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Agronomic evaluation of late sown Wheat (*Triticum aestivum* L.) genotypes

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Abstract
The field experiment was conducted during *Rabi* season, 2020 at Crop Research Farm (CRF), Department of Agronomy, SHUATS, Prayagraj (UP) On sandy loam soil to investigate the Agronomic evaluation of late sown Wheat (*Triticum aestivum* L.) genotypes on growth and yield under irrigated condition of Allahabad. The experiment was laid out in Randomized Block Design consisting of 12 treatments and four replications with different genotypes. Study revealed that (NELS-206) maximum plant height (102.09 cm), highest plant dry weight (21.23g) and number of tillers (13.50) was recorded significantly as compared to all the genotypes. The yield attributes *viz*., maximum number of grains/spike (46.56), maximum length of the spike (14.13), maximum test weight (40.63 g), maximum grain yield (4.26 t/ha), maximum straw yield (5.65 t/ha) and maximum harvest index (42.84%) were recorded with (NELS-206). Highest gross returns (96,969.94 INR/ha), net return (67,601.94 INR/ha) and Benefit cost ratio (2.30) was also recorded in NELS-206 genotype.

Keywords: Wheat, genotypes, viable, productive, evaluation

Introduction
Wheat (*Triticum aestivum* L.) which belongs to the family Poaceae, is the world's most widely cultivated cereal crop. In India, wheat is the second most important cereal crop next to rice contributing nearly 35 per cent to the national food basket and plays an important role in food and nutritional security. It finds a major place in both time meals of common population in major wheat growing states. The cultivation of wheat has also been symbolic of green revolution, self-sufficiency in food and sustained production. India ranks second among wheat producing country in the world. It is mainly used as house hold cereals and consumed in various forms like chapatti, puri, daliya etc. It contains about 70% carbohydrate, 12% protein, 1.7% fats, 2.7% minerals, 2% fiber and 12% moisture (Sharma and Jain, 2004).

Time of sowing is most important factors that govern the phenological development of the crop and also efficient conversion of biomass into economic yield. It has been observed that the wheat crop sown at normal date usually have longer crop duration thus they get an opportunity to accumulate more biomass as compared to late sowing and thus it finally resulted in higher grain yield and biological yield. Being a temperature sensitive crop, late sown crop is exposed to low temperature at the time of establishment and to high temperature at the reproductive phase that finally leads to accelerated maturity of crop and thus crops mature early in North Indian condition. This not only affects yield, but also affects the yield components and other aspects of the growth and development of wheat. Tahir *et al*. (2009).

The sowing time plays an important role among various agronomic factors, which influences the quality and yield of wheat. Its time of sowing is one of the most important fact ors that govern the crop phenological development and efficient conversion of biomass into economic yield. Normal sowing has longer growth during which consequently provides an opportunity to accumulate more biomass as compared to late sowing, hence manifested in higher grain and biological yields. It has been observed that the wheat crop sown at normal date usually have longer crop duration thus they get an opportunity to accumulate more biomass as compared to late sowing and thus it finally resulted in higher grain yield and biological yield. Being a temperature sensitive crop, late sown crop is exposed to low temperature at the time of establishment and to high temperature at the reproductive phase that finally leads to accelerated maturity of crop and thus crops mature early in North Indian condition.

Materials and Methods

An experiment was carried out to study the "Agronomic evaluation of late sown Wheat (*Triticum aestivum* L.) genotypes on growth and yield under irrigated condition of Allahabad" was conducted at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad during Rabi season of 2020-2021. Which is located at 250 24' 33" N latitude, 810 51' 12" E longitude and 96 m altitude above the mean sea level. This area is situated on the right side of the river Yamuna by the side of Prayagraj, Rewa Road about 5 km away from Prayagraj city. The experiment was laid out in Randomized Block Design consisting of 12 treatments and four replications. Treatments *viz*., T1 (NELS – 201) T2 (NELS – 202) T3 (NELS – 203) T4 (NELS – 204) T5 (NELS – 205) T6 (NELS – 206) T7 (NELS – 207) T8 (NELS – 208) T9 (NELS – 209) T10 (NELS – 210) T11 (NELS – 211) T12 (NELS – 212).

