used those

technologies of soil processing mechanization which assure soil preservation in the highest degree.

5. In case in which are conditions for using unconventional systems for soil works, technological variants of soil works mechanization which will be used, starting with the best one, are: V5, V3, V2, V4.

6. Will be avoid the application of variant V1, classic technology, due to the high fuel consumption and weak results regarding the determine indexes.

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