

AOSA PERSPECTIVE OF SEED VIGOR TESTING

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Seed vigor tests have become a routine quality assessment tool for much of the seed industry. The Association of Official Seed Analysts (AOSA) has been actively involved in developing procedures for many of the vigor tests used today. An earlier presentation discussed the history of vigor testing and the numerous contributions of the AOSA Seed Vigor Subcommittee. Other presentations will discuss procedures for certain tests and will relate the views of industry and international trade on vigor testing. It is my challenge to examine the AOSA perspective of vigor testing and to discuss not only the current trends in using these tests, but also to take a close look at why vigor tests are important, how they are used, and the future of vigor testing.

WHY TEST SEED FOR VIGOR?

The germination test is standardized, repeatable, and is a valuable measure of seed quality. The test is performed under laboratory conditions that are designed to promote germination and seedling growth. For this reason, the germination test does not always relate well to field performance if conditions at planting are less than favorable. Field stress such as excessive temperatures, extremely wet conditions, or heavily compacted soil surfaces can lead to delays in emergence, weak seedlings, and, in some cases, loss of seed viability. Under these circumstances, stands, yields, quality, and ultimately profits can decrease substantially. Thus, seed vigor tests were designed to provide additional information about the physiological quality of a seed lot—information such as storage and planting potential that is often not evident from the standard germination test. Seed companies and independent seed producers routinely use vigor tests for in-house quality control or quality assurance programs.

It is essential that analysts and consumers understand that vigor tests are not designed to predict the exact number of seedlings that will emerge and survive in the field, although many of the vigor tests do correlate well with field emergence. Vigor tests should be used to make educated decisions about the fate of an individual seed lot. Results can be used to determine if a seed lot could be planted early when stress is likely to occur, or if it should be planted later when soils are warmer and conditions become more favorable for germination and seedling growth. Vigor tests can help decide if the seed lot should be planted in the southern region of adaptation, to take advantage of warmer conditions, or if the quality is sufficient to withstand harsher conditions of more northern climates.

It is well known that the quality level of a seed lot at the end of a storage period is greatly dependent upon the quality level at the beginning of the storage period. Therefore, another use for vigor tests is to determine

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if the seed lot can be stored for the season or carried over until the next year and still have sufficient germination and vigor potential to satisfy quality standards within the company and meet customer expectations.

Vigor tests are frequently used to monitor in-house handling of seed crops. By testing seed lots at various stages of conditioning, plant managers can detect physical and physiological damage that could lower planting or carry-over potential.

THE TWO ASPECTS OF SEED VIGOR TESTING

Many seed companies have their own in-house vigor test procedures. These tests have been used successfully in some cases for decades. The procedures, evaluation, and interpretation of results work well within the company framework. The primary goal of the tests is to rank seed lots according to vigor level and to eliminate those lots that fall below company standards. The analysts performing the tests are well trained and are consistent in their interpretation of test values. Test procedures used by a seed company will often vary from suggested or recommended procedures outlined in the AOSA Vigor Testing Handbook. Because company tests are in-house and used solely by the company, variations from AOSA procedures have not been a major concern. The key ingredient for these companies is consistency in interpretation of results.

On the other hand, many official and private laboratories offer vigor tests as a service to customers. These laboratories should follow procedures exactly as outlined in the Vigor Testing Handbook. The essential element for these laboratories is uniformity in testing procedures, as well as uniformity in evaluation, much like the need for uniformity in the standard germination test.

Farmers and seed dealers are becoming aware of the concept of seed vigor and are beginning to request vigor test information on seed lots they buy. This is a common practice for cotton producers who ask for the cool test results. Growers are also beginning to ask for cold test information for corn. When relaying information to growers and dealers, it is critical that all laboratories, regardless of whether they are official, private, or company laboratories, adhere to the same procedures. Even small deviations in procedures, equipment specifications, or evaluation criteria can lead to large variation in test results. If consumers are to have confidence in vigor testing as a tool for evaluating the overall quality of the seed lot, then vigor test results from different laboratories must be reliable. Standardization and consistency in testing, interpretation, and reporting are a must.

