

Calorespirometry – a phenotyping tool to assess pea germination efficiency under different temperatures

Problems

Quality of pea seeds has a direct impact on sustainable crop production. The ordinary practices of seed quality evaluation are usually performed by germination tests and can be followed by vigour tests and seedling growth characteristic measurement. However, such methods take a long time and are laborious.

Solutions

Calorespirometry appears as a solution to develop a fast-performing technique for seed viability phenotyping. This technique measures simultaneously the heat and CO₂ rates. Considering that seed germination involves the activation of several metabolic pathways, including cellular respiration to provide the required energy, this technique was proposed and validated as a phenotyping tool to identify and select pea genotypes with different seed germination performance upon a range of temperatures.

Practical recommendations

- Seeds must be imbedded in paper/cotton moistened with sterilized water during 12 hours at selected temperatures under dark conditions.
- A MultiCell Differential Scanning Calorimeter (see Figure) is required to perform measurements.
- Calorespirometric measurements must run as isothermal at selected temperatures.



Figure: MultiCell Differential Scanning Calorimeter (TA Instrument).
(Photo: UÉVORA)

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