International Congress on
Biological, Physical And Chemical Studies

International Congress on Biological, Physical And Chemical Studies - is an international conference platform under open openaccess policy. The conference is led by international expert members who take an objective approach to peer review, ensuring each research paper is reviewed, edited by authors and evaluated on its own scholarly merits and research integration. Publishing and joining on the procedding of the International Congress on Biological, Physical And Chemical Studies will exsure publishing experience and indexing possibilities on various global indexing.

The Effect of Nitrogen Rates on the Growth Period of Triticale Varieties

Raimqulova Maftuna Mashrabovna
Doctoral Candidate at the Biochemistry Institute, Samarkand State University named after Sharof Rashidov

Abstract

This study investigated the effect of different nitrogen application rates on the growth period of triticale varieties. During the experiment, the main phenological stages—emergence, tillering, stem elongation, heading, flowering, and full maturity—were observed, and their duration was recorded. It was found that varying amounts of nitrogen fertilizer significantly influenced the length of the growth period. Higher nitrogen levels led to an extension of the vegetation period, while lower levels resulted in its shortening. The findings are of great importance for determining optimal nitrogen rates in triticale cultivation and for enhancing crop productivity.

Keywords

Triticale varieties, Odyssey, Sardor, Nitrogen rates, Growth period.

Triticale is a self-pollinating cereal crop. Scottish scientist **Stephen Wilson** was among the first to develop triticale by cross-pollinating wheat. The name *triticale* is derived from the partial combination of the scientific names of wheat (*Triticum*) and rye (*Secale*) [3].

The initial hybridization was carried out in Scotland in the late 1870s, and the first fertile wheat–rye amphidiploids were obtained in 1888 by the German scientist **Rimpau** [6].

Triticale is currently considered an alternative crop for human nutrition, particularly effective in soils and climatic conditions unfavorable for wheat cultivation [5].

Triticale is mainly grown for grain feed and green forage; however, in recent years its grain has been increasingly utilized in the food and alcoholic beverage industries [4].

Determining grain quality in triticale cultivation—particularly its requirements for light and nitrogen contribution—is of great importance [1]. Triticale combines the high yield potential, short

stature, and good bread-making quality of wheat with the disease resistance and adaptability to acidic soils characteristic of rye [5]. The grains of triticale are yellowish-brown in color, and its external morphology resembles that of both wheat and rye [2].

When cultivated with modern agricultural technologies, forage varieties of triticale yield 500–600 quintals of green mass per hectare, and under irrigated conditions the yield can be even higher [7].

Our research was conducted in the Payariq district of the Samarkand region. When nitrogen rates were applied to triticale varieties, their growth processes across different phases varied. In both varieties, an increase in nitrogen levels was accompanied by a noticeable increase in plant height.

Table 1

Growth period of triticale varieties (cm)

phases	Tillering	Stem elongation	Heading	Flowering	Grain ripening
Odyssey variety					
Control	17,4	43,7	61,2	75,9	84,5
$N_{150}P_{105}K_{75}$	17,7	48,6	72,4	83,7	93,4
N_{200} $P_{140}K_{100}$	18,1	59,3	81,6	94,5	102,3
N_{250} $P_{175}K_{125}$	18,7	66,4	92,8	106,9	116,7
N_{300} $P_{210}K_{150}$	19,4	78,1	99,7	113,3	123,8
Sardor variety					
Control	15,5	39,6	58,8	71,4	80,2
$N_{150}P_{105}K_{75}$	15,8	42,5	69,3	80,7	89,7
N_{200} $P_{140}K_{100}$	16,2	51,8	74,7	83,2	92,9
N_{250} $P_{175}K_{125}$	16,9	59,2	78,4	88,1	99,8
N_{300} $P_{210}K_{150}$	17,6	69,5	86,2	95,7	105,3

In the tillering phase, the Odyssey variety showed plant height of 17.4 cm in the control (without fertilizer), 17.7 cm in the $N_{150}P_{105}K_{75}$ treatment, and 18.1 cm in the $N_{200}P_{140}K_{100}$ treatment. Under the $N_{250}P_{175}K_{125}$ treatment, the height increased to 18.7 cm, and in the $N_{300}P_{210}K_{150}$ treatment it reached 19.4 cm. In the Sardor variety, growth was slower: 15.5 cm in the control (without fertilizer), 15.8 cm in the $N_{150}P_{105}K_{75}$ treatment, 16.2 cm in the $N_{200}P_{140}K_{100}$ treatment, 16.9 cm in the $N_{250}P_{175}K_{125}$ treatment, and 17.6 cm in the $N_{300}P_{210}K_{150}$ treatment.

At the stem elongation phase, a considerable increase in plant height was observed in both varieties. In the Odyssey variety, the control (without fertilizer) reached 43.7 cm, and with

increasing nitrogen rates, the plant height also increased. It measured 48.6 cm in the $N_{150}P_{105}K_{75}$ treatment, 59.3 cm in the $N_{200}P_{140}K_{100}$treatment, 66.4 cm in the $N_{250}P_{175}K_{125}$ treatment, and reached 78.1 cm in the $N_{300}P_{210}K_{150}$ treatment. In the Sardor variety, the height was lower compared to Odyssey: 39.6 cm in the control (without fertilizer), 42.5 cm in the $N_{150}P_{105}K_{75}$ treatment, 51.8 cm in the $N_{200}P_{140}K_{100}$ treatment, 59.2 cm in the $N_{250}P_{175}K_{125}$ treatment, and increased up to 69.5 cm in the $N_{300}P_{210}K_{150}$treatment.