CURRENT TRENDS IN VIGOR TESTING

According to a 1990 survey by the AOSA Vigor Committee, the number of laboratories conducting vigor tests is increasing. The survey showed 85% of the AOSA and Society of Commercial Seed Technologists (SCST) laboratories answering the survey were performing vigor tests on a regular basis (Table 1). This is a substantial increase over the 51% and 61% reported in 1976 (Grabe, 1976) and 1982 (TeKrony, 1982), respectively.

The 1990 survey also showed that 76% of the SCST laboratories engaged in vigor testing were utilizing the results as part of quality con-

trol programs, while a majority of the tests run by AOSA laboratories (84%) were service tests offered to the public (Table 2). Accelerated aging and the cold test continue to be the major vigor tests utilized in these laboratories (Table 3); however, several other tests continue to be used. The crops that are tested routinely for vigor are listed in Table 4. Corn and soybeans are tested most frequently, followed by wheat, sorghum, and cotton.

These surveys reflect the increasing consumer demand for seed vigor information and the willingness of laboratories to offer these tests. A survey on the accelerated aging test conducted in 1992 (data not shown) indicates that most commercial and regulatory laboratories offering the accelerated aging test utilize the procedures contained in the AOSA Vigor Testing Handbook. As more laboratories initiate vigor testing into their programs, it is critical that they purchase equipment that allows for precise temperature control in order to adhere to established vigor testing procedures.

AOSA SEED VIGOR TESTING SUBCOMMITTEE

The AOSA Vigor Testing Subcommittee is a division of the Research Committee. The objectives of the subcommittee are threefold:

- To provide research based information for the development of tests that accurately measure seed vigor.
- To continue to revise the Seed Vigor Testing Handbook, including updates for existing test procedures and the addition of new procedures.
- To provide educational materials on seed vigor and seed vigor tests.

The committee will continue to be responsive to the AOSA and SCST needs for information and scientific data related to vigor testing.

The 1993 subcommittee consisted of twenty-eight members. Nineteen members are associated with AOSA; thirteen are research faculty at universities across the US and Canada, and six are analysts from state or regulatory laboratories. The subcommittee has nine members from SCST; eight are with private seed companies and one is employed by a commercial seed testing laboratory. The mixture of AOSA and SCST members provides a wealth of experience in research, quality control, and seed testing. It is this diversity that has led to numerous successes by increasing our knowledge of vigor testing, including the publication AOSA Vigor Testing Handbook.

FUTURE OF SEED VIGOR TESTING

The demand for high quality seed of adapted varieties and hybrids will continue to increase. Seed producers, dealers, and farmers are becoming more aware of the value of vigor tests and, as a result, more laboratories will be offering vigor tests as an option. One of the challenges for the vigor

subcommittee is to educate the consumer about how to interpret the results of the various tests.

Vigor testing is essential for value-added seed crops. High value seeds that are primed, pelleted, or coated prior to sale must be of superior quality to satisfy the producer as well as the consumer. Likewise, greenhouse seedling production must begin with seeds that germinate rapidly and uniformly to produce transplants of similar size and quality. Weak seedlings or empty container cells where no seedling formed, could be very expensive for the transplant producer. Seeds used for transplant seedling production must therefore be very high in vigor potential. Vigor tests are used routinely for these seed crops.

Finally, the membership of both AOSA and SCST must consider where the international seed trade is headed. In the future, foreign markets may request or even demand vigor test information for entry into the trade. If this happens, analysts and regulatory agencies must have adequate procedures on hand to assure uniformity exists between laboratories offering vigor tests.

The AOSA Seed Vigor Testing Subcommittee strives to provide testing options and procedures for various crop species. We do not advocate labeling seed for vigor. We do realize, however, that uniformity in testing procedures, interpretation, and reporting is critical if vigor testing is to continue to grow and if vigor test information is to be of any value to the seed trade.

REFERENCES

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