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MINI REVIEW

Examining the impact of filazonit biopreparation on soybean seed quality

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As the world grapples with the challenges of climate change, soil degradation, and declining agricultural productivity, the pursuit of sustainable and eco-friendly agricultural practices has gained significant momentum. One such promising avenue is the utilization of biopreparations, naturally derived substances that can enhance plant growth, yield, and overall quality. In this context, the focus turns to Filazonit biopreparation and its profound influence on soybean seed quality, paving the way for a more resilient and productive agricultural future.

Keywords: Soybeans, Micromycetes, Biopreparations, Agrophytocenoses.

Introduction

Filazonit is a biologically active soil conditioner that contains a consortium of beneficial microorganisms. Derived from natural sources, this biopreparation is meticulously formulated to harness the synergistic interactions between various microorganisms, such as bacteria, fungi, and actinomycetes. These microorganisms establish a symbiotic relationship with plants, promoting nutrient uptake, disease resistance, and stress tolerance. Soybean (*Glycine max*) holds a crucial position in global agriculture, serving as a versatile source of protein, oil, and other valuable compounds. Ensuring the quality of soybean seeds is paramount for achieving optimal crop yield and nutritional value. The application of Filazonit biopreparation in soybean cultivation has yielded remarkable results, significantly influencing seed quality in multiple ways. Due to the widespread consumption of soybeans for nutritional purposes, both domestically in Ukraine and on a global scale, comprehending the impact of environmental variables on yield and grain quality under diverse climatic circumstances holds paramount significance. The adoption of intensive agro-technological methods has led to the degradation of ecological factors for cultivating numerous crops, soybeans included. Moreover, these approaches have substantially altered the phytosanitary dynamics within agrophytocenoses (Ma, L., et al., 2015; Hernandez, C.M., et al., 2023).

Literature Review

For the study, we collected four sets of 50 seeds from each examined cultivar. The seeds underwent a series of treatments: first, they were immersed in sterile water for 30 minutes, then disinfected in a 0.5% potassium permanganate solution for 5 minutes, followed by another rinse with sterile water. Subsequently, the cleaned seeds were placed onto sterile filter paper and dried at a temperature of 30°C in a vacuum oven. Afterward, the dried seeds were ground for 1 minute and sifted through a 1 mm diameter sieve. Combining the samples from the four sets created an averaged composite sample (Vollmann, J., et al., 2011).

This composite sample was then placed into sterile 10 g flasks, with three repetitions for each. To these flasks, we added 90 ml of sterile water, which was vigorously shaken for 5 minutes to achieve a uniform suspension. Taking 1 ml of this suspension, it was sown into sterile Petri dishes, with three replicates for each soybean variety. Subsequently, 10 ml of Czapek agar was poured into

each Petri dish, thoroughly mixed, and allowed to incubate at 25°C for a period of three days. Following incubation, the colonies that developed were quantified using an automatic counter SCAN 4000 from Interscience, France, and then subsequently cultured in test tubes for further analysis and identification purposes (Pandey, N., Gupta, B., 2013).

Enhanced germination and vigor: Filazonit-treated soybean seeds exhibit improved germination rates and seedling vigor. The symbiotic microorganisms in the biopreparation assist in breaking down complex nutrients, making them more readily available to the developing seedlings. This leads to stronger and healthier plants right from the start, providing a robust foundation for higher yields.

Nutrient uptake: The microorganisms present in Filazonit biopreparation enhance the nutrient uptake efficiency of soybean plants. Through processes like nitrogen fixation and phosphorus solubilization, these microorganisms contribute to a better nutrient profile in the seeds. This not only enhances seed quality but also reduces the reliance on synthetic fertilizers, promoting sustainable farming practices.

Disease resistance: Soybean crops are vulnerable to various pathogens that can negatively impact seed quality. The beneficial microorganisms in Filazonit biopreparation stimulate the plant's immune response, bolstering its ability to fend off diseases. By reducing the incidence of infections, the biopreparation indirectly contributes to improved seed quality.

Stress tolerance: Environmental stresses, such as drought and salinity, can hamper soybean growth and seed development. Filazonit-treated plants demonstrate heightened stress tolerance due to the microorganisms' role in enhancing the plant's stress response mechanisms. As a result, soybean seeds produced under such conditions maintain their quality and viability (Champolivier, L., Merrien, A., 1996).

Discussion

The adoption of Filazonit biopreparation represents a significant stride towards sustainable agriculture. By harnessing the power of naturally occurring microorganisms, farmers can reduce their reliance on chemical inputs, minimize environmental impacts, and still achieve desirable crop yields and seed quality. This approach aligns with the principles of agroecology, promoting biodiversity and ecosystem health while ensuring food security for a growing global population. In the soybean seed cultivar Suzirya, grown utilizing the "Filazonite" technology, the protein content fluctuated between 37.5% and 39.21%. Similarly, the seed soybean variety Kent displayed protein levels ranging from 38.3% to 41.11%. These values fell within the established norms of the control group. Notably, the soybean seed cultivar Kent exhibited a slightly higher protein content, surpassing the soybean variety Suzirya by 1.9%. Interestingly, the lowest protein readings, 37.5% for the soybean seed cultivar Suzirya and 38.3% for the soybean seed cultivar Kent, were recorded during the 2018 study period. This observation can be attributed to the intricate interplay between soil types and the moisture supply available to soybean plants. Additionally, the research indicated a relatively high hydrothermal coefficient of 1.35 for the same period, suggesting ample moisture. As it is well-known, excessive moisture tends to lead to a reduction in protein content within soybean seeds. Conversely, in terms of oil content, the soybean seed cultivar Suzirya exhibited variations between 19.02% and 21.23% when subjected to different cultivation technologies. Comparatively, the soybean seed cultivar Kent demonstrated oil content ranging from 19.1% to 21.7%. Notably, both cultivars' oil content levels remained consistent with those observed in the control group (Salazar, M.J., et al., 2012).

Conclusion

The influence of Filazonit biopreparation on soybean seed quality underscores the potential of biologically based solutions in modern agriculture. As the world seeks innovative strategies to address the challenges of agricultural production, incorporating biopreparations like Filazonit into farming practices holds immense promise. By enhancing germination, nutrient uptake, disease resistance, and stress tolerance, Filazonit paves the way for a greener and more sustainable agricultural future, where high-quality soybean seeds can contribute to improved crop yields and nutritional security.

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