TÝR, Š. 1999. Influence of arable farming systems on actual weed infestation of selected crop. In: Acta fytotechnica et zootechnica; mimoriadne číslo: Trendy v agropotravinárstve, 2, 1999, p 153. ISSN 1335-258X.
TÝR, Š. – LACKO-BARTOŠOVÁ, M. 1998. Weed infestation of spring barley in integrated and ecological arable farming systems. In: 5th Congress ESA, volume 1, 1998, p. 129. ISBN 80-7137-500-4.
TÝR, Š. – POSPIŠIL, R. 1999. Pestovanie hustosiatych obilnín bez používania herbicídov. In: Poľnohospodárstvo, 2, 45, 1999, p. 108-119. ISSN 0551-3677.
The authors thank the grant agency VEGA no. 1/6124/99 for supporting of this project.

THE INFLUENCE OF DIFFERENT SOIL CULTIVATION INTENSITY ON SOIL HUMIDITY DYNAMICS IN MAIZE STAND

Jozef SMATANA, Pavol OTEPKA
Department of Agricultural systems, Slovak Agricultural University, Tr. A. Hlinku 2, 949 76 Nitra, Slovak Republic

Summary

The soil humidity by different cropping systems and different soil cultivation have been evaluated at the Experimental Base Dolná Malanta near Nitra on brown clay – loamy soil during 1995-1997. The influence of cultivation – mouldboard ploughing plus surface cultivation of ploughed field (B1) and combined cultivator only (B3) on soil humidity dynamics has been ascertained. The maize was growing at four course crop rotation after winter wheat as a pre-crop plant. Samples were taken five times during vegetation period to the depth of 0.6 m with six levels at 0.1 m range. No significant differences between two soil cultivation in any depth level have been noted.

Key words: soil humidity, soil cultivation, minimisation, maize.

Introduction

Soil cultivation is one of the basic points in crops cultivation. Actual soil humidity is changing quite quickly in shallow layer of soil by soil cultivation. Water in the soil has many very important functions, mainly for soil fertility, because soil water with nutrients together are one of the main conditions for cultivating crops. Therefore adjustment of water regime is one of most important aims of soil cultivation. Favourable content of water in the soil has positive impact for soil cultivation (quality of cultivation, lower energy consumption etc.). Mechanical effect of soil cultivation regulates the thermodynamic conditions in arable layer of soil and permeability of the soil for water. This depend of granularity, structure of mineral soil composition and sorption complex, as well. Soil permeability is significantly increased by soil fauna, vertical crevices in the dry heavy soil, etc. Mechanical loosen of the soil increases soil permeability at all. Soaking of water to the soil is decreased by soil compaction and consolidation.

Materials and methods

Experiments were established on Research Station of Slovak Agricultural University in Nitra, Dolná Malanta, on clay-loamy brown soil, which are created on loess parent rock. Research Station is situated in warm climate region, 173 m above sea level, with average annual air's temperature 9.6°C, average annual precipitation 580 mm. Content of humus in arable layer (0.0-0.35 m) is 2.33 %. Rate of humid acid to fulvid acid is 1.31; exchange acidity (in KCl) is 5.49; volume weight reduced is 1.32 $g.cm^{-3}$; porosity 49 %, maximal capillary water's capacity 34 %; minimal air's capacity 15 % and cationic sorption capacity is 165.4 mmol chemical equivalent for 1 kg of soil (Hanes et al., 1991).
The soil humidity was observed in different farming systems and different basic soil cultivation in maize stand during 1995, 1996 and 1997. Winter wheat was a pre-crop for maize, spring barley and common pea were cultivated after maize. Variations of soil cultivation were: ploughing to the depth of 0.3 m with following of surface arrangement of ploughed field (B1) and loosening of soil with combinatory (B3). Whole block was fertilising by balance method for average yield's level of 8 $t.ha^{-1}$.
Soil humidity was determined five-times during vegetative period of maize to the depth of 0.60 m at six layers, regularly with 0.1 m intervals of depth in three replications. Dates of sampling was determined by the most important of agrotechnical operations and growing stages of crop, as well. Evaluation of founded data were done by analysis of variance with helping of appropriate tables.

