Table 3 Qualitative parameters of sugar beet

Variant of Fertilization	Year	Digestion (%)		Ash content (%)		α-amino N (mmol.100g^{-1})		Refined sugar yield (%)	
		EF	FEG	EF	FEG	EF	FEG	EF	FEG
1st	1996	19,00	14,50	0,558	0,442	3,57	4,28	15,968	11,932
	1997	17,20	17,00	0,442	0,498	4,28	4,64	14,632	14,208
	1998	16,25	15,90	0,436	0,573	2,86	3,11	13,706	12,808
	Average	17,48	15,80	0,479	0,504	3,57	4,01	14,769	12,983
2nd	1996	19,40	14,70	0,460	0,490	3,21	5,35	16,760	11,940
	1997	18,40	17,50	0,412	0,462	3,57	4,11	15,952	14,852
	1998	16,35	16,40	0,502	0,533	3,03	3,07	13,542	13,468
	Average	18,05	16,20	0,458	0,495	3,27	4,18	15,418	13,420
3rd	1996	20,20	15,70	0,403	0,406	3,21	4,28	17,788	13,276
	1997	17,00	17,80	0,460	0,516	4,28	4,46	14,360	14,936
	1998	16,50	15,25	0,524	0,546	2,86	3,39	13,604	12,266
	Average	17,90	16,25	0,462	0,489	3,45	4,04	15,251	13,493

Content of soluble ash was moved in the range 0,403 - 0,573 %, α-amino nitrogen 2,86 - 5,35 mmol.100 g^{-1} and refined sugar yield 11,932 – 17,788 %. Also values of these parameters were dependent from variant of fertilization, soil types and the year of cultivation.
The influence climatic condition is reflected not only in yield roots but at the values qualitative parameters of sugar beet too. These results are in the harmony with literature (Pačuta, Černý, Karabínová, 2001).
Production of polarizing sugar and production of refined sugar is shown in table 2. The fertilization of sugar beet caused the average increase of the production of polarizing sugar from 1,26 to 1,66 t.ha^{-1} and of the production of refined sugar from 0,51 to 0,96 t.ha^{-1} in comparison to the control without fertilization.
At reciprocal comparison of fertilizing variants were higher yield and superior qualitative parameters roots were found on the 2nd variant (method of electro-ultrafiltration).

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INFLUENCE OF TILLAGE SYSTEMS ON SOIL MOISTURE DYNAMICS UNDER WINTER WHEAT CULTIVATION.

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Summary

The soil moisture by different cropping systems and conventional and reduced soil tillage management have been evaluated at Ortic Luvisol near Nitra during 1998–2000. The soil moisture in soil profile under winter wheat canopy was determined to the depth 0.6 m with 0.1 m interval layers by gravimetric analysis at different cropping systems No significant differences in soil moisture between evaluated conventional and reduced tillage treatments have been noted. The average soil moisture was in range 14.28 – 15.99% (conventional) and 14.30 – 16.12%(reduced) in favour of shallow loosening. The seasonal dynamics of soil moisture in spite of different rainfall characters within the space of three years was very similar. The significant differences between date of sampling during vegetation period and years were determined.

***Keywords*:** soil moisture, tillage management, winter wheat.

Introduction

Tillage options must include profitability gains and environmental benefit of soil management. The identification of alternative practices requires field studies of crop responses to provide appropriate information before new practices are widely accepted. The advantages of tillage options may include increased crop establishment and yields(Cigľar, Smatana, 1988) , weed control (Bartošová et al.,2000), physical and chemical soil characteristics (Líška, Smatana,1985; Smatana, 2000a) and environmental aspects of reduced soil tillage (Kováč, Antal,1999). Tillage system may influence soil microbial activity via soil hummidity (Pospišil et al.,1999) but the longevity of these all effects may be short.
The purpose of this study was to asses influence of conventional and reduced tillage on soil moisture under winter wheat cultivation.

Material and methods

The experimental site belongs to warm and moderate arid climatic region in the south – west of Slovakia. The main soil type is Orthic Luvisol, with 2.3 % of humus content. The soil moisture was observed in different farming systems and different tillage by winter wheat cultivation during 1998 – 2000. The investigated basic tillage treatments were: B1 – conventional cultivation mouldboard plough tillage to a depth 0.2 m and surface cultivation of topsoil ; B3 – reduced cultivation – shallow loosening. Balanced fertilising to the designed yield level of 6 tonne per ha was used. The soil moisture (gravimetric analysis) in soil profile was determined to the depth 0.6 m with 0.1 m interval layers with three replications, five- times during vegetation period. The date of sampling was determined by tillage management practices and wheat growing stage.

Results and discussion

The soil moisture and soil moisture dynamics under winter wheat canopy have been assessed. The three year trials confirm no significant differences between two evaluated tillage treatments. The soil moisture in average of investigated soil profile(0,6m) was 14.28 – 15.99% in mouldboard tillage treatment and 14.30 – 16.12% in shallow loosening treatments. The seasonal dynamics of soil moisture in spite of different rainfall characters within the space of three years was very similar.(Table 1). The significant differences between date of sampling during vegetation period and years were determined. The high significant differences between top and bottom layers were noted in all evaluated years. The highest soil moisture was in 0.5 –0.6 m layer.

