Zealquest Asia

Zealquest Group Company

LemnaTec
MEMBER OF THE NYNOMIC GROUP

SEEDAIXPERT

The Fastest Digital Seed and Seedling Testing System

LemnaTec AIxpert Product Family

Documentation, Phenotyping, Seed Testing and more

SEEDAIXPERT

The fastest digital seed and seedling testing system measuring seed, germination, and seedling emergence quality.

- For many samples in lab application
- Paper-based germination assays and seedling emergence tests
- seed counting
- seed purity
- seed and seedling phenotyping
- Overcome inconsistent assessments by digitizing the inspection
- Save time and labor in seed testing
- Reproducible and standardizable through unified imaging and analysis
- The digital seed testing system for breeders, testing labs, and researchers

Features

- Artificial intelligence enables seed and seedling quality assessments
- Reliable technology that makes seed testing easy
- Image acquisition, storage, analysis, and retrieval
- Image annotation, metadata recording
- Advanced image processing algorithms including machine learning
- Easy export of images, data, and analyses
- Intuitive graphical user interface
- High-resolution industrial camera

In our seed testing lab, four people are responsible for rating the quality of germination. Despite having strict criteria for visual inspections, results tended to differ among colleagues. To be honest, working speed and accuracy decreased during the day when there were lots of samples to be processed. Having recently introduced LemnaTec's SeedAIxpert, we were able to increase the throughput and eliminate deficient estimates, often caused by inaccurate personal performance. Our seed testing has now become reliably standardized, comparable and repeatable.

Jone, Seed Testing Expert

SeedAIxpert Models

Imaging and image processing on three different hardware platforms.

❶ SeedAIxpert | Manual System

Imaging

- Manual sample loading and image recording
- Top view visible light RGB 12.4 Megapixels camera
- Comprehensive software package for system control and machine-learning based image processing
- 16 mm prime lens with approx. field of view 44 cm x 32 cm

Accessories

- Sample stage as light box for samples requiring bottom illumination
- Sample holders for seed germination and seedling emergence trays
- Seed germination and seedling emergence trays matching with the system

❷ **SeedAlxpert HTC** | Semi-Automated Compact System

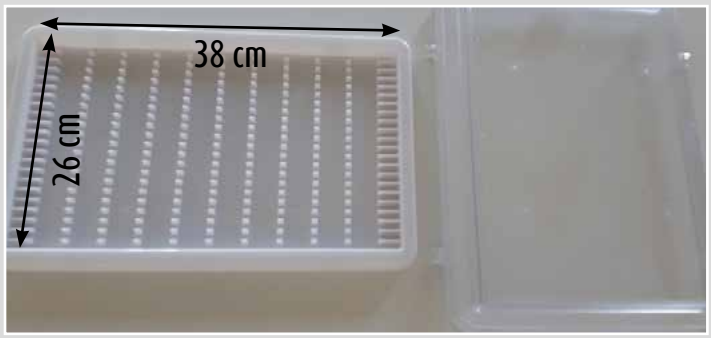
- Semi-automated imaging system
- Top view visible light RGB 12.4 Megapixels camera
- Comprehensive software package for system control and machine-learning based image processing
- Automated loading of samples from a trolley
- Trolley transport system for up to 15 trays
- Different tray layouts available for Germination trays, Petri dishes and MTPs

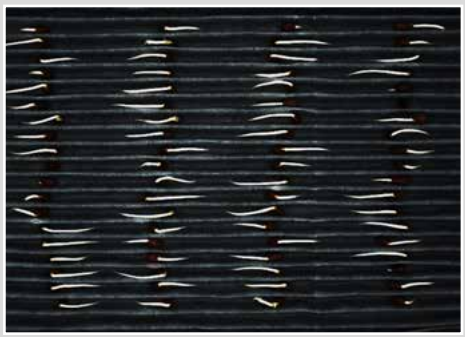
❸ **SeedAlxpert HT** | Automated System as Customized Solution

- Fully automated imaging system
- Top view visible light RGB 12.4 Megapixels camera
- Comprehensive software package for system control and machine-learning based image processing
- Automated loading of samples from customized shelfs
- RGB imaging from top
- Automatic lifting of lids if required
- Different tray layouts available
- Variable number of sample positions in shelves – automation for thousands of samples possible
- Integration in climate-controlled rooms possible

