The New York Times on the Web Learning Network
Teacher Connections

Back to Main

Daily Lesson Plan
Lesson Plan Archive
News Snapshot
Issues in Depth
On This Day in History
Crossword Puzzle
Campus Weblines
Education News
Newspaper in Education (NIE) Teacher Resources
Classroom Subscriptions

Student Connections

News Summaries
Daily News Quiz
Word of the Day
Test Prep Question of the Day
Science Q & A
Letters to the Editor
Ask a Reporter
Web Navigator

Parent Connections

Conversation Starters
Vacation Donation Plan
Discussion Topics

Site Guide
Feedback
Job Opportunities

GO TO The New York Times on the Web

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Pop Star Secrets Revealed!

By HENRY FOUNTAIN

GO TO LESSON PLAN

Popcorn kernels are nature's firecrackers, and as with any explosive device, sometimes you get a dud. In this modern era of microwave popcorn, in fact, sometimes you get a lot of duds - a mass of unpopped kernels rolling around the soggy bottom of the bag.

But fret not, snack food lovers, help is on the way. Scientists at Purdue University think they've uncovered why some kernels fizzle instead of explode. The discovery may help popcorn producers grow varieties that have lower failure rates.

While a poppable kernel must have a precise amount of moisture in the endosperm, or starchy center (about 14.5 to 15 percent), the Purdue researchers say the real explosive secret lies in the hull, or pericarp.

In some varieties, the pericarp becomes more moistureproof as it is heated, sealing in the steam until the pressure gets so high that the hull fractures and the kernel goes pop. In other varieties that don't undergo heat-induced change, the moisture escapes, the hull never breaks and the kernel goes pfffft.

"Those varieties that have a lot of kernels where moisture leaks out too rapidly don't pop too well," said one of the researchers, Dr. Bruce R. Hamaker. He and his colleagues should know: they tested 14 varieties of popcorn, all Indiana-grown, for popping performance and moisture loss.

The percentage of unpopped kernels ranged from 4 percent to more than 45 percent. The study is published online by the journal Biomacromolecules.

A major component of the pericarp is cellulose, a polymer made up of chains of glucose molecules. In the better-performing varieties, "the cellulose component undergoes a transition where it becomes more crystalline," Dr. Hamaker said.

Hydrogen bonds form between nearby cellulose strands. "It creates a moisture barrier," he added.

The difference between a tight pericarp and a leaky one appears to have something to do with the amount of cellulose and how the strands are aligned, Dr. Hamaker said.

Popcorn producers could switch to varieties with the proper pericarp qualities, and it should be possible for researchers to selectively breed more moistureproof varieties as well.

But Dr. Hamaker said he'd leave that work to others.