Table 1 Soil moisture in winter wheat cultivation , under conventional and reduced cultivation in profile 0 – 0.6m, during 1998 – 2000 years.
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Cultivation	Moisture %					Average
Year/date 1998	25.3.	24.4.	27.5.	13.7.	31.8.	
B1	21.84	18.84	11.54	9.53	9.66	14.28
B3	22.19	19.24	11.05	9.13	9.87	14.30
Year/date 1999	24.3.	21.4.	26.5.	6.7.	18.8.	
B1	18.47	16.99	13.00	15.81	15.70	15.99
B3	18.49	17.43	12.76	16.42	15.50	16.12
Year/date 2000	20.3.	25.4.	3.6.	28.7.	7.9.	
B1	22.10	16.67	9.16	12.81	10.79	14.31
B3	22.03	16.29	9.74	14.00	12.59	14.93

B1 conventional tillage – mouldboard ploughing
B3 reduced tillage – shallow loosening

The wettest period of soil condition was a spring and the driest was an autumn. Spring soil samples have from 18.47 %(B1-1999) to 22.19%(B3-1998) soil moisture. In March, April and May we can noted relatively narrow range of soil moisture with similar decrease in soil moisture in all evaluated years. July and August/ September samples had broad range of soil moisture 9.13%-16.42%/ 9.66%-15.70% respectively. Under winter wheat cultivation we can note tendency towards higher moisture in shallow loosening treatment rather than in mouldboard ploughing due to winter crop character and covering index of winter wheat . Also Smatana (2000b) did not note significant differences in three year trials of different tillage treatments of the soil profile by winter wheat cultivation. The soil moisture of different date of sampling was influenced predominantly by distribution and amount of precipitation and air temperature. The variability of soil moisture with relationship of deep soil and different tillage was also noted. Similar results received Gnatenko (1992). He noted in deep layers (1.0 – 1.5m) the high moisture of soil samples in loose treatments with comparison to mouldboard ploughing, in dry weather condition only.

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INFLUENCE OF CROPPING TECHNOLOGIES ON BIOLOGICAL SOIL CHARACTERISTICS.

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Summary

Field experiment started in 1994, in order to determine effect of tillage and residue management in different crop sequences on microbial activity and dynamic of soil organic carbon, at Experimental station of Slovak Agricultural University in Nitra - Dolná Malanta on Orthic Luvisol. No significant differences between fertilizer treatments in basal respiration of topsoil have been noted under any growing crops : maize (*Zea mays* L.) – spring barley (*Hordeum vulgare* L.) –common pea (*Pisum sativum* L.) – winter wheat (*Triticum aestivum* L.). The soil tillage management has a significant influence on microbial activity with basal respiration intensity of the soil under mouldboard ploughing - 22.7 mg CO_2 and 26.7 mg CO_2 per kg of the soil under shallow loosening soil. The same tendency was noted in organic carbon content in soil after seven years mouldboard ploughing - C_{org} 1.21 % with comparison of C_{org} 1.36 % by reduced cultivation using – shallov loosening.

Keywords: basal respiration,organic carbon, tillage management, crop sequences

Introduction

In a mature natural ecosystem or a stable agroecosystem, the release of carbon as carbon dioxide by oxidation of soil organic matter (mostly by microbial respiration) is balanced by the input of carbon into the soil as a plant residues. Agroecosystem has some perturbation, results in a net loss of carbon from the soil system. Crop rotation has an important role in sustainable agriculture from aspect of biodiversity of agroecosystem in place and time Kováč et al.(1977) . Industrial cropping system and lack of farm yard manure have negative impact on soil biological activity. Cash crop production with high share of grain crops may influence soil biological activity (Pospišil et al.,1999). Respiration activity indicates the intensity of metabolic processes and it is an important characteristic of the carbon dynamics in soil (Kubát et al.,1999).
Material and Methods
The aim of this study was to evaluate the crop management practices on the biological activity of the soil and soil organic mater. The field trial was conducted at the Experimental station of Slovak Agricultural University in Nitra - Dolná Malanta, during 1994 – 2000 years. The experimental site belongs to warm and moderate arid climatic region in the south – west of Slovakia, the average rainfall is 561 mm, for the growing season 327 mm. Average air temperature is 9.7 ^{0}C, for the growing season 16.2 ^{0}C. The main soil type is Orthic Luvisol,. with 2.3 % of humus content and pH 5.7 in average, the parent material is silt loess. Maize (*Zea mays* L.) – spring barley (*Hordeum vulgare* L.) –common pea (*Pisum sativum* L.) – winter wheat (*Triticum aestivum* L.) were under different crop management practices. The impact of three fertilization levels and tillage treatments growing in different crop sequences have been studied. The crop rotation treatments were as follows: single cropped – maize rotation, double cropped - maize for corn – spring barley rotation, three crops rotation - maize for