

# Seed Laboratory

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## **The Ergovision Inspection Station**

### The need for advance technology in Seed Purity Testing

The modern seed industry requires accurate and timely purity test results to make their daily business decisions and maintain their presence in the global market. This means that testing technologies need to be fast and accurate.

The OSU Seed Laboratory, in recent years, experienced backlog situations in the grass seed purity testing area. This is in part because of the trend in marketing grass seed, which requires testing large numbers of samples in a narrow window of time. In addition, small seeded grass are more time consuming to test than large seeds such as soybean or corn. Thus, the Lab has researched and developed an improved 'Purity Inspection Station' that incorporates advanced optical, ergonomic and mechanical technologies to achieve fast and accurate testing. The new equipment is called the 'Ergovision Inspection Station' (Fig. 1). It has potential to be used in many other fields like grain inspection and any other product that needs to be examined or selected under a microscope in a continuous manner.

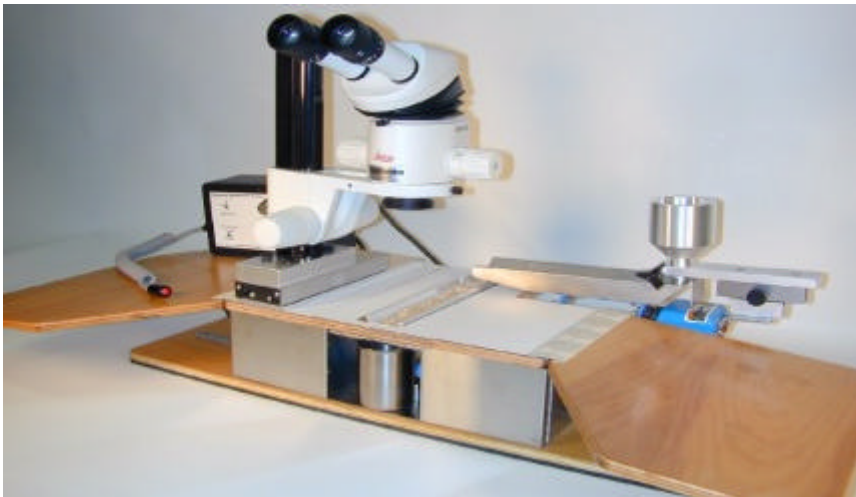


Fig. 1. The Ergovision Inspection Station used by Oregon State University Seed Laboratory designed to provide optimum ergonomics, magnification, clarity and efficiency.

### Background

The concept of microscopic purity stations is not new at all. In the late 60's, the OSU Seed Lab in collaboration with the USDA and Mater International Inc. pioneered the development of the first models. Currently, there are labs using it routinely in purity testing, either in its original form or with various modifications. One such station is still used frequently at the OSU Seed Laboratory.

The Seed Laboratory at the California Department of Food and Agriculture has used it successfully for over 20 years. In the Washington State Department of Agriculture Seed Lab in Yakima, every purity analyst has one station. Many other seed testing labs use it as well. In general, the result has been positive. Furthermore, the 'Seed Purity' chapter of the newest training manual for seed analysts, written by Jim Effenberger who has used this technology for over 20 years, and published by the Society of Commercial Seed Technologists, recommends it for purity testing.

## The Research, Development, and Validation of the Ergovision Inspection Station

After extensive evaluation of previously existing models of the 'Microscopic Inspection Station', the OSU Seed Laboratory and Mater International decided to redesign and incorporate new technologies. The main features that were considered in developing the new station were:

- 1) Ergonomics, to reduce analyst's fatigue and discomfort,
- 2) Accuracy, to provide the best magnification, clarity and resolution for each seed,
- 3) Productivity, to ensure fast and timely results.

The standard principle in developing any new equipment or method in the OSU Seed Lab is that the new method should be equal to or superior in accuracy than the existing method. To fulfill this requirement, the following procedures were undertaken:

- Initial design: Gathering analysts input including magnification, lighting, comfort during testing and speed. This was critical to achieve not just accuracy but also to decrease the fatigue produced by the traditional board hand lens method.
- Development of the prototype. This step ensured that all the critical features identified by analysts were present to full satisfaction. The prototype was evaluated extensively and was modified until optimum performance was achieved.
- Development of the first four units, which were especially geared for small grass seed such as bentgrass and Kentucky bluegrass. These seeds present the greatest level of difficulty to the purity analyst due to the small size of the seed and the contaminants. The concept was that, if the technology proved useful for these difficult seeds, later on it would be adapted for larger seeds like tall fescue and ryegrass with minor modifications. The first four units were assigned to the most experienced analysts in the lab for more evaluation and modification. This step was achieved successfully in 2001.
- Development of four additional units with modified inspection trays for tall fescue and ryegrass. This was achieved successfully by early 2002, followed by extensive evaluations, to make sure that the station would work at optimum capacity for these crops. These units were assigned to experienced analysts as well.
- Once the equipment was assigned, each analyst followed an intensive training period where comparisons between the traditional and new method were made to the fullest satisfaction of the laboratory. This means that each analyst using the new method was able to detect the same contaminants found by the traditional method.

