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PLANT HEIGHT AND LODGING RESISTANCE IN SOFT WHEAT GENOTYPES

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Abstract

The article discusses plant height and lodging resistance parameters in varietal samples obtained from the Central Asian and Kyrgyz soft wheat germplasm, which possess broad genetic diversity, under the conditions of meadow alluvial soils of the Khorezm region.

Keywords: grain yield, productivity, mineral fertilizers, soft wheat, germplasm, milk ripening, thousand grain weight, yield capacity.

Introduction

Among the morpho-physiological characteristics of plants, one of the most important is lodging, which depends on the stem strength and root system. Lodging in wheat plants may occur during the milk ripening stage or during the vegetative growth period. When this happens, plants shade each other, leading to reduced photosynthesis and consequently to shriveled or underdeveloped grains.

Lodging during the ripening period makes harvesting more difficult and can lead to considerable yield loss. Some wheat varieties have tall plants but weak stems and heavy spikes, making them susceptible to lodging even under light wind conditions.

Materials and Methods

High-yielding and lodging-resistant varieties are typically characterized by a strong culm and well-developed anatomical stem elements. In contrast, moderately productive varieties often display average or weak structural features. Importantly,

lodging resistance is not always directly related to plant height; rather, it is associated with stem strength and root anchorage.

To improve lodging resistance, particular attention is given to short-statured genotypes with robust stems and strong root systems. According to V. A. Kumakov (1985), when plant height is below 70 cm, yield reduction can occur due to decreased thousand-grain weight and difficulties during mechanical harvesting.

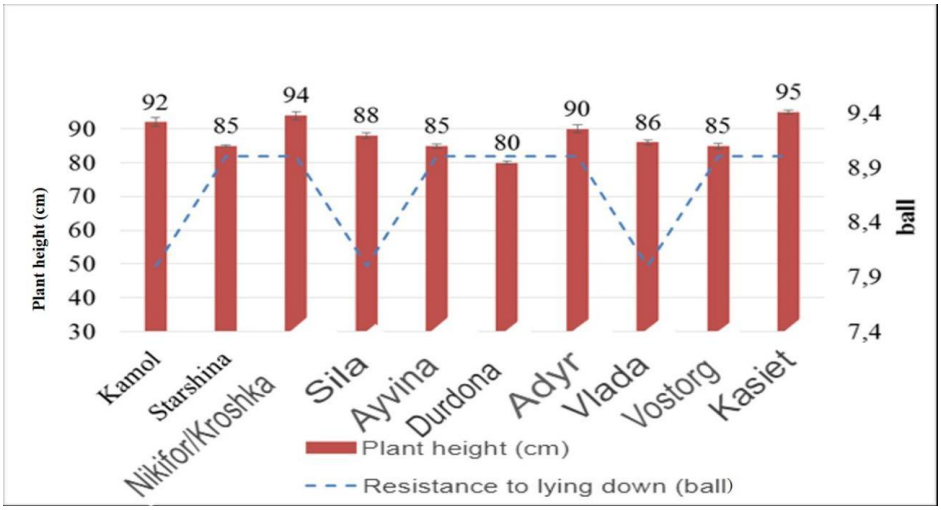
As G.O. Tomm et al. (2000) noted, excessive application of mineral fertilizers may also reduce lodging resistance in wheat varieties.

Two main types of lodging are distinguished: Stem lodging, related to weak parenchyma tissue within the culm; Root lodging, which occurs when the root system is shallow or weakly anchored in the upper soil layers.

In this study, lodging resistance was evaluated on a 9-point scale, where 9 points indicate very strong resistance. Under the experimental conditions, all varieties achieved between 8 and 9 points, indicating a high level of lodging resistance. Generally, shorter plants demonstrated better resistance to lodging.

Results and Discussion. The research analyzed plant height and lodging resistance indicators in varietal samples of soft wheat germplasm from Central Asia and Kyrgyzstan grown under the soil-climatic conditions of the Khorezm region. The obtained results are presented graphically.

Plant height (cm) and lodging resistance (1-9 scale)



According to the graphical data, the plant height of the studied varieties ranged between 75 cm and 95 cm. The variation in height reflects the genetic diversity among the studied genotypes.

Short-statured varieties (75-80 cm) included “Durdona” (80 cm) and “Starshina” (85 cm). These genotypes are typically highly resistant to lodging and perform well under intensive agro-technical conditions (particularly with high nitrogen fertilizer application).

Medium-height varieties (85-90 cm) such as “Vostorg” (85 cm), “Sila” (88 cm), “Ayvina” (85 cm), and “Vlada” (86 cm) exhibited both good lodging resistance and stable yield potential.

Tall varieties (90-95 cm) included “Kamol” (92 cm), “Nikifor/Kroshka” (94 cm), “Kasiet” (95 cm), and “Adyr” (90 cm). Taller plants tend to require higher fertilizer inputs but are more efficient in light interception and photosynthesis, which can increase yield. However, this also raises their susceptibility to lodging.

The results indicate that, despite variations in plant height, no significant differences in lodging resistance were observed among the studied varieties. All genotypes demonstrated high resistance (8-9 points) to lodging under the agro-climatic conditions of the Khorezm region.

Conclusion

Under the soil-climatic conditions of the Khorezm region, the analyzed Central Asian and Kyrgyz soft wheat germplasm samples showed a plant height range between 75 and 95 cm, with all varieties exhibiting strong resistance to lodging. These findings suggest that the tested genotypes possess valuable agronomic traits suitable for breeding programs aimed at developing high-yielding and lodging-resistant wheat varieties.

References

1. Kumakov, V. A. (1985). Fiziologicheskoe obosnovanie modeley sortov pshenitsy [Physiological Justification for Wheat Variety Models]. Moscow: Agropromizdat, p. 269.

2. Tomm, G. O., Didonet, A. D., Sandri, J. L., Frizon, M. I. (2000). Lodging in wheat: relationships with soil fertility and plant characters in southern Brazil. 6th International Wheat Conference Abstracts, Budapest, Hungary, 5-6 June, p. 85.
3. Regmi, D., Poudel, M. R., Bishwas, K. C., & Poudel, P. B. (2021). Yield Stability of Different Elite Wheat Lines under Drought and Irrigated Environments Using AMMI and GGE Biplots. International Journal of Applied Sciences and Biotechnology, 9, 98-106.
4. Mondal, S., Sallam, A., Sehgal, D., Sukumaran, S., Farhad, M., Krishnan, J. N., et al. (2021). Advances in breeding for abiotic stress tolerance in wheat. In C. Kole (Ed.), Genomic Designing for Abiotic Stress Resistant Cereal Crops (pp. 71-103). Basel: Springer Nature Switzerland.