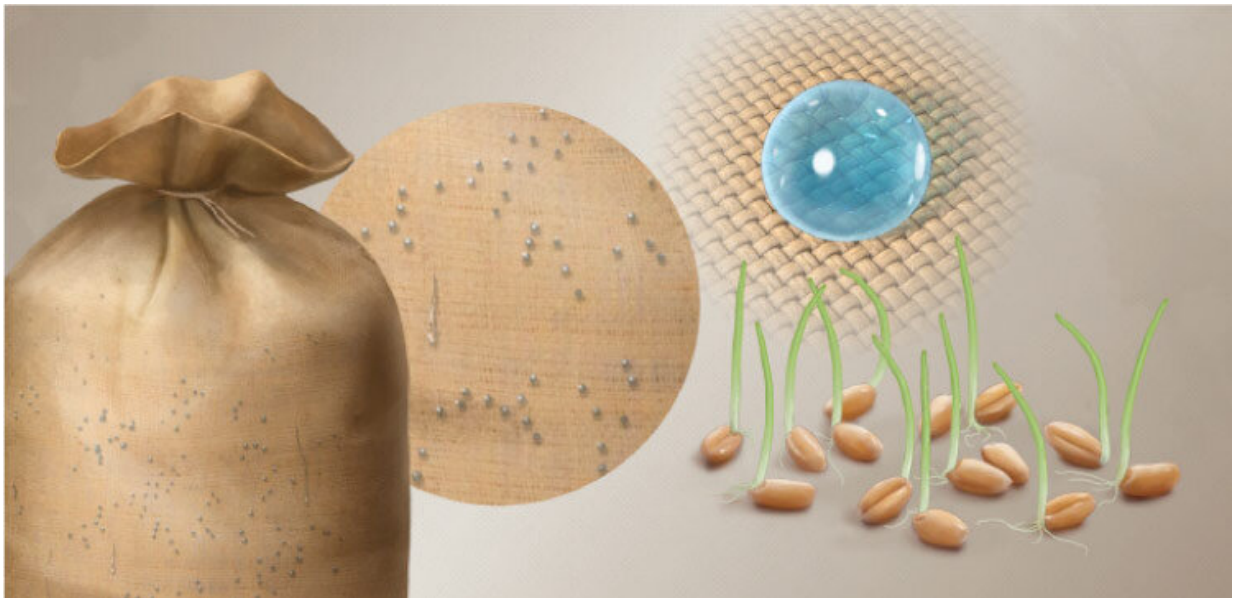


Treated jute bags boost grain storage and other green goals

October 19 2021



KAUST researchers develop a simple approach for grain storage that prevents moisture-induced damage and improves the seed germination efficiency. Credit: KAUST; Xavier Pita

Taking inspiration from water repellent surfaces in nature, KAUST researchers have pioneered a simple surface treatment for traditional jute storage bags that prevents moisture-induced damage to stored grains.

Each year, up to one-third of harvested [grains](#) are lost because of

environmental factors such as [moisture](#), fungi and pests. In developing countries, [cereal grains](#), such as wheat, rice and maize, are [staple foods](#), but on a calorific basis their losses can be as high as 60 percent due to moisture damage. The strong hardwearing jute bags that underpin traditional grain [storage](#), particularly in rural and developing regions, have an Achilles' heel—they absorb and retain moisture. Often, the storage infrastructure in places of high humidity (or rainfall) is inadequate to prevent moisture from seeping into these bags. "Farmers put extraordinary time, energy and resources into growing crops," says Kennedy Odokonyero, a postdoc who worked on this project with Himanshu Mishra. "But when a 1 percent rise in seed moisture content can exponentially reduce seeds' shelf life by up to 50 percent, it is easy to see how rapidly a whole crop can be lost. This is not just a devastating waste of food, it also dampens the morale of those who worked so hard to produce it."

"From an ecological and practical perspective, improving an extensively utilized biodegradable material like jute is ideal," adds Mishra.

Jute is a plant-based product composed of water-loving components such as cellulose. The researchers treated jute with an alkali to roughen its surface and alter its surface properties. They then added a very thin layer of paraffin (candle) wax to the bags, before testing their water repellency under simulated rain and relative humidity ranging from 55 to 98 percent.

The grain storage experiments, which lasted two months, revealed that seed moisture content reduced by up to 7.5 percent in wax-coated bags, and the seed germination efficacy after storage was up to 35 percent higher than in seeds stored in ordinary jute bags. Grains stored in the wax-coated bags experienced far fewer fungal infections, regardless of relative humidity. "Longer trials are needed to examine the efficacy and durability of the bags," Odokonyero acknowledges.

The wax-coated bags are reusable but could also create an organic mulch once they are no longer fit for storage purposes. The mulch could reduce evaporation in farmers' fields and add nutritional content to the soils.

"With comprehensive further trials, we hope to refine and optimize this wax-coating technique, with the hope that one day it can be rolled out at scale," says Mishra.

More information: Kennedy Odokonyero et al, Nature-inspired wax-coated jute bags for reducing post-harvest storage losses, *Scientific Reports* (2021). [DOI: 10.1038/s41598-021-93247-z](https://doi.org/10.1038/s41598-021-93247-z)

Provided by King Abdullah University of Science and Technology

Citation: Treated jute bags boost grain storage and other green goals (2021, October 19) retrieved 18 April 2024 from <https://phys.org/news/2021-10-jute-bags-boost-grain-storage.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--