Session 4 – The importance of quality seed in agriculture

Raising seed quality: what is in the pipeline?

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in cooperation with

Wageningen Seed Centre
Seed quality = ?

Physical and physiological quality

Genetic quality = Breeding
Good seed quality is made in the field!

>> Technologies to raise seed quality after harvest
Categories of technology

• Testing & research
• Enhancement (sorting, priming & sanitation)
Seed testing & research

X-ray
Image analysis
CF-analyzer
Q2 technology
Ethanol assay
Molecular technologies
X-ray and image analysis
Crack detection
Chlorophyll fluorescence (CF) analyzer
Principle of CF

- Petri dish with seeds
- Laser
- Detector
- Motor
Germination of CF fractions of paddy
CF of germinating pepper seeds
CF-analysis of germinating seeds
Gas analyses

• Oxygen
• Ethanol
Real-time $O_2$ measurements: the Q2
Ethanol production as measure for seed quality
Optimizing seed treatments

**Graph 1:**
- Germination percentage vs. Heat treatment (minutes at 55°C)
- Germination rate decreases as heat treatment increases.

**Graph 2:**
- Ethanol production vs. Heat treatment (minutes at 55°C)
- Ethanol production increases with longer heat treatment times.

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**INTERNATIONAL SEED TESTING ASSOCIATION (ISTA)**
www.seedtest.org

**PLANT RESEARCH INTERNATIONAL**
WAGENINGEN UR
Ethanol as marker for seed deterioration

Germination energy

Ethanol production

Seed age

1 yr

2 yrs
Flow cytometry

*Xanthomonas axonopodis*

in beans
Immunobeads
Genomics

cDNA micro-array: 1536 spots

Gene expression correlates with:

• maturation,
• germination
• priming

Proteomics

Dry seed

Imbibed seed

Metabolomics
Seed enhancement
A MANUAL OF THE ELECTRO-CHEMICAL TREATMENT OF SEEDS

BY

CHARLES MERCIER, M.D.
F.R.C.P., Etc.

"He gave it for his opinion that whoever could make two ears of corn, or two blades of grass, to grow upon a spot of ground where only one grew before, would deserve better of mankind, and do more essential service to his country, than the whole race of politicians put together."

A Voyage to Brobdingnag.

LONDON
UNIVERSITY OF LONDON PRESS, LTD.
18 WARWICK SQUARE, E.C.4

1919
few would have thought of making, to conjecture that the electrification of seed before it is sown might produce such a change in the seed as to cause it to germinate earlier when subsequently sown, and to produce a more healthy, vigorous, and fertile plant. This was a totally new conception. There were no known facts either in support of it or in conflict with it, and the only thing to be done was to follow the maxim of John Hunter—Don’t think: try.

Here, however, occurred the first difficulty. If currents of high tension, such as the inventor had been experimenting with, were passed into the grain, the apparatus required would be very expensive and complicated and would need an expert to work it. It would be desirable, therefore, to use ordinary low-tension electricity. But ordinary low-tension electricity would not have the penetrating power of high-tension electricity, and would not be able to penetrate the seed without the aid of a conducting medium. Such a medium would be furnished by a
Priming of grass seed

PreGerm®:

5-7 days faster germination
About 2x as much Poa survival
Electron treatment
Electron treatment

- throughput 30 t/h
- 2004: 10,000 t
Aerated steam
Spinach seed

- Control
- ThermoSeed

% Germination: Verticillium, Stemphylium, Colletotrichum, Cladosporium, Fusarium, Alternaria
ThermoSeed™ upscaled
Future

ISTA Advanced Technologies Committee