Sample preparation for paper-based germination assays

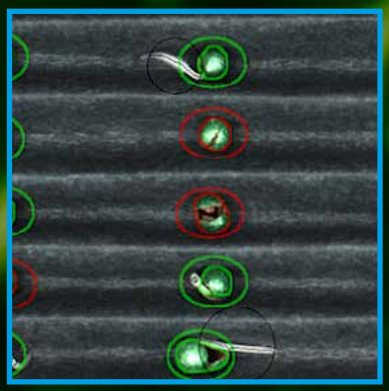
- Germination trays fit in all SeedAlxpert models
- Papers to ensure adequate contrast for image processing
  (Hahnemühle 3644 blue paper board or Hahnemühle 3236 gray pleated paper)
- Optional: Vacuum seed positioner matching the tray





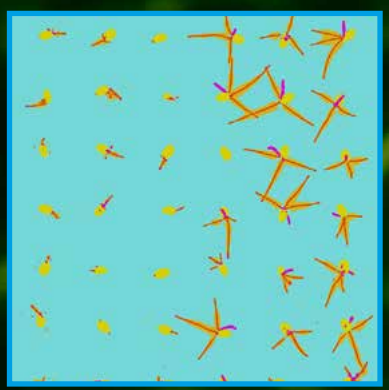
Application examples

Germination detection
Roots emerging from seeds were detected by SeedAIxpert and marked in yellow. Germination percentage (seeds with / without roots in relation to total seed number) is provided. Detected roots can be measured, e.g. root lenght.



Germination detection of coated seeds
SeedAIxpert is designed to work with coated seeds, too. Here coated seeds were classified as germinated or not germinated according to the occurence of roots. As SeedAIxpert can work with color analysis, it can handle differently coated seeds at once.

SeedAIxpert works with most seeds
SeedAIxpert technology is able to cope with seeds of different sizes and colors. No matter whether you work with small herb or vegetable seeds or with maize, SeedAIxpert makes seed testing easy.

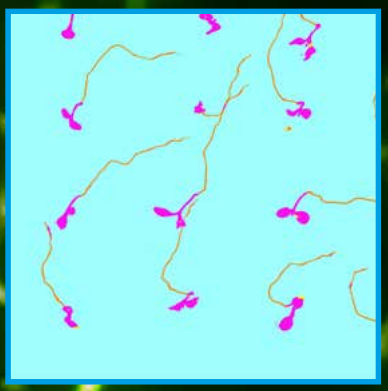


Artificial intelligence for seedling classification
Emerging seedlings consist of various parts, e.g. roots, shoots, or root hairs. With machine learning algorithms, SeedAIxpert can be trained to recognize each of these parts separately.

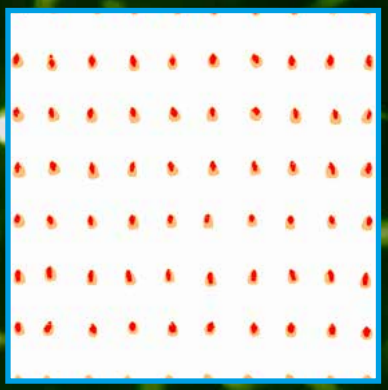
Application examples

Maize germination
Example for a maize germination test as top-of-paper assay. SeedAIxpert images the samples and derives germination quality data from the images.

Vegetable seed germination classified with machine learning
Vegetables germinating in a top-of-paper test were classified with the SeedAIxpert machine learning algorithms. Occurence and size of shoot and root are analyzed and a subsequent quality rating, e.g. as usable plant test can be set up.

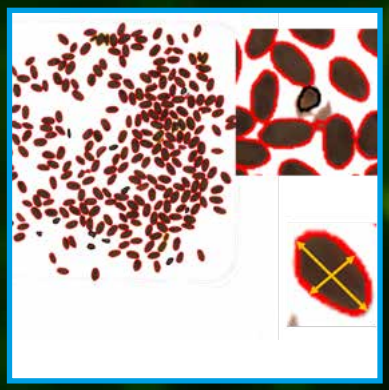


Seed classification
Embryo and Endosperm are visible on the surface of maize seeds. Imaged and classified by SeedAIxpert, fractions of embryo and endosperm are measured for each seed.



Seedling emergence test
Oilseed rape germination was assessed in a seedling emergence test with seeds placed in substrate. Emerging cotyledons were recognized and measured for germination frequency and seedling quality.

Application examples



Seed counting and phenotyping

Seeds are imaged with SeedAIxpert and counted through image processing. In addition to the seed count that can serve to determine factors such as thousand-kernel-weight, the software delivers phenotypic factors including length, width, area or color of the seeds. These in turn can serve to assess quality.

Seed purity

Seed batches can contain unwanted materials including dirt, plant debris, weed seeds, or seeds of other cultivars. Imaging with SeedAIxpert combined with machine-learning based image processing finds and characterizes the foreign objects so that seed batch purity can be analyzed.

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