



General Mills

Monitoring popcorn kernel moisture content

Background

In popcorn production, moisture content is a key factor in kernel quality and popping performance. While the ideal harvest moisture is 16–20%, producers in Brazil typically harvest at 12–16% due to the absence of hot-air drying systems, which are not commonly used because of the country's hot climate. As a result, drying to the optimal 13–14% storage moisture is often avoided, as it could further increase the risk of excessive moisture loss during storage. Any deviation below 13% and the kernel won't pop effectively because there won't be enough steam pressure to expand the starch, leading to poor expansion, excessive unpopped kernels, or tough, chewy popcorn.

Optimal harvest timing is currently determined by agronomists, who assess field conditions and moisture levels across large areas. While 14–16% moisture at harvest would be ideal, this is difficult to achieve consistently due to the extensive acreage involved and moisture levels variations across different parts of the field.

Once harvested, some kernels are stored for up to a year before processing. Refrigerated silos have helped stabilize storage conditions and reduce pest pressure, but preventing kernel moisture loss over time remains a challenge. Currently, quality assessments rely on manual monthly sampling, where kernels are removed from silos and tested offline to determine readiness for processing. This periodic approach limits responsiveness and may miss critical changes in moisture content.

Solutions that can help preserve ideal moisture levels and maintain kernel performance over extended storage periods would allow manufacturers to achieve higher expansion rates, reduce waste, and enhance the consistency of their final product.

What we're looking for

We are looking for innovative solutions that enable accurate, in-silo assessment of popcorn kernel moisture content to determine the optimal timing for dispatch to manufacturing. While the primary focus is on real-time internal moisture monitoring, we also welcome technologies that support moisture control during storage, long-term quality preservation, mitigation of pest-related degradation, and improved tools for identifying optimal harvest windows, particularly if they offer greater precision than current agronomic practices.

Solutions of interest include:

- Real-time kernel moisture monitoring throughout storage
- Storage coatings to prevent moisture loss and mold growth
- Natural pest control solutions for long-term kernel storage
- Technologies that can determine the optimal moment for harvesting popcorn kernels

Our must-have requirements are:

- Supports timely decision-making to direct kernels for processing at peak quality
- Scalable for large-scale storage operations and long-term use

Our nice-to-have's are:

- Provides real-time moisture and quality monitoring
- Prevents moisture loss, pests and mold risks
- Adaptable to different climates and storage conditions

What's out of scope:

- Solutions that negatively impact popcorn expansion or texture
- Changes to popcorn varieties

Acceptable technology readiness levels (TRL): Levels 4-9

1. Basic principles observed
2. Concept development
3. Experimental proof of concept
4. Validated in lab conditions
5. Validated in relevant environment
6. Demonstrated in relevant environment
7. Regulatory approval
8. Product in production
9. Product in market

What we can offer you**Eligible partnership models:**

- Sponsored research
- Co-development
- Supply/purchase
- Material transfer

Benefits:**Sponsored Research**

Support may be available to explore promising technical approaches aligned with the goals of this opportunity, subject to further discussion and mutual agreement.

Expertise

Relevant internal expertise to help refine or validate proposed approaches, depending on project alignment and availability.

Who we are

General Mills is committed to making food with passion and putting people first by delivering the tastes they love while improving the nutrient density, affordability, and accessibility of our products. We collaborate with scientists, universities, companies, and organizations around the world to strengthen our impact and bring our purpose to life.

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