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MINI REVIEW

Assessing the influence of filazonit biopreparation on soybean seed quality

L.V. Havryliuk

Institute of Agroecology and Environmental Management of National Academy of Agrarian Science, Ukraine

**Corresponding author E-mail: Havryliuk021@gmail.com*

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In the face of global challenges such as climate change, soil degradation, and diminishing agricultural output, the adoption of sustainable and environmentally friendly farming practices has gained considerable traction. A promising approach in this endeavor is the application of biopreparations-naturally sourced compounds capable of improving plant growth, crop yield, and overall quality. Within this framework, our attention turns to Filazonit biopreparation and its significant impact on enhancing soybean seed quality, offering a pathway towards a more resilient and productive agricultural future.

Keywords: Soybeans, Micromycetes, Biopreparations, Agrophytocenoses.

Introduction

Filazonit stands as a biologically active soil conditioner composed of a consortium of beneficial microorganisms harnessed from natural sources. This carefully crafted biopreparation capitalizes on the synergistic interplay among diverse microorganisms, including bacteria, fungi, and actinomycetes. These microorganisms establish symbiotic relationships with plants, bolstering nutrient absorption, bolstering resistance to diseases, and enhancing stress tolerance. Soybean (*Glycine max*) occupies a pivotal role in global agriculture, offering a versatile array of proteins, oils, and other valuable compounds. The preservation of soybean seed quality is of paramount importance in achieving optimal crop yield and nutritional content. The application of Filazonit biopreparation in soybean cultivation has yielded remarkable outcomes, exerting a significant influence on seed quality through various mechanisms. Considering the widespread consumption of soybeans for nutritional purposes, both within Ukraine and on a global scale, understanding the impact of environmental variables on yield and grain quality under diverse climatic conditions holds immense significance. The adoption of intensive agro-technological methods has, regrettably, led to the deterioration of ecological factors affecting the cultivation of numerous crops, including soybeans. Furthermore, these practices have substantially altered the phytosanitary dynamics within agrophytocenoses (Ma, L., et al., 2015; Hernandez, C.M., et al., 2023).

Literature Review

For this investigation, we procured four sets of 50 seeds from each of the cultivars under examination. The seeds underwent a sequence of treatments: initially, they were immersed in sterile water for half an hour, followed by immersion in a 0.5% potassium permanganate solution for 5 minutes, and then subjected to another rinse with sterile water. Subsequently, the cleaned seeds were positioned on sterile filter paper and dried in a vacuum oven at a temperature of 30°C. Afterward, the dried seeds underwent a minute of grinding and were sifted through a 1 mm diameter sieve. Combining the samples from the four sets generated an averaged composite sample (Vollmann, J., et al., 2011).

This composite sample was subsequently transferred into sterile 10 g flasks, with three repetitions for each. In these flasks, we introduced 90 ml of sterile water, which was vigorously agitated for 5 minutes to ensure a uniform suspension. Taking 1 ml of this suspension, it was sown into sterile Petri dishes, with three replicates for each soybean variety. Following this, 10 ml of Czapek agar was poured into each Petri dish, meticulously mixed, and allowed to incubate at 25°C for a duration of three days. After incubation, the colonies that developed were quantified using an automatic counter SCAN 4000 from Interscience, France, and subsequently cultured in test tubes for further analysis and identification purposes (Pandey, N., Gupta, B., 2013).

Soybean seeds treated with Filazonit display improved germination rates and heightened seedling vigor. The symbiotic microorganisms present in the biopreparation play a pivotal role in breaking down complex nutrients, rendering them more readily available to the developing seedlings. This, in turn, results in robust and healthier plants right from the outset, forming a solid foundation for increased yields.

The microorganisms contained in Filazonit biopreparation augment the efficiency of nutrient uptake in soybean plants. Through processes like nitrogen fixation and phosphorus solubilization, these microorganisms contribute to an enriched nutrient profile in the seeds. This not only enhances seed quality but also diminishes the dependency on synthetic fertilizers, fostering sustainable agricultural practices.

Soybean crops are susceptible to various pathogens that can detrimentally affect seed quality. The beneficial microorganisms in Filazonit biopreparation stimulate the plant's immune response, fortifying its capacity to ward off diseases. By reducing the occurrence of infections, the biopreparation indirectly contributes to an improvement in seed quality.

Environmental stresses, including drought and salinity, can impede soybean growth and seed development. Filazonit-treated plants showcase heightened stress tolerance, courtesy of the microorganisms' role in amplifying the plant's stress response mechanisms. Consequently, soybean seeds produced under such conditions maintain their quality and viability (Champolivier, L., Merrien, A., 1996).

Discussion

The adoption of Filazonit biopreparation signifies a significant leap forward in the realm of sustainable agriculture. This innovative approach harnesses the natural power of microorganisms, offering farmers a means to reduce their dependence on chemical inputs. In doing so, it helps to minimize the environmental footprint of farming practices while still ensuring bountiful crop yields and high-quality seeds. Embracing Filazonit aligns perfectly with the principles of agroecology, which prioritize biodiversity and the overall health of ecosystems, all while safeguarding global food security. When we examine the soybean seed cultivars Suzirya and Kent grown with the "Filazonite" technology, we find that their protein content falls within a narrow range, with Suzirya varying between 37.5% and 39.21% and Kent ranging from 38.3% to 41.11%.

Importantly, these figures remain consistent with the established norms of the control group. Notably, Kent boasts a slightly higher protein content, surpassing Suzirya by 1.9%. It's worth noting that the lowest protein readings for both cultivars, 37.5% for Suzirya and 38.3% for Kent, were recorded during the 2018 study period. This observation can be attributed to the complex interplay between soil types and the moisture supply available to soybean plants. Furthermore, the research points to a relatively high hydrothermal coefficient of 1.35 for the same period, indicating ample moisture. As is well-known, excess moisture tends to lead to reduced protein content in soybean seeds. Shifting our focus to oil content, we observe variations in Suzirya's oil content, ranging from 19.02% to 21.23%, under different cultivation technologies. Kent, on the other hand, demonstrates oil content ranging from 19.1% to 21.7%. Remarkably, the oil content levels for both cultivars remain consistent with those observed in the control group, as documented by Salazar et al. in 2012.

Conclusion

The impact of Filazonit biopreparation on the quality of soybean seeds highlights the remarkable potential of biologically-driven solutions within contemporary agriculture. In an era where the agricultural sector is actively exploring novel approaches to tackle its various challenges, integrating biopreparations such as Filazonit into farming methodologies emerges as a highly promising avenue. Through its capacity to bolster germination rates, facilitate nutrient absorption, fortify disease resistance, and enhance stress resilience, Filazonit lays the foundation for a more environmentally friendly and sustainable future in agriculture. This advancement

not only promises improved crop yields but also contributes significantly to ensuring nutritional security, underscoring the vital role of high-quality soybean seeds in this endeavor.

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