

THE INFLUENCE OF NITROGEN ON SOME MORPHOLOGICAL CHARACTERS AT THE WINTER RAPE

Alina Laura AGAPIE¹, P. PARSAN²

¹*Agricultural Research and Development Station Lovrin, 200, Lovrin, 307 250, Romania*

²*Banats University of Agricultural Sciences and Veterinary Medicine Timisoara*

alinamartinig@yahoo.com

Abstract: *The winter rape is one of the crops with the highest consumption of nutrients. The chemical fertilizers applied both unilaterally and in different combinations, influences different the plant morphology. This paper proposes an analysis of the influence of the applied fertilizers, of: plant height, number of branches / plant, number of a silique / plant, average number of seeds / silique and the weight of the seeds / plant.*

Keywords: *fertilization, Nitrogen (N), winter rape.*

INTRODUCTION

Of all the nutrients used to fertilize winter rapeseed crops, nitrogen fertilizers strongly influence the quantitative and qualitative yields of this plant (ALLEN, 1972; BOLOG, 2004; HERA, 1994; BUZDUGAN, 2013).

This nutritive element stimulates the resistance to various disturbing factors of the vegetation, allows the formation of a well-developed foliar appliance and a high capacity of photosynthesis, influences the production activity, stimulates the production of inflorescences and favors a stronger development of the plant (HOLMES, 1980 ; BUZDUGAN, 2013).

A nitrogen balanced fertilization results in a large photosynthetic surface that will allow winter rape plants to produce a large number of flowers, siliques and seeds (HERA, 2002 ; VINTILA, 1984 ; BUZDUGAN, 2013).

MATERIAL AND METHODS

The experiment was located on the land of ARDS Lovrin on a semicarboxylic, weakly-gleized chernozem, between 2014 and 2016. The previous plant was winter wheat.

The research was conducted in a stationary experienced, established in 1967, with the following graduations of the nitrogen: N_{0,30,60,90,120}.

In the field, the technical dimensions of the experience were the following: plots area of 36 m² (9 x 4), harvested area of 24 m² (8 x 3), four replications. The nitrogen (ammonium nitrate 33.5%) was applied fractionated: one-third of the dose during sowing and the other two thirds in the spring, after the resumption of the vegetation period.

The data was statistically analyzed using the variance analysis procedure.

RESULTS AND DISCUSSIONS

The influence of chemical fertilizers, especially of nitrogen, on the vegetative development of rape plants is well known.

Table 1

Analysis of variance for the effect of fertilization with nitrogen on stem length of winter rape

Source of variation	DF	SS	S ²	F	
				Value	Significance
Replications	2	474.133	237.067	12.8260	
Nitrogen (N)	4	920.933	230.233	12.4563	**
Error	8	147.867	18.483		
Total	14	1542.933			

The coefficient of variation: 3.14%.

Table 2

The effect of nitrogen on stem length in winter rape

Nitrogen	Stem length [cm]		Diff.(cm)	Significance
	cm	%		
a1 – control (unfertilized)	125	100	mt	
a2 – N50	136	109.1	11	*
a3 – N100	143	114.7	18	***
a4 – N150	147	118.2	23	***
a5 – N200	134	107.2	9	*

DL 5% = 8.09 cm DL 1% = 11.77 DL 0.1% = 17.70

The length of the strain in the rape is significantly influenced ($R = 0.72$ **) by the application of nitrogen fertilizers. The N_{150} fertilization level is the highest increase (18.2%) compared to the unfertilized control variant. This is followed by N_{100} , with an increase in strain length of 14.7%, both fertilization variants being on the first level of significance.

On the second level of significance is the N_{50} variant, with an increase of 9.1%, followed by the N_{200} with the lowest value against the control, of 7.2%.

Regarding stem length, during the analyzed period, it is proved to be stable over time, the coefficient of variation being insignificant, 3.14%

Table 3

Analysis of variance for the effect of fertilization with nitrogen on the number of siliques per plant

Source of variation	DF	SS	S ²	F	
				Value	Significance
Replications	2	349.200	174.600	4.3361	
Nitrogen (N)	4	18238.267	4559.567	113.2343	***
Error	8	322.133	40.267		
Total	14	18909.600			

The coefficient of variation: 5.05%

Table 4

The effect of nitrogen on the number of siliques/plant

Nitrogen	number of siliques/plant		Diff.	Significance
	no	%		
a1 –control (unfertilized)	72	100	mt	
a2 – N50	111	153	38	***
a3 – N100	146	201	73	***
a4 – N150	177	244	104	***
a5 – N200	123	170	50	***

DL 5% = 12 nr DL 1% = 17 DL 0.1% = 26

The number of siliques / plant is another significant element influenced by the unilateral application of nitrogen (R = 0.92 ***). The most significant increase in this productive structure is the N₁₅₀ with more than 104 siliques than in the unfertilized variant (72 siliques / plant). Fertilized variant with 200 kg nitrogen / ha shows a decrease in the number of siliques/ plant by 94%, compared to the N₁₅₀.

