

# ATC

## Advanced Technologies Committee (2021-2022)

Presenter: Bert van Duijn  
Location: Cairo  
Date: May 9, 2022



# 15 Members from 13 Countries



- Bert van Duijn (NL), chair
- Francisco G. Gomes Junior (BR), vice chair
- Brigitte Hamman (SA)
- Devaraja Achar A.M. (IN)
- Birte Boelt (DK)
- Sebastian Bopper (GER)
- Kent J. Bradford (USA)
- Henry Bruggink (NL)
- Aurélie Charrier (FR) \*
- Mieczyslaw Grzesik (PL)
- Giovanni Lopez (NL) \*\*
- Mailén Ariela Martinez (AR)
- Nikolay S. Priyatkin (RU)
- Tomoko Sakata (JP)
- Zhujun Zhu (CN)

# Aims

- To form a bridge between the world of research and development, and ISTA's other Technical Committees.
- To collect and interpret data and opinions on 'advanced' technologies.
- To provide information on advanced technologies to the ISTA community.
- To chair or participate in research and tests of advanced technologies in cooperation with other Technical Committees and/or act as reviewers.
- To assist ISTA by formulating views of ongoing or future technological developments from a seed testing perspective.

# Current working groups

- **X-ray based technologies**
  - **2D X-ray**
  - **3D X-ray**
- **Nano-technology**
- **Multi spectral imaging**
- **(Mathematical) Modelling in seed testing**
- **X-ray handbook chapter 14 (with PUR and FTC)**
- **Workshops/ seminars**

ATC is  
involved in  
3 ISTA  
funded  
special  
projects

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## New Technologies for Other Seeds Determination

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(Collaboration between ATC and PUR)

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Assessment on available technologies of imaging and image analysis for other seeds determination (OSD), purity analysis and germination.

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(Collaboration between PUR, ATC and GER)

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Exploration of methods for detecting insects in seed lots.

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(Collaboration between SHC and ATC)



Workshops and seminars

We missed them so much

Next  
workshop on  
Seed Imaging  
Technology.  
202X???, Italy  
or XXX?



# Working group Mathematical Modelling for Seed Testing (?)

(Tomoko Sakata, Kent Bradford, Bert van Duijn)

