Savvy Seed Sorter Gains New Fans

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The sorter is also skilled at separating yellow from brown flax and barley from durum wheat.

Pearson explains that yellow flax is used somewhat like sesame seeds as a tasty, nut-flavored garnish for breads and other baked goods, while brown flax is harvested for its oil. The sorter was accurate 94 percent of the time in detecting yellow flax seeds from brown ones in Pearson’s tests.

Barley plants can sometimes turn up as unwanted “rogues” or “volunteers” in neighboring test rows of candidate durum wheats. The sorter system detected durum kernels with 93 percent accuracy, Pearson reports.

The device is handling other important tasks, as well. For instance, seed from native grass plants, needed for revegetating publicly owned lands in the western United States, is being sorted to rid it of seeds of unwanted plant species. A major breeder of peas and beans for vegetable farms uses the sorter to remove damaged seeds. Some university plant breeders rely on the machine to discern and discard spotty peas or to reject wheat kernels that show coloration associated with Fusarium head blight, a costly disease of wheat and barley.

The sorter assembly, which measures 3 feet by 1 foot by 3 feet, sits snugly on a wheeled base, making it easy to move from one worksite to another. Unsorted seeds are placed in a vibrating hopper and begin sliding down any of three adjacent chutes. After a seed falls off the end of its chute, a color camera equipped with an image sensor (a complementary metal-oxide semiconductor) snaps an image and sends it, via a circuit board, to a chip for processing.

The chip (a field programmable gate array) uses preprogrammed data to determine whether the seed’s surface texture and red, green, and blue color values more closely match those of an “accept” seed than those of a “reject.” Seeds that appear similar to “rejects” are quickly directed, via a puff of air from an air valve, into the “reject” container, while the desirable seeds fall neatly into the “accept” bucket.


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Biological science aide Anne Berry puts wheat in the hopper of a color-image sorter. The ARS-developed camera behind her takes and processes a color image of each kernel as it falls off the end of the chute. The kernels are then sorted based on visual features and deposited into either of two separate buckets at the base of the sorter.