When these mixtures entered into the second year only those have given proper performance which contain perennial species : Onobrichys viciefolia on sandy soil, with 7-7,5pH, and Melilotus albus, or Coronilla varia for clay soil with low pH. For the third year grass species have gain territory Festuca rubra and subspecies, which are also components of the perennial mixtures. The evaluation of the third and second year old mixtures are shown on Figure 5.
This experiment is planned for longer period, because weather soil, seed quality has influenced our results, and prevented us to do all the planned examinations related to nectar and pollen productivity of the species in mixture.
Different ecological circumstances of areas need different kind and composition of mixtures we composed 6 mixtures suitable for sandy soil and the composition was modified for heavy clay soil with low pH.

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DYNAMICS OF UPTAKE AND ACCUMULATION OF NITROGEN BY WINTER WHEAT VEGETATION

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Summary

An influence of differentiated nitrogen doses on the dynamics of uptake and accumulation of nitrogen by the winter wheat vegetation was observed during the period of 1987-1989. The results were obtained from field experiments established at two experimental stations of UKSUP (Central Control and Examination Agricultural Institute) in Veľké Ripňany (172 m above sea) and in Báhoň (159 m above the sea). It was found out that at high grain yields in Veľké Ripňany the differences in the positions of the uptake line are not as significant as in the case of Báhoň locality. It is a result of a high level of mobile available nitrogen in soil, accumulated by lucerne which eliminates the effect of the applied nitrogen doses. Grain yield in Báhoň corresponds with the uptake lines of nitrogen. Significant statistical differences have been detected in each year from the period of shooting (r_{1987} =0.73^{++}, r_{1988} = 0.82^{++}, r_{1989} = 0.76^{++}) up to the full maturity (r_{1987} = 0.97^{++}, r_{1988} = 0.98^{++} , r_{1989} = 0.98^{++}) . Compared to the non-fertilized control, the vegetation which was nitrogen fertilized took up at the end of tillering more nitrogen by 4.2 - 13.4 kg N.ha^{-1}, at the beginning of shooting by 21.3 -35.7 kg.ha^{-1}, at the end of shooting by 13.5 - 74.8 kg.ha^{-1} and in milk maturity by 22.8 - 105.4 kg N.ha^{-1}.

Key words*: nitrogen, winter wheat, uptake, biomass, yield*

Nitrogen holds an unreplaceable position in the plant nutrition, compared to other nutrients it has the greatest influence on the quantity and quality of the yield. The higher are the requirements on the yield, biomass production, the more nutrients are transported from the soil and these need to be replaced by fertilization. Targeting influence on the production process course, and simultaneously meeting environmental protection requirements, can be carried out only via scientifically proven plant nutrition in a complex of other environmental determinants (*Bízik 1989; Ložek 1998; Jolankai and Ragasits 1995*).
The article deals with processed results of a study on the influence of differentiated fertilization on the nitrogen uptake and accumulation dynamics in the Viginta variety of winter wheat vegetation at regular sampling of soil and plant in three growing periods of year 1987, 1988 and 1989.

Material and methods

The results were obtained from field experiments established at two experimental stations of UKSUP (Central Control and Examination Agricultural Institute) in Veľké Ripňany and Báhoň where gradually increasing nitrogen doses and five authors methodologies for evaluation of nitrogen nutrition status for wheat fertilization needs were tested. In Veľké Ripňany the experiment was set up on brown soil, foreplant was lucerne, in Báhoň it was set up on black soil, foreplat was winter wheat. An overview of nitrogen fertilization treatments, nitrogen doses and attained grain yields of winter wheat are presented in table 1. Phosphorus and potassium fertilization was in all treatments applied in the same doses determined by the fertilization plan, except for treatment 8 and 9, where based on the plant analysis fertilization by foliar application of Fostim was carried out.

Table 1 Influence of differentiated conditions of N nutrition on the yield and natural grain

production (3 years average)

Treatment	Veľké Ripňany			Báhoň		
	N dose	Yield	Nat. prod.	N dose	Yield	Nat. prod.
	$kg.ha^{-1}$	$t.ha^{-1}$	$kg.kg^{-1}$ N	$kg.ha^{-1}$	$t.ha^{-1}$	$kg.kg^{-1}$ N
1	0	9.06	-	0	5.61	-
2	80	9.20	115	80	7.24	91
3	120	8.99	75	120	7.30	61
4	160	9.18	57	160	7.53	47
5	200	9.08	45	200	7.51	38
6 – Baier method	122	9.29	76	164	7.43	45
7 – Michalík & Ložek (N) method	55	9.20	167	83	7.15	86
8 – Michalík & Ložek (N+P) method	62 +13 P	8.90	144	58 + 17 P	6.84	118
9 – Bízik method	118 +3 P	9.15	78	134 + 3 P	7.37	55
10 – Lopatník method	157	9.17	58	177	7.39	42