H. Liu et al./Journal of Theoretical Biology 427 (2017) 10-16

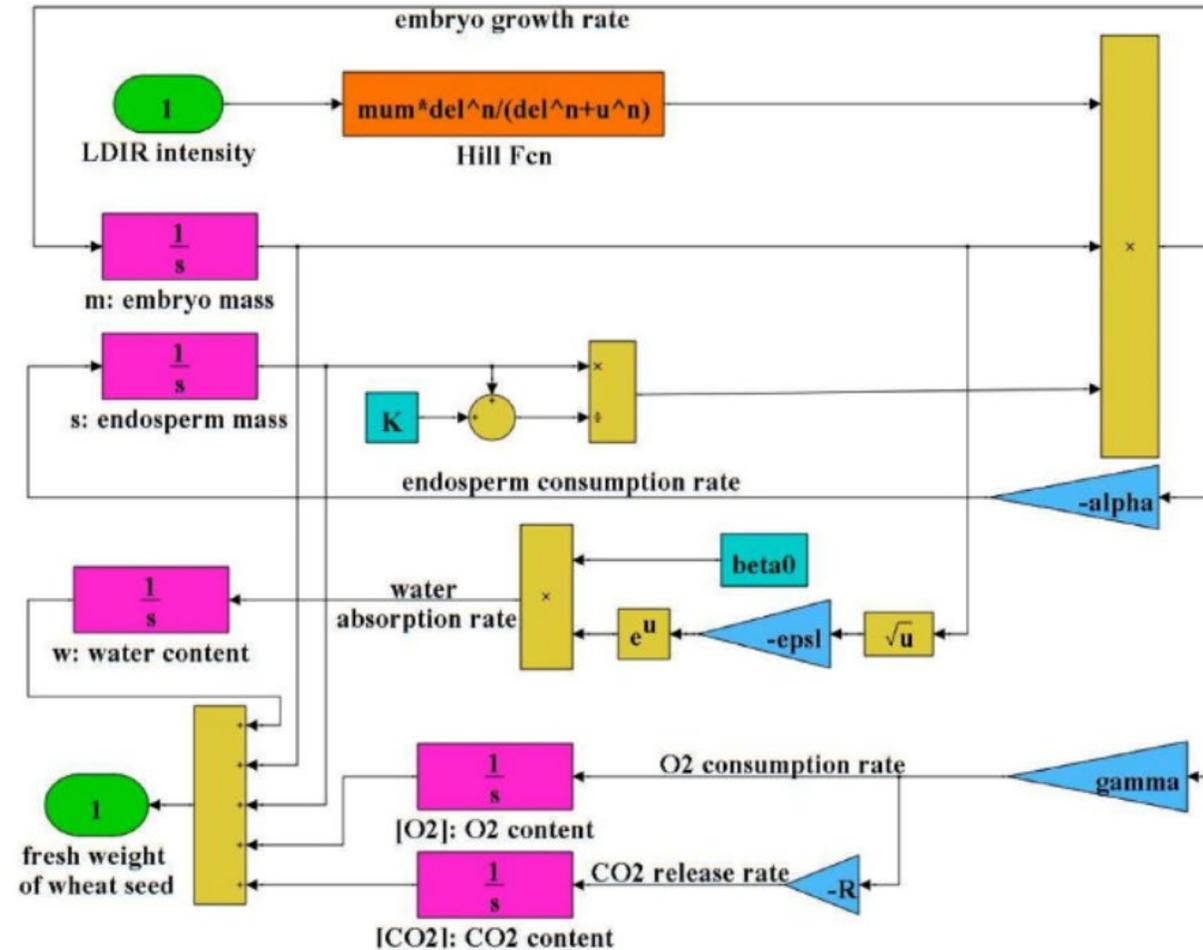


Fig. 4. Simulation model of wheat seed germination response to LDIR intensity variation.

# Aim & plan

The aim of this working group is to explore the possible role of mathematical modelling in seed testing.

- Collect "all" research papers related to (mathematical) modelling and seed performance, seed technology and testing.
- Categorish the papers on different applications and different "types" of models.
- Consult ISTA committee members on needs and ideas (survey).
- **Select 1 or 2 applications based on survey results and "status" of research.**
- **Evaluate and advise on possibilities and work to be done for the selected applications**

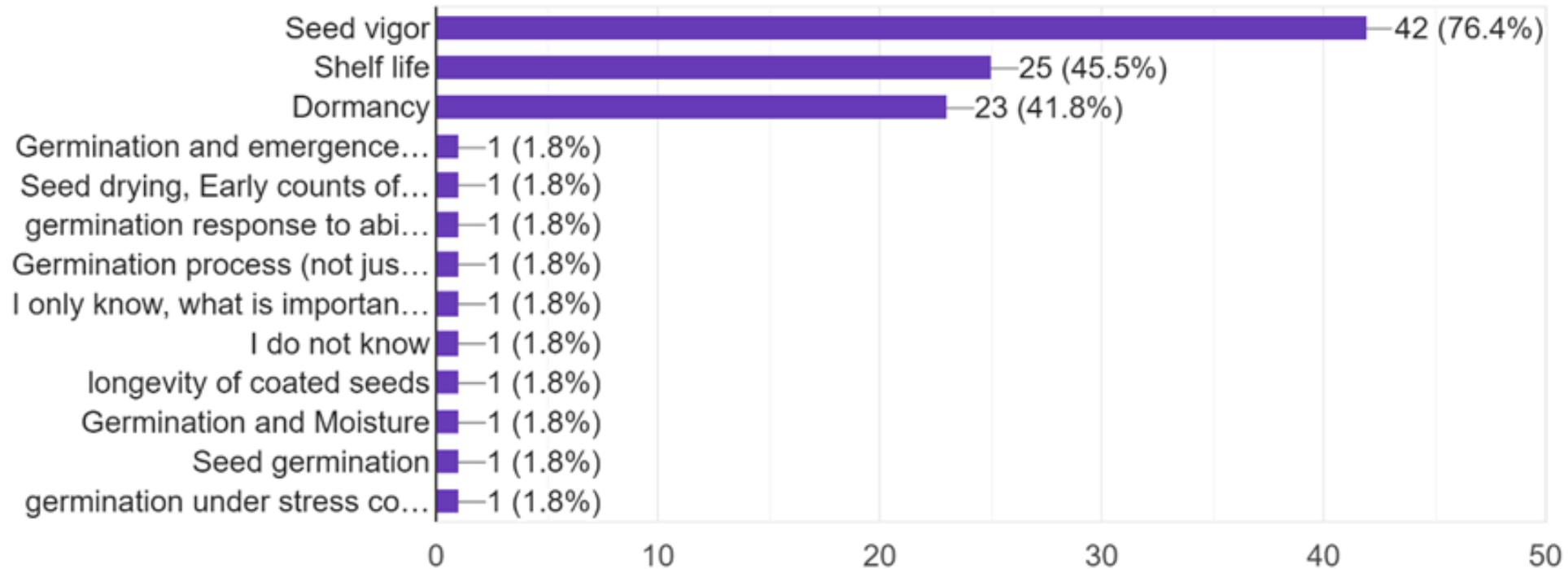
# Results (so far)

- Collected 78 research papers (1950-2021) in which a mathematical model is developed related to seed properties. All available as PDF.
- Identified 272 research papers in which a mathematical model is applied to describe/support the results.
- Based on the “applications” in the research papers a survey was sent to Tcom members.
- From the sent surveys 55 responses were received (about 35% response).