Results and discussion

During three observed years, the weather conditions was very different, mainly in the viewpoint of precipitation and its distribution. In spite of it, the dynamics of soil humidity reached very equable course. Results explicitly confirmed, that between two determined soil cultivation variances (1. ploughing to the depth of 0.3 m with following of surface arrangement of ploughed field, 2. loosening of soil with combinatory) were not significant differences of water content in the soil. High significant differences of water content in the soil during the years were influenced by different sampling of the soil samples. Significant influence of determined soil cultivation to the changes of soil humidity was not founded. Similarly Blevins et al. (1971) and Talafantová (1978) reported, that the content of water in non-cultivation soil is not significantly different with comparison of arable land.
Significant differences in content of soil water were determined within years, only. The soil humidity was increased with the soil depth. In 1996, we founded almost equal soil humidity in soil layers. Gnatenko (1992), Vereteľnikov et al. (1992) founded higher content of soil water until to depth of 1.0-1.5 m, almost in dry conditions in favour of loosening against ploughing.

Table 1: Soil humidity in maize stand (cultivated after winter wheat) during 1995-1997 in depth of the soil 0.0-0.6 m

Cultivation	Date					*Average*
1995	3. 4.	10. 5.	21. 6.	13. 7.	22. 8.	-
B1	21.86	19.69	21.73	13.95	8.38	17.12
B3	22.12	20.71	22.11	11.67	8.04	16.93
1996	25. 3.	29. 4.	3. 6.	11. 7.	26. 8.	-
B1	22.42	17.10	23.97	17.57	13.94	19.00
B3	22.20	16.80	22.73	19.70	14.55	19.20
1997	11. 4.	7. 5.	2. 6.	16. 7.	20. 8.	-
B1	19.67	18.74	16.88	20.56	15.12	18.19
B3	19.42	18.77	16.69	19.45	14.80	17.83

Legend: B1: ploughing to the depth 0.3 m with following surface arrangement of ploughed field; B3: loosening of soil with combinatory.

References

Blevins, R. L. et al. 1971. Influence of no-tillage on soil moisture. Agronomy Journal, 1971, 63, p. 593-596.
Gnatenko, A. F. 1992. Ploskorez protiv erozii počvy. In: Zernovyje kuľtury. Moskva: „Kolos“, 1992, 2-3, p. 17-19.
Hanes, J. - Mucha, V. - Slovík, R. - Zaujec, A. - Libant, V. 1991. Parametre východiskového stavu úrodnosti hnedozeme na stacionárnom pokuse výskumného projektu. In: Zborník „Ekologické princípy hospodárenia na vybraných agroekosystémoch južného Slovenska“. Nitra: VŠP, 1991, p. 21-24.
Talafantová, A. 1978. Ovlivňovaní některých faktorů půdní úrodnosti obdelávaním půdy k obilovinám. In: Zborník „Obrábanie pôdy k obilninám“. Nitra: VŠP, 1978, p. 43-55.
Vereteľnikov, V. P. - Rjadovoj, V. A. - Radčenko, N. S. 1992. Vlijanije system podgotovki počvy na urožajnosť ozimoj pšenicej i jeji kačestvo posle gorocha. In: Zernovyje kuľtury. 1992, 4, p. 23-24.

This work has been arisen by support of grant VEGA no. 1/8159/01.

WINTER BARLEY GRAIN PRODUCTION IN DEPENDENCE ON SOME SAVING GROWING TECHNOLOGIES DURING TWO CLIMATIC DIFFERENT YEARS

Juliana MOLNÁROVÁ, Jozef ŽEMBERY, Rastislav BUŠO
Department of Plant Production, Slovak Agricultural University, Tr. Andreja Hlinku 2, 949 76 Nitra

Summary

We have examined the influence of different soil cultivation ways, varieties and year on the grain yield amount of winter barley in field polyfactor experiments in 1998/1999 and 1999/2000. There were four varieties (Luxor – multi-rowed, Babylone, Hanna, Tiffany – two-rowed variety) and three different tillage types (A-ploughing + post-harvest remainders, B-ploughing without remainders, C-discs without remainders). Results shown that there had been a statistically manifested difference between the crop of two and multi-row barley in favour of Luxor variety (0,48 to 1,02 t.ha^{-1}). The years crop influence has also been statistically manifested by the difference from 0,44 t.ha^{-1} (Luxor) to 1,14 t.ha^{-1} (Babylone). Results have shown that there had been a different reaction of varieties to tillage. Luxor, Hanna and Tiffany variety had reacted to the shallow soil