Results and discussion

The uptake of nitrogen by winter wheat vegetation is significantly modelled by fertilization. Different uptake conditions, and therefore fytomass production conditions, can be generally presented via uptake lines. Therefore, differentiated nitrogen nutrition has been shown by a different courses of the uptake lines. Uptake lines for nitrogen, if wheat was not nitrogen fertilized, (treatment 1) are the lowest ones and with the increasing nitrogen dose rises its uptake and the tangent of the S lines linear part. More characteristic course of these relationships was detected at the base in Báhoň (figure 3).
It is also being confirmed that higher nitrogen uptake is tightly connected to the grain yield (higher nitrogen uptake, higher yield and vice versa), especially if there are greater position differences between the uptake lines. In case of Báhoň the line position was the lowest under the lowest yield (6,48 $t.ha^{-1}$) in treatment 8 (figure 4). At high grain yields reached in experiments in Veľké Ripňany, no such high differences in the uptake lines courses have been detected (figure 1 and 2). It is a result of a high level of mobile source of available nitrogen in soil, that suppresses the effect of applied nitrogen doses in a fertilizer. A close relationship between the soil nitrogen sources, its uptake, utilisation and yield production is being proven. This can be used for yield prognosis during the growing period and for corrections of the nutrition status of the vegetation (*Bízik 1989*).

Figure 1 Uptake of N by wheat during growing period in $kg.ha^{-1}$ (average for period 1987-1989, Veľké Ripňany)

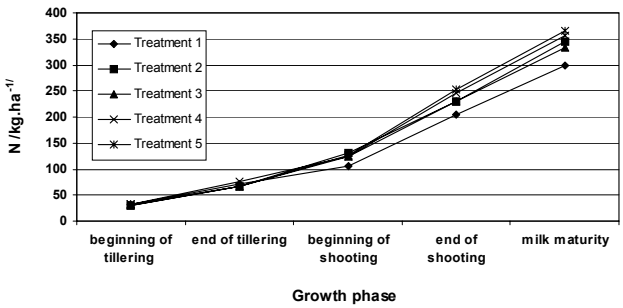

Figure 2 Uptake of N by wheat during growing period in kg.ha^{-1} (average for period 1987-1989, Veľké Ripňany)

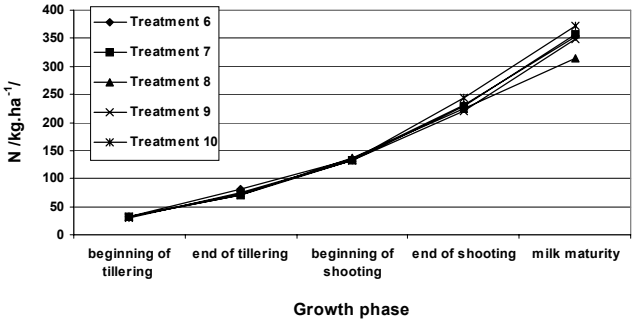

Figure 3 Uptake of N by wheat during growing period in kg.ha^{-1} (average for period 1987-1989, Báhoň)

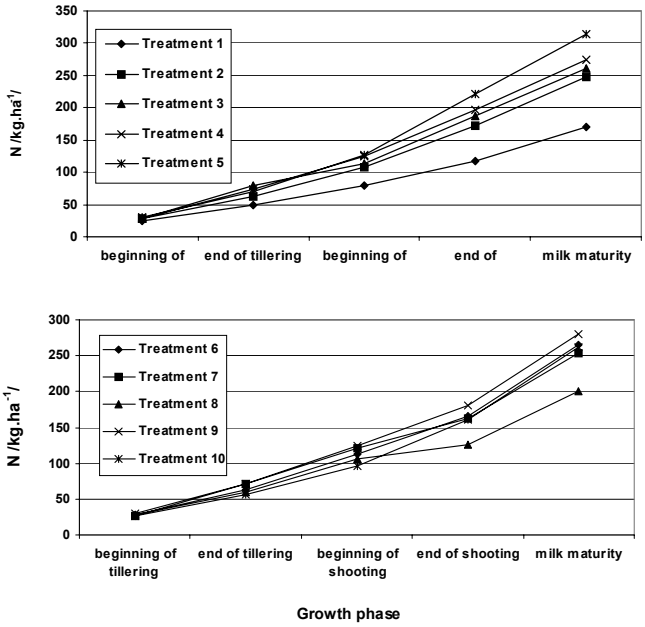

Figure 4 Uptake of N by wheat during growing period in kg.ha^{-1} (average for period 1987-1989, Báhoň)

