AGRONOMY



THEMATIC PROJECTS

SEED IMAGING ANALYSIS IN SEED TECHNOLOGY RESEARCH

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Internal splits caused by mechanical injuries that cannot be detected by naked eye are detected by x-ray analysis. Lesions usually promote decresases in seed performance (Flor, 2003). 1. External image; 2. Radiography; 3. Abnormal Seedling

Seed testing is an important component of seed production systems. It is a dynamic activity as shown by the improvement of the available procedures and the development of new approaches and modern methodology. These tools comprise relatively new techniques such as seed and seedling imaging analysis that have indicated consistent potential to be used in basic and applied research.

This proposal was designed with the collaboration of recognized seed technology researchers and promising younger professionals that have demonstrated

sufficient qualification to guarantee the success of future actions in seed research. The members of this group represent important national and international institutions, comprising universities and research institutes located in São Paulo and Minas Gerais states, Brasilia and USA.

The central theme is Seed Imaging Analysis and the proposal includes different approaches such as:

- a) evaluation of seed morphology by X-ray analysis and its possible association to performance as influenced by environment and seed physiological potential;
- b) use of an automated computer imaging system (SVIS®) to assess seed vigor; studies on seed maturation and seed priming in association of imaging analysis.
- c) association between physical and physiological characteristics of seeds identified by imaging analysis;
- d) identification of developmental stages during seed maturation and its relation to seed performance;
- e) evaluation of mechanical injuries and effects on seed physiological potential;
- f) identification of the relation between physical and physiological characteristics of seed embryo and the effects on seed performance;

g) evaluation of the damage caused by insects, pathogens and adverse environmental conditions;h) the use of seed imaging analysis as a support on Molecular Biology research.

Different grain crops, fruits, and vegetable are included in the proposal such as maize, soybean, field bean, papaya, cucurbits, okra, bell pepper, castor bean and also some and Brazilian native species.

Results will produce useful information to seed companies mainly to identify factors that affect seed performance, improvement of some available procedures to determine seed quality and establish consistent diagnosis necessary to solve problems.

Depending on the information provided by initial results, the inclusion of new approaches and species will be considered, but all possibilities of distortion to the main focus will be avoided.

SUMMARY OF RESULTS TO DATE AND PERSPECTIVES

X-ray imaging tests is an effective tool to identify the seed structure and the action of factors that negatively affect seed performance such as immediate and latent mechanical injury and other disturbances that may occur during and after seed maturity. It is a non-destructive test applicable to evaluate seed structure of several species.

The X-ray results can be associated with those from germination and vigor tests, providing consistent information to diagnose seed quality and to allow efficient procedures during different phases of seed production, processing and testing.

The software "Seed Vigor Imaging System" (SVIS®) provides important advantages such as rapid measurement of seed physiological potential. This attribute clearly demonstrate that SVIS is an enhancement over traditional vigor tests for determining seed physiological quality.

The software "Tomato Analyzer" can be successfully used to evaluate the extent of embryo growth within non-endospermic seed species and is a promising alternative for the assessment of seed physiological potential by its indirect association with germination and vigor.

The association of X-rays and automated computer imaging system analysis comprises a modern and efficient resource to evaluate different aspects of seed quality. It is a significant improvement to be adopted in seed quality control programs.

MAIN PUBLICATIONS

Kikuti ALP, Marcos Filho J. 2008. Drying and storage of cauliflower hydroprimed seeds. *Seed Science and Technology*. **36**: 396-406.

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