THE DYNAMIC OF NITROGEN UPTAKE BY DIFFERENT VARIETIES OF RAPE.

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ABSTRACT

The experiments with seven varieties of winter rape on 29 locations around the whole Czech Republic showed the maximum nitrogen uptake 250 - 300 kg N per ha by green biomass in the stage (DC 70 - 80). Idol variety has taken up the lower N amount than others. The lower nitrogen uptake was not confirmed by low N concent in the seed among the investigated varieties. The negative correlation between oil seed concentration and protein seed content was found. The areas of the lowest N content are situated in worse climate conditions with higher precipitation, the highest N concent has been found at high fertile soils.

INTRODUCTION

There are four major winter rape varieties planting in the Czech Republic. The variety Lirajet is planted on the 57 %, Falcon on the 29 %, Ceres on the 9 %, and Idol on the 5 % of the whole acreage of the winter rape. Especially the variety Idol is the new type, which is characterized by thinner habitus and a high oil content. The results of Zukalova (1994) showed the oil seed content 48.00 % for Idol variety, but only 46.95 % for Lirajet variety, 46.95 % for Falcon variety, 45.94 % for Ceres, and 46.44 % for Algona variety in 1993. In our study the effect of different character of Idol variety on the dynamic of nitrogen uptake by biomass during the growth period, and N concentration in seed was investigated .

EXPERIMENTAL

The exact field experiments around the whole Czech Republic on the 29 locations were used in that study. The total nitrogen rate was 130 kg N per ha. Seven "00" varieties were investigated. Ceres, Lirajet, Falcon, and Zeus are German varieties, Idol and Eurol are France varieties, and Algona is Czech variety. Ceres was registered in the Czech Republic in 1990, Algona and Falcon in 1993, Lirajet and Zeus in 1994, Idol and Eurol are still under investigation.

The dynamics of nitrogen uptake by green biomass and by roots was investigated at three locations. The average nitrogen fluctuation in green biomass is shown in figure 1. The lower nitrogen content was found in Idol variety during the growth period not due to higher biomass yield. The highest nitrogen accumulation was 250 - 300 kg N per ha at the green biomass in the stage of maximum uptake (DC 70 - 80). High portion of that amount (75 - 150 kg N) was taken up in four, maximum in six weeks. The biomass growth was found as the most important factor for the nitrogen balance.

Fluctuation of nitrogen concentration in roots was higher, due to higher variability of this biological material. Any trend of lower root nitrogen content has not been found for

Idol variety. The total nitrogen accumulation was 10 - 25 kg N per ha in tap and secondary roots.

The determination of nitrogen changes in the rape seed was the other part of our investigation. Analyses of the seed were made from all 29 locations. The Idol, Zeus, and Eurol varieties were not planted at all locations, the three subgroups had to be created (Table 1). The results showed non significant differences in the N content of rape seeds among varieties.

TABLE 1. The effect of variety on the N content in the rape seed.

group A			group B			group C		
variety	n	% N	variety	n	% N	variety	n	% N
Ceres	18	3.22	Ceres	14	3.21	Ceres	14	3.23
Lirajet	18	3.06	Lirajet	14	3.03	Lirajet	14	3.08
Aglona	18	3.23	Aglona	14	3.23	Aglona	14	3.22
Falcon	18	3.11	Falcon	14	3.14	Falcon	14	3.11
Idol	18	3.12	Zeus	14	3.11	Eurol	14	3.02
F = 1.84 (non sign.)			F = 1.73 (non sign.)			F = 1.93 (non sign.)		

The assumption of lower N content in the seed of Idol variety was not confirmed. The lowest N content was found for Eurol variety, which created very high amount of oil seed in our climate condition (Zukalova, 1994). The negative correlation between oil and protein content was confirmed. From the point of N seed content the field location is the dominant factor. The whole group of experiments was divided into four subgroups using statistic methods (Figure 2). The regions with the lowest nitrogen content are equal the areas with the highest oil seed concentration, that were described by Zukalova et al. (1988), and Vašák (1994). The areas are situated in the Northern part of our country, from 400 to 500 m above sea level. The average year precipitation is 600 - 700 mm and temperature 8 - 9 ^{o}C. Sandy soils are characteristic for that region above all. The highest N content more than 3,42 % has been found on the 7,4 % of experimental fields. That areas are situated in Southern and Mid Bohemia at the high fertille soils. The temperature is above country average in that locations.

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Figure 1

The N content in different varieties of the rape biomass

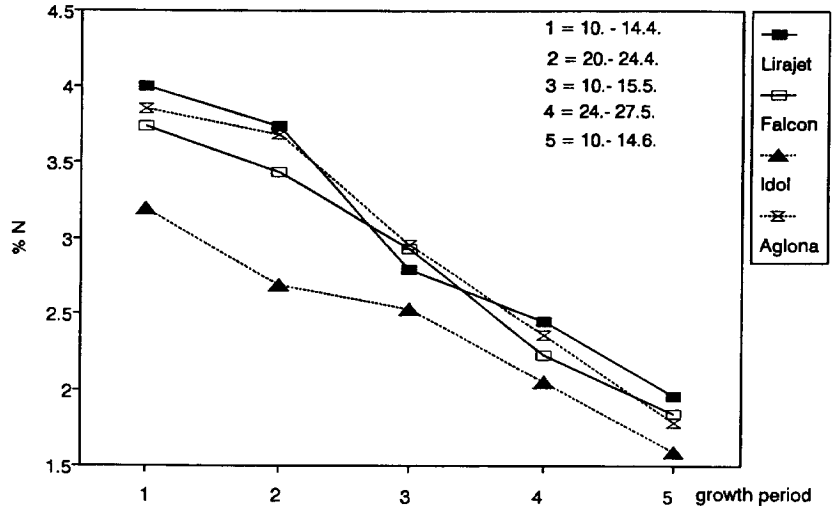

Figure 2

The effect of locality on the N content in the rape seed