Natural silica-based pesticide protects crops in storage and can eliminate toxic phosphine

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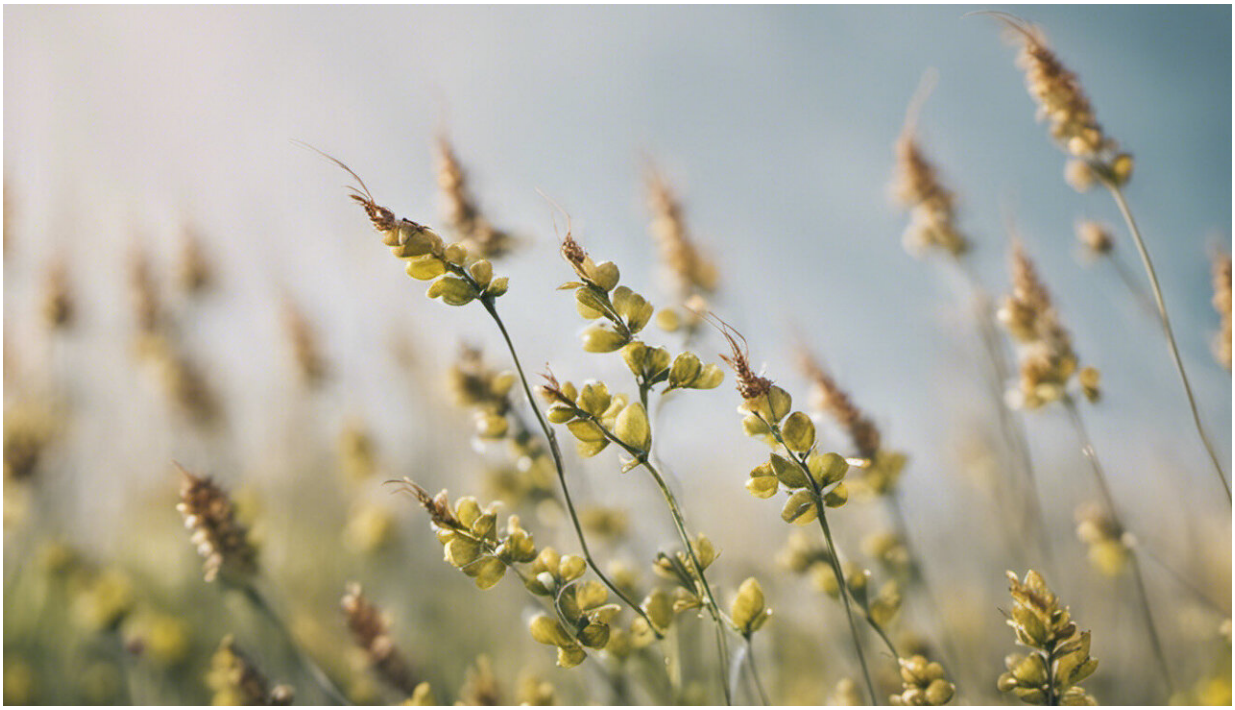

Credit: AI-generated image (disclaimer)

Corn, wheat and rice constitute 90 percent of cereal production globally, and around 40 percent of all calories in food consumed. Yet up to half of those harvested cereal grains, so vital for our daily diets, can be lost due to ineffective storage techniques related to pest infestation.

Chemical fumigation for insect pests using hazardous chemicals such as phosphine is gradually being phased out due to its harmful health effects and the added problems of greenhouse gas and climate change effects. The PestiSi project aimed to complete a feasibility study to examine the technological and market viability of a novel silica-based insecticide, PestiSi. According to project coordinator Mr Laszlo Berta of Dunagabona Kft, Hungary, PestiSi is a "natural insecticide that can be applied during long-term grain storage based on a formulated, natural and siliceous rock known as diatomaceous earth (DE)."

Implementing a refined application method developed throughout the project, PestiSi exterminates all insects during the storage period of agricultural commodities and harvested crops with a long-lasting effect that is completely safe for humans and other mammals.

Ambitious targets

Project aims included a thorough examination of the most appropriate application method for wheat treatment at an industrial scale, as well as the development of a standardised protocol that accounts for various handling and storage techniques.

Isolated customer requests were also taken into consideration such as the optional need of removing PestiSi from the grain upon the storage period's completion.

Successful developments – safe and effective

During the technological feasibility trials, PestiSi was tested and verified by a certified laboratory ensuring it is completely harmless on humans and other mammals. Another key result was the revelation that the amount of PestiSi required for the successful treatment of grain is well

below the threshold set for inorganic dust traces by the Hungarian Wheat Standard Regulations. This signifies that PestiSi can harmlessly remain in the grain after the storage period has ended.

Test results also indicated the specified DE rate that is vital for successful grain protection. Also, the team completed an initial conceptual design for a prospective industrial treatment procedure.

PestiSi results revealed that the treatment is technologically feasible, following small-scale mixing optimisation tests that displayed effective grain treatment using PestiSi. The company's commercial strategy was also confirmed as viable, following a professional competitor analysis.

A key challenge

Whilst the researchers were aware that the amount of DE necessary for maintaining the grain free of insects is under the threshold set for inorganic dust traces, there is concern that buyers will insist on complete elimination of DE.

A cost-effective method of complete DE removal, at an industrial level, remains a key challenge that will need to be solved in future R&D work regarding PestiSi.

A sustainable production chain

Berta claims that the company has already been contacted by potential buyers within the food industry who would like to base their production on grain that has been treated with DE. Having already established a technological roadmap, the next step would entail the development of an industrial-scale PestiSi technology.

To garner further interest from grain consumer companies, Dunagabona Kft has positioned its product as a technology that would contribute to the elimination of phosphine-based practices from the grain supply chain of SMEs, protecting the environment and human consumption.

When questioned on who would benefit from PestiSi, Berta pointed out that all parties involved within the grain production chain, including grain consumers themselves, would enjoy its advantages.

Dunagabona's commercial route targets both small and medium sized grain producers and grain storage owners. "These companies need low cost solutions and, with the help of PestiSi, could extend their business line towards sustainable storage practices. This way, the entire supply chain will ultimately benefit from PestiSi," concludes Berta.

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