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

cultivating (C, discs) by crop increase from 0,26 to 0,97 t.ha^{-1}. Babylone variety had reached more yield crop by conventional tillage (0,28-0,42 t.ha^{-1}) in both years.

Key words: winter barley, fertilization, soil cultivation, variety, ploughing, shallow, years, crop

Introduction

The main purport of soil cultivation is to create suitable conditions for quick seed germination, regular plant growing and development, and to secure stability of the yield in climatically unfavourable years.

Continued improving of technical means according with the effort to produce more rationally by similar or higher yield amounts lead to several minimisation ways and systems in the soil cultivation. Research results from several cereal soil cultivation systems can be applied to a conception of so-called rational soil cultivation system representing such a system when only appropriate, i.e. reasonable soil cultivation measures are realised.
Problems on the soil protection in cereals are dealt by several authors (Kováč, Marko 1997, Procházková, Dovrtěl, Suškevič 1997, Molnárová, Žembery 1997 and others).
Objective of our paper is to evaluate the influence of some saving measures during the soil cultivation in dependency of the year climatic conditions on the grain yield amount in two and multi-rowed winter barley.

Material and methods

We have examined the influence of different soil cultivation ways, varieties and year on the grain yield amount of two and multi-rowed winter barley in conditions of warm corn production area with an year total precipitation amount of 561 mm and an average year temperature of 9,7 °C (according to 30-year average) on clay brown soil with medium phosphorus, ample potassium and the humus content of 2.7 %.
Examined varieties: year 1998/1999 multi-rowed winter barley - Luxor
two-rowed barley - Babylone a Hanna
year 1999/2000 multi-row winter barley - Luxor
two-rowed barley - Babylone a Tiffany
3 soil cultivation methods:
A – ploughing up to 0.20 m + post-harvest remainders
B – ploughing up to 0.20 m, without remainders
C – shallow soil cultivation without remainders (disc harrow)
Forecrop was rape. Number of treatments - 4.
The influence of examined production technology elements and year on the yield amount was evaluated by the analysis of variance by means of the Statgraphics software. The climatic characteristics course of regarded years are shown in figure 1-4.