The whole process of research and development, evaluations and modifications from the initial concept to the production of the latest model of the Ergovision Inspection Station took over two years. Initially, as with any new method, there was a fear that some analysts might not adopt it easily. However, our experience demonstrated that this fear was unfounded. As expected, it is true that some analysts took longer to get used to it, but they all switched smoothly to the new method.

### The Main Features of the Ergovision Inspection Station

#### I. Accuracy

##### *Factors that contribute to the accuracy*

As in any analysis, accuracy is the function of analyst proficiency, equipment quality, and operational skills. Therefore, to assure accuracy, the following technologies were integrated gradually to the new system:

- The quality of the equipment, which has an examination tray with precise speed control vibration system designed to present every seed distributed uniformly to the field of vision. The system also has stop-start controls to zoom in on specific seeds that need closer examination.
- The use of an advanced optical system that produces a 3-D picture with detailed features for the kind of

seed under examination. Magnification depends on the kind of seed being examined. The optic system is accompanied by a high quality illumination provided by fiber optics.

- The clarity and focus can be standardized easily. This is because the magnification and lighting can be set at one optimum level for all samples of a specific species. This decreases the possible variations due to equipment, individual skills, fatigue or other reasons.
- The use of both eyes, and the tilted microscope allow a comfortable sitting position for the analyst and provide good working conditions that reduce fatigue.
- To reduce variation due to proficiency level, the new equipment was assigned first to the most experienced analysts. The same approach was used during the second year when more units were available.
- The equipment has simple controls to manage with one hand. This makes it easy to operate so that the analyst can concentrate on distinguishing and identifying seeds.
- The extensive training that was done before the testing season eased the transition from the old to the new system. During this period, the analysts also compared the accuracy of both methods and found that the Ergovision was equivalent or superior to the traditional hand lens method. In some cases the machine made it easier to find certain contaminants because of the quality optic system.
- Finally, all tests are monitored routinely through the testing season, as part of the normal quality assurance system of the laboratory.

## II. Ergonomics

### *Factors that contribute to ergonomics*

The Ergovision Inspection Station is designed to reduce analyst's fatigue and discomfort during seed testing. The following are key factors in the ergonomics of the new station:

- The analysts are able to sit straight, at a suitable chair height, without bending over, and they can breath normally (Fig. 2).
- They can use both eyes at all times (Fig 2). In the traditional hand lens method, the analyst uses one eye.
- A tilt-adjustable microscope provides additional ergonomic benefits because the analyst does not have to stretch or bend, which minimizes or eliminates neck and back pains. This feature also provides greater flexibility because analysts with different heights can use the same station.
- The repetitious hand motion to move the seeds to the viewing area is eliminated. Holding the forceps and moving the seeds for a long time can cause hand aches. In addition, one hand is released completely for crop and weed separation.
- The fiber optic light system contributes to viewing clarity, which reduces eye strain.
- All these and other factors contribute to the reduction of fatigue and discomfort, which is critical in seed testing, especially during the busy season.



Fig. 2. The Ergovision Inspection Station is designed to reduce analyst's fatigue and discomfort.

### III. Productivity

#### *Factors that contribute to productivity*

The ergonomic working conditions enable working extended hours of uninterrupted testing, staying alert, and avoiding sick leaves and absences. Accuracy also contributes to productivity because a test that is done right the first time eliminates the need to re-do the work. In addition, the following factors contribute to higher output in purity testing:

- The mechanical seed feeder and simple controls enables more continuous seed flow.
- The continuous flow eliminates the gap-time of the traditional method. In the traditional method, the seeds are moved by hand, therefore half of the time the seeds are not in the viewing area and cannot be examined resulting in waste of time. This problem is eliminated in a continuous flow system.
- Light quality and optimum magnification provide optimum clarity at all times. This enables the analyst to see clearly and make the right decision.

#### Conclusions








- In general, the OSU Seed Laboratory experience after two seasons of testing has been positive.
- There are strong indications that the Ergovision Inspection Stations are reducing physical stress despite the long working hours of testing work.
- Testing accuracy is equal or superior to the traditional purity board and hand lens method.
- Productivity has increased about 20-30% compared to the traditional method.
- It should be clarified that this equipment is especially valuable for bulk exams such as All State Noxious Weeds, CW, UGS, SOD, P&D, and similar bulk exams. The Ergovision Inspection Station is less useful for the separation of the smaller purity portion into pure seed, inert matter, weed seed, and other crop seed. These separations are still done by the traditional board and forceps method because they require extensive manual separations.

Those who are interested in evaluating the new Ergovision Inspection Station are welcome to stop by the OSU Seed

Laboratory and see the clarity, magnification and ergonomic features of this equipment. Most importantly, you can ask the analysts about their new experience.

### Acknowledgments

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