Results and Discussion

Effect of late sown Wheat genotypes on growth parameters

The growth parameters like Plant height, Plant dry weight (g/hill), Number of tillers/hills were significantly affected by the late sown Wheat genotypes. Table No 1

Table 1: Field evaluation of wheat genotypes based on growth parameters

Treatments	Plant height (cm) 125 DAS	Dry-weight (g/plant) 125 DAS	Number of tiller/hill 125 DAS
NELS – 201	99.24	20.52	11.55
NELS – 202	101.12	21.03	12.75
NELS – 203	99.41	20.78	11.90
NELS – 204	100.41	20.91	12.60
NELS – 205	100.27	20.80	12.05
NELS – 206	102.09	21.23	13.50
NELS – 207	97.46	19.47	10.45
NELS – 208	96.59	19.21	10.35
NELS – 209	97.34	19.62	10.60
NELS – 210	97.56	19.94	10.85
NELS – 211	101.53	21.15	12.90
NELS – 212	98.59	20.01	11.15
S.Em(±)	0.71	0.14	0.23
CD (p=0.05)	1.63	0.41	0.66

Growth parameters

The results revealed that (NELS-206) recorded maximum plant height (102.09 cm), highest Number of tillers (13.50), highest plant dry weight (21.23 g). The differences in plant height among various genotypes are in general, due to their genetic constitution. These results are in line with those of Nainwal and Singh (2000) [4]. This difference in general, attributed because of different genetic potential of varieties to produce tillers. The development of tillers per hill is dependent on genetic background of plant and environmental conditions. Similar results had also been reported by Das *et al.* (2016) [2]. The difference in dry-matter accumulation among genotypes was mainly due to the difference in their number of tillers. These results are well comparable with Shivani (2001) [5] and Choudhary (2004) [1].

Effect of late sown Wheat genotypes on yield attributes and yield

Effect of late sown Wheat genotypes on yield attributes and yield are presented in Table No 2.

Table 2: Field evaluation of wheat genotypes based on yield attributes and yield.

Treatments	Number of grains/spikes	Spike length (cm)	Test weight (g)	Grain yield (t/ha)	Straw yield (t/ha)	Harvest index (%)
NELS – 201	43.38	12.38	37.02	3.26	5.43	37.43
NELS – 202	45.25	13.55	39.18	3.70	5.48	40.06
NELS – 203	43.56	12.63	37.43	3.37	5.44	37.92
NELS – 204	45.06	13.23	38.71	3.66	5.45	40.19
NELS – 205	44.50	13.05	37.89	3.48	5.46	38.77
NELS – 206	46.56	14.13	40.63	4.26	5.65	42.84
NELS – 207	41.56	11.45	36.06	2.92	5.31	35.64
NELS – 208	41.25	11.38	35.71	2.42	5.28	34.99
NELS – 209	41.63	11.73	36.34	2.97	5.33	36.55
NELS – 210	42.69	12.03	36.73	3.25	5.36	37.67
NELS – 211	46.06	13.73	40.11	3.83	5.61	40.52
NELS – 212	42.94	12.20	36.89	3.25	5.41	37.36
F TEST	S	S	S	S	S	S
SEM (±)	1.01	0.34	0.51	0.25	0.05	1.90
CD (P=0.05)	2.92	0.98	1.48	0.72	0.13	3.48

Table 3: Field evaluation of Wheat Genotypes based on Economics

Treatments	Cost of cultivation (₹/ha)	Gross Return (₹/ha)	Net Return (₹/ha)	B: C ratio
NELS – 201	29,368	73,991.53	44,623.53	1.52
NELS – 202	29,368	80,749.51	51,381.51	1.75
NELS – 203	29,368	71,119.59	41,751.59	1.42
NELS – 204	29,368	84,185.39	50,817.39	1.72
NELS – 205	29,368	83,508.16	51,240.16	1.74
NELS – 206	29,368	96,969.94	67,601.94	2.30
NELS – 207	29,368	65,711.01	36,343.01	1.24
NELS – 208	29,368	58,911.20	29,543.20	1.01
NELS – 209	29,368	72,524.92	43,156.92	1.47
NELS – 210	29,368	71,568.04	42,200.04	1.44
NELS – 211	29,368	80,977.34	51,609.34	1.76
NELS – 212	29,368	72,131.72	42,763.72	1.46

Yield attributes and Yield

Yield attributes and yield were significantly affected by late sown wheat genotypes resulted in significant increase in maximum number of grains/spike (46.56), maximum length of the spike (14.13), maximum test weight (40.63 g), maximum grain yield (4.26 t/ha), maximum straw yield (5.65 t/ha) and maximum harvest index (42.84%) was obtained in (NELS-206).

Grains/Spike is the main yield component in the cereal crops as well as in Wheat. Improvement in grains/spike is important to achieve genetic gains in wheat yield. Test weight is a function of various production factors which are influenced by both environment and heritable characteristics. Also, kernel weight is significantly affected by filling patterns during maturity. Similar findings reported by Kaya *et al.* 2012 [3].

Economics

Highest gross returns (96,969.94 INR/ha), net return (67,601.94 INR/ha) and Benefit cost ratio (2.30) was also recorded in NELS-206 genotype.

Conclusion

It can be concluded that NELS-206 genotype recorded highest growth parameters, yield and also highest net returns and benefit cost ratio. These findings are based on one season therefore, further trails may be required for considering it for recommendation.

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