Figure 1

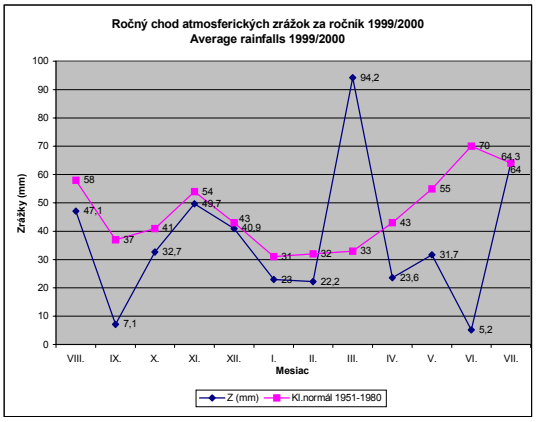


Figure 2

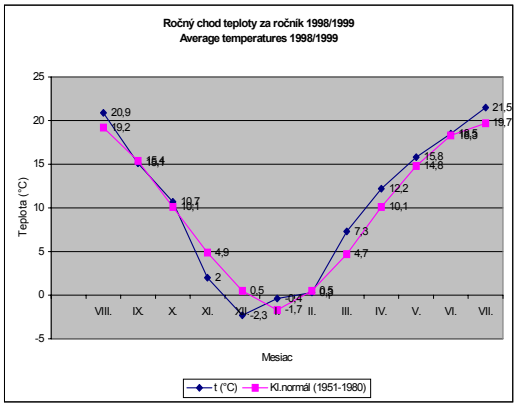


Figure 3

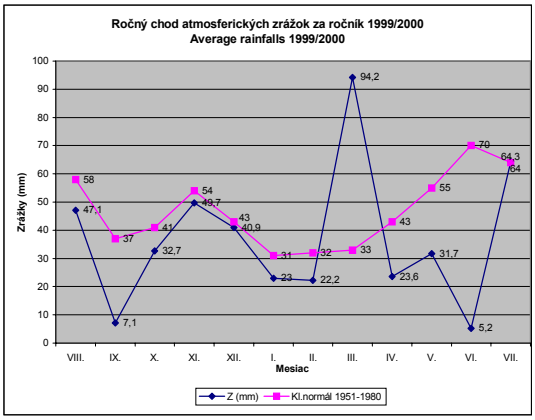
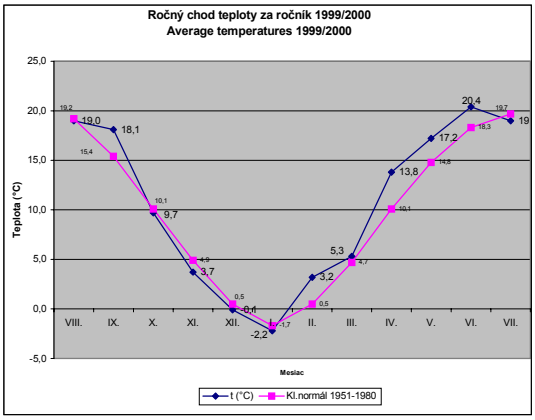


Figure 4



Results and discussion

Results have shown possibility of a partial elimination of injurious climatic influence on the yield formation by soil cultivation ways. In the season 1998/1999 with extremely rainy autumn – September 404.3%, October 190% (Figure 1,2), barley sowing delayed till the 30th October. The stand rose only for 55-60% till winter. That is why the formation of the basic yield-formation element – number of plants - was influenced negatively. Extremely wet autumn was relieved by dry winter and spring period, which influenced negatively the shoot formation and the total number of spikes (this was 426 to 440 pcs per m^2 in multi-rowed variety Luxor, 486 to 628 pcs per m^2 in two-rowed variety Hanna and 457 to 548 pcs per m^2 in Babylone). Petr, Pflug, Šnejdar (1985) consider as the optimal one 400 – 600 spikes per square meter, Molnárová (1990) more than 500 spikes. In two-rowed varieties figure Kufelj (1999) as optimal one 734 – 747 spikes per square meter. There was observed an different reaction to single soil cultivation ways by examined varieties.
Average grain yield in season 1998/1999 ranged from 6,65 $t.ha^{-1}$ (Babylone) to 7,74 $t.ha^{-1}$ (Luxor). Luxor and Hanna varieties reached the highest yield amount by shallow soil cultivation method (C), Babylone by ploughing up to 0.20 m + post-harvest remainders (A) (Table 1).
The yield difference between the multi-rowed variety Luxor and two-rowed varieties was statistically highly significant.
In season 1999/2000 was the total amount of precipitation for 232,7 mm lower compare to previous year and it reached only 78.7% (Figure 3,4). Contrary to previous year was September extremely dry, with total precipitations of 7.1 mm (19.2%). This dry period delayed till the third decade of October, with total precipitations of 6,8 mm. The stand came up completely only in the case of shallow tillage (C). Incoming favourable precipitation during the shoot growing phase ensured good shooting and that is why also by lower plant number in A,B treatments was a good stand cover contributing to the yield. Grain yield comparing to the previous year amount was statistically highly significant higher for 0.44 to 1.14 tons per hectare. Similar as in the previous year, in average for the whole experiment, the highest yield was in the multi-row variety Luxor (8.18 $t.ha^{-1}$). Positive reaction to the shallow soil cultivation was noticed by Luxor (8.61 $t.ha^{-1}$) and Tiffany (7.75 $t.ha^{-1}$). Babylone react more positively on conventional tillage (A, B) (Table 2). These results partially confirm the opinion of Procházková, Dovrtěl and Suškevič (1997), according to them it is important to adapt the soil cultivation system in the corn production area to moisture conditions and to apply the shallow tillage especially during dry years.

