Seed Respiration Analyser (SRA)

Fytagoras: assessment of single seed respiration with the Seed Respiration Analyser (SRA).

Single seed respiration measurements provide valuable information about physiological processes in seeds. It provides detailed information on seed batch homogeneity and changes after seed treatments.

Why use SRA measurements?

The SRA analysis is a supporting method for seed testing. It provides a fast and accurate measurement of single seed respiration during germination. Depending on the species, an analysis takes 10 to 100 hours. The result is an easy determination of dead, dormant and germinating seeds. Measurements with the SRA deliver fast and accurate information about homogeneity, and changes after seed treatments. In addition, the SRA analysis is excellent for determination of differences between (individual) seeds and seed batches in comparison trials.

'A modern measuring device that can be used in laboratories, seed processing companies and on seed production locations.'

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Fytagoras – BVD-08-2018

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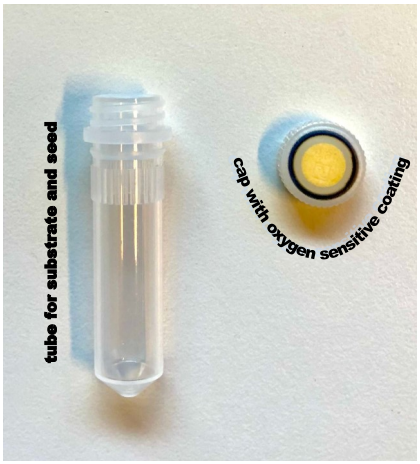
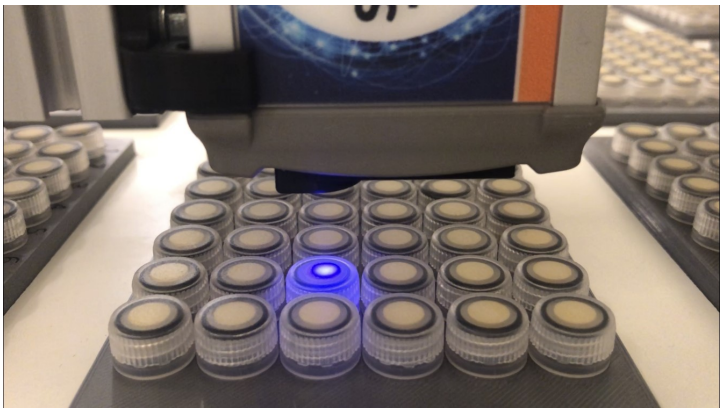
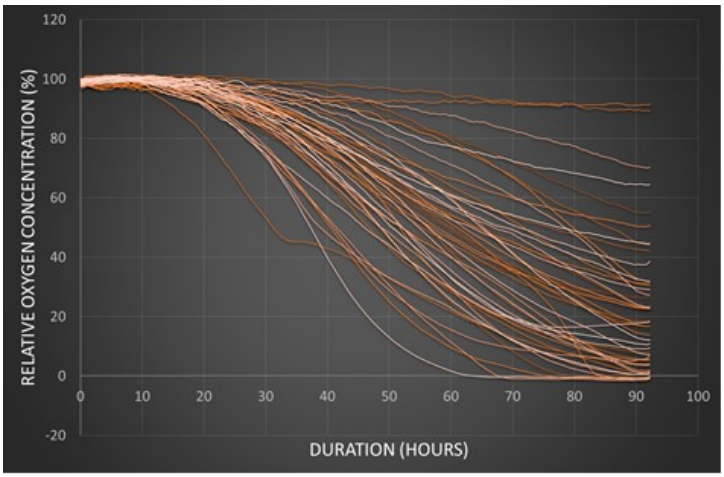
Seed Respiration Analyser (SRA)

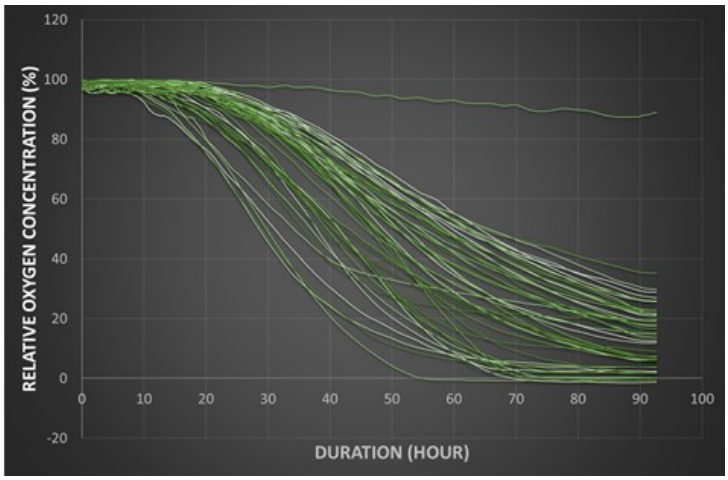
In the SRA, single seed respiration is measured. To achieve this, each seed is placed into a vial containing substrate with water (e.g. agar or filter paper). The vials can be closed airtight. The inside of the vial cap contains the secret of the measurement, an oxygen sensitive fluorescent coating. Once the vial is closed, any respiration of the seed will result in a decrease of the oxygen concentration in the vial. Hence, we can measure the respiration of the seed from the outside of the vial with help of the fluorescent coating inside the vial using an optical measurement. Repeated measurements will show the seed respiration profile reflected in the oxygen level profile in the vial. In the SRA a large number of vials (up to 768) can be placed, that are evaluated individually during time at regular intervals. The resulting curves are stored and can be analysed in detail.

Vials of different sizes (e.g.2 ml and 5 ml) are available for different measurement conditions and different types of seeds and applications.