Uptake of nitrogen in relation to the grain yield is statistically significant at a lower supply of soil nitrogen sources. Statistically significant differences in experiments in Báhoň were detected from the beginnig of shooting to the full maturity. The results are in line with findings of *Smetánková (1985); Halás (1993) and Cerling (1987)* who found out that shooting phase is the most important for the grain production. The findings are logical, since nitrogen from fertilizers is effective with a certain delay from their application.

No statistical relationship between the nitrogen uptake and grain yield in any of the growth phases has been confirmed in Veľké Ripňany.

If the nitrogen uptake by winter wheat is evaluated quantitatively per individual growth phases, we can state that a vegetation fertilized by nitrogen took up more nitrogen at the end of tillering by 4.2 - 13.4 kg N.ha^{-1}, at the beginning of shooting by 21.3 - 35.7 N kg.ha^{-1}, at the end of shooting by 13.5 - 74.8 N kg.ha^{-1} and in milk maturity by 22.8 N kg.ha^{-1} compared to the non-fertilized vegetation (treatment 1).

Response of the winter wheat vegetation to the nitrogen fertilization was shown in a different manner in respect of both locations and years. In 1987 there was determined a significant or highly significant relationship between the nitrogen doses and nitrogen uptake in the shooting phase ($r = 0.80^{++}$, or $r = 0.78^{++}$), in milk maturity ($r = 0.75^{+}$) and in full maturity ($r = 0.84^{++}$)

in Veľké Ripňany. In year 1988 on the same stand there was the significant value determined at the end of shooting (r = 0.74+), in year 1989 at the end of tillering (r = 0.63+). In Báhoň this relationship was statistically significant in all year under review, from the beginning of shooting to full maturity.

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SOIL STRUCTURE AND FOOD WHEAT QUALITY

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Summary

In this contribution, changes in the quality of food wheat grown since 1994 in the tetraculture (barley - pea - wheat - corn) are shown in connection to the soil structure evolution. Significant positive changes emerged in the soil structural state and the food wheat quality, seven years from the start of the research (2000). The percentage of the water-resistant structural aggregates increased, whereas, in the same time the abundance of the microaggregates decreased. The gluten content, SDS-value, and valorigraphic value increased in both - grain and flour. The wheat quality improvement, compared to the initial state, was observed in the very same variants showing positive tendencies for the soil water-resistant structural aggregates as well.

***Keywords*:** food wheat, quality, soil structure, water-resistant soil aggregates

Introduction

The soil structure integrates all the basic physical characteristics of the soil system (Mamedov 1974, Jambor 1992, Morgan 1996, Mucha et al 2000). The agronomical importance of the soil structure, water-resistant in particular, manifestates itself in the creation of more aerated topsoil with favorable conditions in respect to the spring-up, further growth and evolution of cultivated crops. Compared to the soil far from the optimal structural state (high abundance of microaggregates), it (the soil in the good structural state) releases the water and nutrients reserves more economically.
Thus, we were interested, how the changes in the abundance of the water-resistant aggregates would exhibit themselves in the quality of food wheat.

Material and methods

The research was carried out during 1994 – 2000 via a stationary field trial in the experimental base of the SPU in Dolná Malanta. The soil in the locality of interest is Orthic Luvisol created from the preluvial sediments. The detailed description can be found in Hanes et al (1997).
The investigated variants included the one without fertilization (O), the tillage of all after-harvest-remnants (straw and root rests) under soil combined with NPK industrial fertilizers (PZ), and the tillage of stubble and root rests under soil + NPK (PH). The NPK-doses were determined by a balance method for the planed wheat yield of 6 t ha^{-1}. The C:N ratio in the straw was adjusted (0,5 kg N in 100 kg of straw). A conventional tillage to depth of 0,2 m (B1) and a treatment without soil turning (B2) were applied.
Observed parameters and methods covered: water-resistant structural aggregates and microaggregates (Dolgov 1958), flour yield, gluten content (STN 461011 part 9 1993), gluten quality after Berliner in modification of Horel, Hýža, and Prugar (Prugar et al 1959), ability of flour to sediment characterized by seditest (Axford et al 1979, STN 461021 1993), amylases activity by falling number (STN/ISO 3039 1993), and rheologic properties of dough by valorigraphic value.