References

Kufelj, D.: Produkčný a akumulačný potenciál jačmeňa dvojradového ozimného. Doktorandská dizertačná práca, Nitra, 1999, 143 s.
Kováč, K.,- Marko, F.: Vplyv obrábania pôdy na úrodu a ekonomiku pestovania ozimnej pšenice. In: Zborník : Obilniny, Nitra 1997, s. 12-17.
Molnárová, J.: The influence of fertilization, time of sowing and sowing rates on corn yield of winter barley in weatherly different year´s crops. Poľnohospodárstvo,1990, ročník 36, č. 7, s. 596-606.
Molnárová, J.,- Žembery, J.: Produkcia pšenice letnej- ozimnej v trikultúrnej sústave pri rôznych vstupoch. Zborník : Obilniny, Nitra 1997, s. 36-40.
Petr, J. – Pflug, L. – Šnejdar, Z.: Dynamika odnožování ozimého ječmene a podíl odnoží na výnosu. Rostl. Výr. 31, 5, 1985, s. 507-515.

Procházková, B.,- Dovrtěl, J.,- Suškevič, M.: Systémy zpracování půdy v kukuřičné výrobní oblasti. Sborník referátů, Agroregion 1997, Problematika současného zemědělství a případové studie, České Budějovice 1997, s. 165-168.

Tab 1. Influence of the cultivation way on the grain yield in winter barley in year 1998/99

Variety	Way of cultivation	Yield $t.ha^{-1}$	Difference caused by the way of cultivation		
			$t.ha^{-1}$	%	*Sk*
LUXOR	A	7,61	-	100,00	-
	B	7,74	0,13	101,71	390
	C	7,87	0,26	103,42	780
HANNA	A	6,67	-	100,00	-
	B	6,52	-0,15	97,75	-450
	C	6,98	0,31	104,65	930
BABYLONE	A	6,76	-	100.00	-
	B	6,33	-0,43	93,64	-1290
	C	6,58	-0,18	97,34	-540

$Hd_{0,05}$: 0,20089 $Hd_{0,01}$: 0,25147

Tab.2: Influence of the cultivation way on the grain yield in winter barley in year 1999/2000

Variety	Way of cultivation	Yield $t.ha^{-1}$	Difference caused by the way of cultivation		
			$t.ha^{-1}$	%	Sk
LUXOR	A	7,64	-	100	
	B	8,30	0,66	108,6	2112
	C	8,61	0,97	112,7	3104
TIFFANY	A	7,64	-	100	
	B	7,51	-0,13	98,3	-416
	C	7,75	0,11	101,4	352
BABYLONE	A	7,71	-	100	
	B	7,91	0,20	102,6	640
	C	7,49	-0,22	97,1	-704

$Hd_{0,05}$ cultivation:0,67223, $Hd_{0,01}$ cultivation:1,13411

DEVELOPMENT OF MELLIFEROUS PLANT MIXTURES WITH LONG LASTING FLOWERING PERIOD

Zita SZALAI, László RADICS, Izóra GÁL, Péter PUSZTAI , Eszter Sz. BOGNÁR
Szent István University, Faculty of Horticulture Science, Department of Ecological and Sustainable Production Systems H-1518 Budapest, Pf.53. (mezg@omega.kee.hu)

Summary

In this project we would like to develop mixtures of melliferous plant species with long lasting flowering period to offer bee pasture for the honey bees and wild bees and for the protection and reconstruction of the original association of the eroded uncultivated lands. The reasons for the research are the foreseeable increasing amount of the fallow, the presently decreasing natural bee forage lands, and the increasing territories of the eroded uncultivated lands. The experiment was set in the two places. There have been 6 melliferous plant mixtures examined: 3 annual and 3 perennial, in four repetition.
The purpose of the examinations were to detect the flowering stages and fenological aspects of the species in the mixture, the soil covering and the weed suppression effect of the mixtures. We have examined the appropriate time of sowing of the mixtures and the optimal percentage of the components in the mixture.
Our examinations so far have resulted that our plant mixtures have been flowering continuously from the end of May ensuring good bee forage for the wild bees living on the territories and for the visiting honey bees as well. From the annual mixtures mustard and buchweat, from the perennials saintfoin, melilot and coronilla proved good weed suppressive effect and long flowering period.

Key words: Melliferous flora, fallow, plant mixture, beepasture, honey bees, wild bees