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SCIENTIFIC FOUNDATIONS OF NITROGEN AND FOLIAR FERTILIZATION IN IMPROVING WINTER WHEAT YIELD AND GRAIN QUALITY

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Annotation: This article extensively discusses the role of nitrogen fertilization and foliar feeding in enhancing winter wheat production under the conditions of Uzbekistan. Field experiments revealed that the application of nitrogen fertilizer three times increased grain yield to 72 c/ha. Simultaneously, protein content rose to 14.3% and gluten to 30.3%, leading to a substantial improvement in grain quality. Foliar application of carbamide solutions enabled yields of up to 71.7 c/ha. Moreover, protein levels increased to 13.8% and gluten to 29.5%, thereby ensuring superior grain quality. These findings indicate that integrating root fertilization with foliar feeding creates a comprehensive approach to improving both yield and quality indicators in winter wheat cultivation.

Abstract: This article highlights the importance of nitrogen fertilization and foliar feeding in winter wheat cultivation under the conditions of Uzbekistan. Field experiments demonstrated that applying nitrogen three times increased grain yield up to 72 c/ha. At the same time, protein content increased to 14.3% and gluten up to 30.3%, significantly improving grain quality. Foliar application of carbamide solutions provided yields up to 71.7 c/ha. Protein content rose to 13.8% and gluten to 29.5%, ensuring higher grain quality. The results show that combining root and foliar feeding can significantly improve both the yield and the quality of winter wheat.

Аннотация: В данной статье освещается значение азотного удобрения и внекорневой подкормки в возделывании озимой пшеницы в условиях Узбекистана. Полевые опыты показали, что трёхкратное внесение азота увеличивает урожайность до 72 ц/га. При этом содержание белка возросло до 14,3%, а клейковины – до 30,3%, что значительно улучшило качество зерна. Внекорневая подкормка растворами карбамида обеспечила урожайность до 71,7 ц/га. Содержание белка повысилось до 13,8%, клейковины – до 29,5%. Полученные результаты показывают, что сочетание корневого и внекорневого питания существенно повышает как урожайность, так и качество озимой пшеницы.

Keywords: winter wheat, yield, nitrogen fertilization, foliar feeding, protein, gluten, grain quality, innovative technologies.

Introduction

Since gaining independence, Uzbekistan has achieved remarkable results in cereal production. In 1991, wheat yield was only 11.9 c/ha, whereas in recent years this figure has reached 78 c/ha. The total grain harvest increased from 943 thousand tons to 8.2 million tons, enabling the country to become fully self-sufficient in grain production. This progress has been largely driven by the introduction of innovative agrotechnologies, in particular, the widespread use of mineral fertilizers and foliar feeding techniques. At the same time, the effectiveness of nitrogen fertilization and foliar feeding in improving both yield and quality indicators necessitates comprehensive scientific investigation. The present article is aimed at exploring the scientific foundations of these practices based on field experiments.

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Methodology

The research was carried out on irrigated typical gray soils of Tashkent region. The soils had a medium loamy texture with deep groundwater levels. The study used the *Tanya* variety of winter wheat. Three nitrogen fertilization schemes were tested in field experiments: one-time (tillering), two-time (tillering and stem elongation), and three-time (tillering, stem elongation, and heading). For foliar feeding, carbamide solutions of 5%, 10%, and 15% concentration were applied. Foliar fertilization was conducted once, twice, and three times during the vegetation period. Each treatment was replicated four times, with a plot size of 50 m². Yield, protein, and gluten content were analyzed under laboratory conditions. The data obtained were processed according to B.A. Dospexov's methodology for field experiments, and scientific conclusions were drawn accordingly.

Results

The findings demonstrated that applying nitrogen fertilizer three times increased winter wheat yield from 35 c/ha to 72 c/ha. Compared to the control, the additional yield amounted to 37 c/ha. Grain quality also improved: protein content rose to 14.3%, while gluten content increased to 30.3%. In foliar fertilization experiments, the application of 5–15% carbamide solutions raised yields up to 71.7 c/ha. Protein content improved from 11.5% to 13.8%, while gluten content increased from 24.8% to 29.5%. These results clearly show the effectiveness of foliar feeding. Furthermore, the fact that wheat yields in Uzbekistan have increased from 11.9 c/ha to 78.0 c/ha, and total grain harvest from 943 thousand tons to 8.2 million tons since independence, confirms the success of scientific and practical advancements in agriculture.

Conclusion

Under Uzbekistan's conditions, nitrogen fertilization and foliar feeding play a decisive role in enhancing winter wheat yield.

Triple nitrogen fertilization increases yield up to 72 c/ha and significantly improves grain quality.

Foliar feeding elevates protein and gluten content, thereby enhancing the nutritional value of grain.

Integrating nitrogen fertilization with foliar feeding markedly increases both yield and quality efficiency in winter wheat production.

To consolidate the achievements in Uzbekistan's cereal sector, these agrotechnical practices must be expanded and applied on a larger scale.

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