The value of the variation coefficient of 5.05 % indicates stability of the character analyzed in the experience.

Table 5

Analysis of variance for the effect of fertilization with nitrogen on seed weight/plant

Source of variation	DF	SS	S ²	F	
				Value	Significance
Replications	2	36.195	18.098	18.1776	
Nitrogen (N)	4	1932.182	483.045	485.1833	***
Error	8	7.965	0.996		
Total	14	1976.342			

The coefficient of variation : 1.61%

The weight of seeds on the plant is a productive element significantly influenced by the application of nitrogen fertilizers (R = 0.96 ***). Significant increases are recorded by increasing nitrogen doses up to 200 kg of active nitrogen / ha.

Table 6

The effect of nitrogen on seed weight/plant

Nitrogen	Seed weight/plant		Diff. (g)	Significance
	g	%		
a1 – control (unfertilized)	42.91	100	mt	
a2 – N50	61.73	143.8	18.82	***
a3 – N100	69.57	162.1	26.66	***
a4 – N150	76.48	178.2	33.57	***
a5 – N200	58.43	136.2	15.51	***

DL 5% = 1.87 g DL 1% = 2.73 DL 0.1% = 4.11

The highest increase in seed weight / plant is recorded in the N₁₅₀ variant - 76.48 g, with 33.57 g more than the unfertilized control (42.91 g). In the N₂₀₀ version, seed / plant weight is 58.43 grams, 18 grams less than the N₁₅₀, but significant to the control (36.2 %).

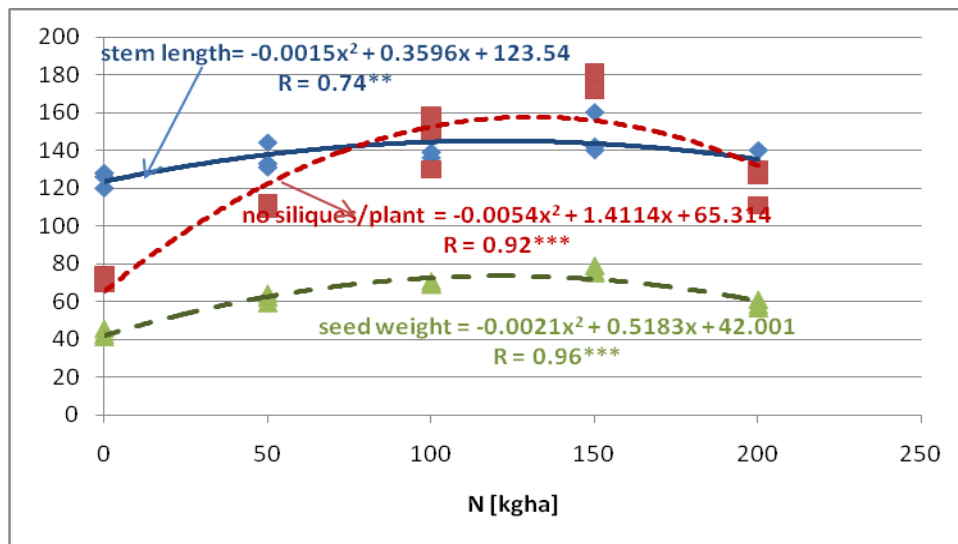


Fig. 1 The correlation between the nitrogen dose and the morphological characters studied

The unilateral application of nitrogen leads to significant increases of the analyzed productive parameters (conclusion justified by the significant values of the coefficients of determination), the correlation between this fertilization element and the analyzed morphological characters being positive.

CONCLUSIONS

- The nitrogen significantly influences the vegetative development of rape plants;
- The unilateral application of nitrogen leads to significant increases in the analyzed productive parameters, the correlation between this fertilization element and the analyzed morphological characters being positive;

BIBLIOGRAPHY

1. ALINA LAURA AGAPIE, GABRIELA GORINOIU, SIMONA NITA, 2016 - *Results regarding the effect of phosphorus and nitrogen on rape yield*, 48(4), Research Journal of Agricultural Science;
2. BUZDUGAN L.; NASTASE D., *Rapita de toamna*, Editura Academiei Romane, 2013;
3. CONSTANTIN SAICA, IOAN CATALIN ENEA, 2013 –Cercetari privind influenta ingrasamintelor cu azot si sulf asupra unor caractere morfologice si a productiei plantelor de papita de toamna, AN. I.N.C.D.A. FUNDULEA, VOL. LXXXI, 2013.
4. RÎȘNOVEANU, LUXIȚA, BUZDUGAN, L., 2011 – Some aspects regarding the influence of sowing time of winter oilseed rape production in the condition of north-east Bărăgan. *Lucrări științifice*, 54, Seria Agronomie, U.S.A.M.V. Iași.
5. SIDLAUSSKAS, G., BERNOTAS, S., 2003 – Some factors affecting seed yield of spring oilseed rape (*Brassica napus* L.). *Agronomy Research*, 1 (2): 229-243, Lituania.