# Survey results

## What are the most interesting areas to apply (mathematical) modelling?

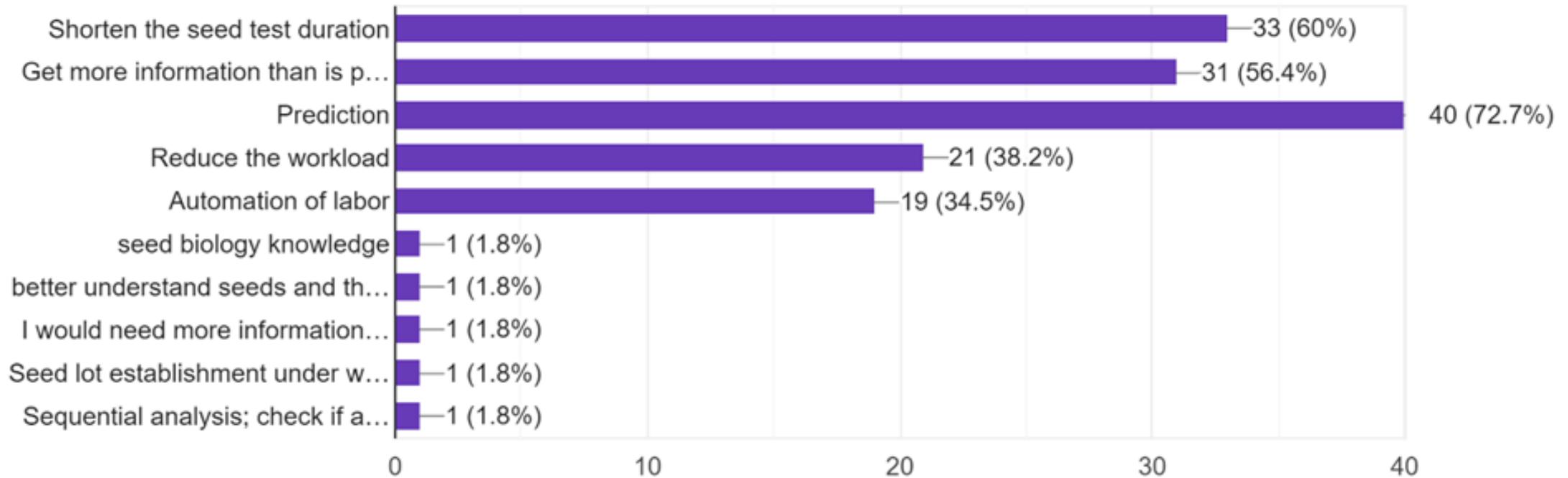
55 responses



# Survey results

## What do you foresee as the purpose of application of (mathematical) modelling?

55 responses



# Survey results

## Some remarks received

- Modelling of germination curves would also be of interest - I think. There seems to be different approaches.
- I'd be interested in such methods on quality testing, with the aim to evaluate untreated seeds and then extrapolate the experience for quality of treated seed (drying, shelf-life, germination, etc.)
- Anything that would serve to reduce the subjectivity involved in germination assessment would be helpful.
- Would be very useful if genebank laboratories could be involved in this. Their purpose of germination test results are different from the industry.
- I find it hard to know how mathematical modelling could be used for seed vigour.
- Improve the accuracy and is widely applicable to different varieties of the same crop
- The project is very relevant as it will speed up the pace at which standard ISTA rules (test conditions) are reviewed and developed with predictive and simulative modelling

## Some remarks received

- ISTA labs must have soooo much seed testing data that nothing is currently done with. More and more labs will be recording this data electronically. Can we make better use of this resource?
- I see there would be some potential interest in modeling seed vigor, shelf-life and even dormancy for these type of time series models. I hope that they are modeled these as a true time series considering the dependence that is present in a time series (evaluating the same experimental unit over time).
- I can see some seed shelf-life purposes being helpful and possible duration the test.
- I do a lot of linear modelling in space but not so much in time (time series) and longitudinal analysis. This does seem interesting

# Next

- Evaluate the relevant research papers with respect to the survey results (applications and purpose)
- Report & (if relevant) plan action for further development (with other Tcom's input)



Getting in contact with ATC?



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Thank you!

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