Sorter Detects and Removes Damaged Popcorn Kernels

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A device that can detect and remove damaged popcorn kernels has been developed from a machine that is usually used to sort wheat. Photo courtesy of USDA-GIPSA.

(PhysOrg.com) -- A device developed by an Agricultural Research Service (ARS) scientist to sort wheat has been successfully used to detect and remove popcorn kernels that have been damaged by fungi.

ARS engineer Tom Pearson in Manhattan, Kan., developed the low-cost, high-speed device to inspect and separate a variety of grains based on color variations or slight defects. This technology was previously applied to sorting white and red wheat grains.

The system achieved 74 percent accuracy when removing popcorn with fungal damage called blue-eye, and was 91 percent accurate at

recognizing undamaged popcorn, according to Pearson, at the ARS Center for Grain and Animal Health Research in Manhattan. The sorter, which uses a specially-designed camera linked to a processor, can handle 88 pounds of popcorn per hour. Pearson is currently designing a sorting machine that has much higher accuracy and can handle greater volumes.

Blue-eye damage in corn is characterized by a small blue spot of the popcorn germ and is caused by certain species of Aspergillus and [Penicillin](link), which can grow under poor storage conditions and can affect up to 20 percent of the popcorn harvest. Blue-eye can be minimized if popcorn is dried before storage to reduce its internal moisture to no more than 14 percent.

The sorting device combines a color image sensor with what's called a field-programmable gate array, which is a programmable, electrical circuit that Pearson configured to execute image processing in real-time, without the need for an external computer.

The sorter also could be useful for detecting and removing other defective grains, such as insect-damaged grain, scab-damaged wheat, and bunted wheat. Parts for the system cost less than $2,000, suggesting that it may be economical to simultaneously operate several of the systems to keep up with processing plant rates.

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