At the heading phase, a further increase in plant height was recorded. In the Odyssey variety, the control (without fertilizer) reached 61.2 cm, while in the $N_{150}P_{105}K_{75}$ treatment it was 72.4 cm. The height increased to 81.6 cm in the $N_{200}P_{140}K_{100}$ treatment, 92.8 cm in the $N_{250}P_{175}K_{125}$ treatment, and reached 99.7 cm in the $N_{300}P_{210}K_{150}$ treatment. In the Sardor variety, the height was lower compared to Odyssey: 58.8 cm in the control (without fertilizer), 69.3 cm in the $N_{150}P_{105}K_{75}$ treatment, 74.7 cm in the $N_{200}P_{140}K_{100}$ treatment, 78.4 cm in the $N_{250}P_{175}K_{125}$ treatment, and 86.2 cm in the $N_{300}P_{210}K_{150}$treatment.

At the flowering phase, the Odyssey variety reached 75.9 cm in the control (without fertilizer), 83.7 cm in the $N_{150}P_{105}K_{75}$ treatment, and 94.5 cm in the $N_{200}P_{140}K_{100}$ treatment. The plant height further increased to 106.9 cm in the $N_{250}P_{175}K_{125}$ treatment and reached 113.3 cm in the $N_{300}P_{210}K_{150}$ treatment. In the Sardor variety, the height was lower compared to Odyssey: 71.4 cm in the control (without fertilizer), 80.7 cm in the $N_{150}P_{105}K_{75}$ treatment, 83.2 cm in the $N_{200}P_{140}K_{100}$ treatment, 88.1 cm in the $N_{250}P_{175}K_{125}$ treatment, and 95.7 cm in the $N_{300}P_{210}K_{150}$ treatment. With the increase in nitrogen rates, plant height was found to increase accordingly.

At the grain ripening phase, the Odyssey variety reached 84.5 cm in the control (without fertilizer), 93.4 cm in the $N_{150}P_{105}K_{75}$treatment, and 102.3 cm in the $N_{200}P_{140}K_{100}$ treatment. The plant height further increased to 116.7 cm in the $N_{250}P_{175}K_{125}$ treatment and reached 123.8 cm in the $N_{300}P_{210}K_{150}$ treatment. In the Sardor variety, the height was lower compared to Odyssey: 80.2 cm in the control (without fertilizer), 89.7 cm in the $N_{150}P_{105}K_{75}$ treatment, 92.9 cm in the $N_{200}P_{140}K_{100}$ treatment, 99.8 cm in the $N_{250}P_{175}K_{125}$ treatment, and 105.3 cm in the $N_{300}P_{210}K_{150}$ treatment.

CONCLUSION

The results of the conducted research revealed that the growth period and phenological stages of triticale varieties are significantly dependent on nitrogen application rates. Increasing nitrogen levels led to higher growth indicators in both varieties across all phases, from tillering to grain ripening, and extended the vegetation period. The Odyssey variety consistently demonstrated higher growth parameters compared to the Sardor variety under all treatments, distinguishing itself by showing a stronger response to nitrogen fertilization.

REFERENCES:

1. Aguirre A., Badiali O., Cantarero M., León A., Ribotta P., & Rubiolo O. (2002). Relationship of Test Weight and Kernel Properties to Milling and Baking Quality in Argentine Triticales. Cereal Research Communications, 30(1/2), 203-208.
2. Aprodu I., Banu I. Milling, functional and thermo-mechanical properties
3. of wheat, rye, triticale, barley and oat, J. Cereal. Sci., 77 (2017), pp. 42- 48
4. Mergoum M, Sapkota S, El-Fatih A. ElDoliefy A, Naraghi M, Pirseyedi S, Mohammed S. Alamri M.S and AbuHammad W (2019) Tritikale (x Triticosecale Wittmack) Breeding Springer Nature Switzerland AG 2019 405 J.
5. Mergoum M. Singh P.K., Peña R.J., Lozano-del Río A.J., Cooper K.V., Salmon D.F., Gómez Macpherson H. Tritikale: A "New" Crop with Old Challenges. Cereals. - New York: Springer, 2009. - P. 1-21.
6. Oettler G. (2005). The fortune of a botanical curiosity-Tritikale: past,
7. present and future. J. Agric. Sci. 143, 329–346
8. Ворончихин В.В., Ворончихина И.Н., Рубец В.С., Пыльнев В.В. Влияние наличия нижнего узла кущения на зимостойкость и урожайность озимой тритикале (x Triticosecale Wittm.). Кормопроизводство. – 2019. – № 9. – С. 31-35.
9. https://vnish.org/tehnologiya-vozdelyvaniya-yarovoj-tritikale.