Single seed respiration measurements provide information about homogeneity differences between seed batches. In this example, the oxygen consumption profiles of seeds from two different batches are shown. The seed batch shown on the left is clearly more heterogenous than the batch shown on the right.

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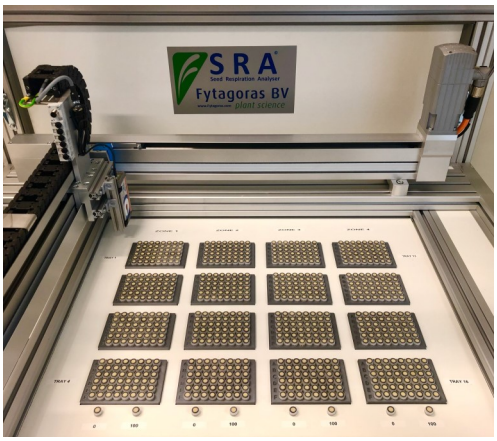
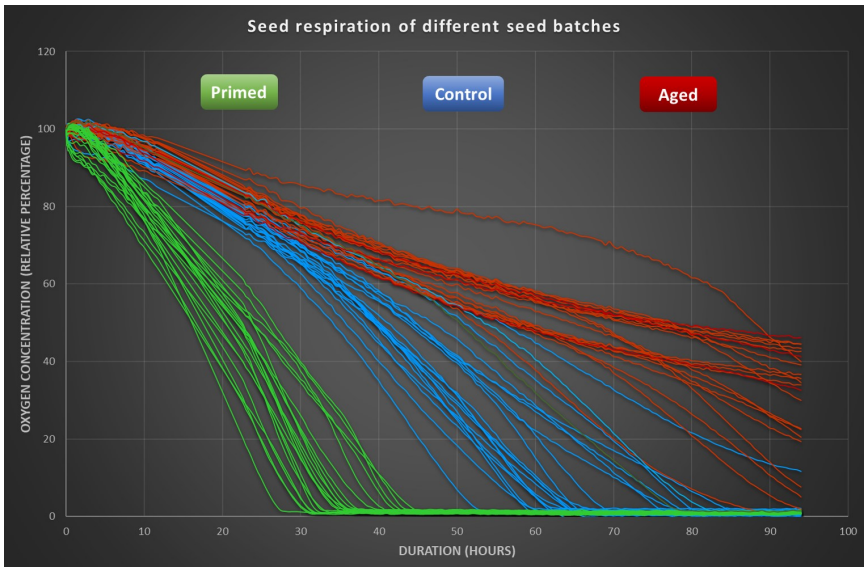
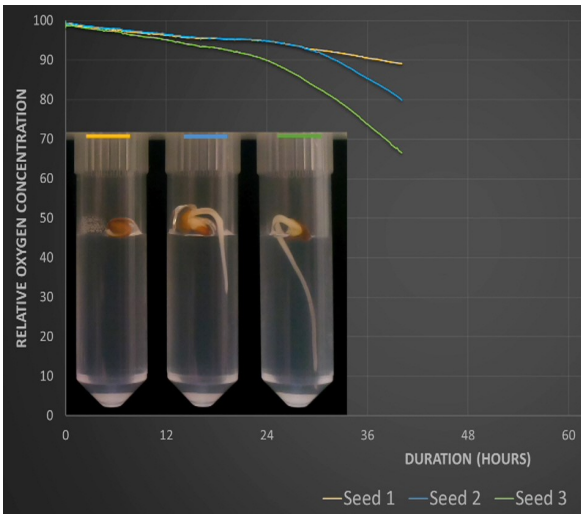
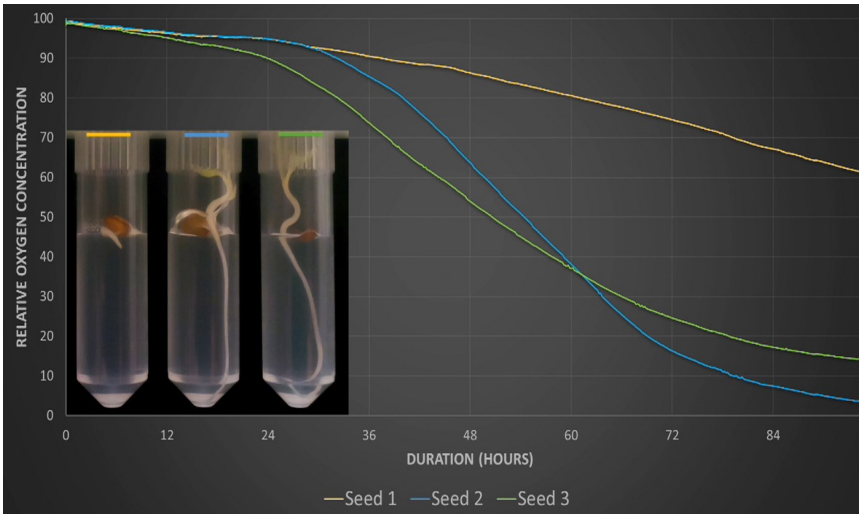




Single seed respiration measurements provide information about differences between seed samples after seed treatments, such as priming and accelerated aging. The example shows that priming (green lines) results in more homogenous (individual seed curves close together) and faster (steeper lines) oxygen consumption as compared to the control seeds (blue lines). Aged seeds (red lines) show reduced and delayed oxygen consumption as compared to control seeds (blue lines).





Single seed respiration measurements provide information about differences between seeds in a sample. In this example the germination of three individual seeds in the SRA measuring vials can be seen together with their oxygen consumption profiles. The most vigorous seed (indicated green and green line) is fastest in oxygen consumption, while the least vigorous seed (yellow indicator and line) lags behind in both germination and oxygen consumption .

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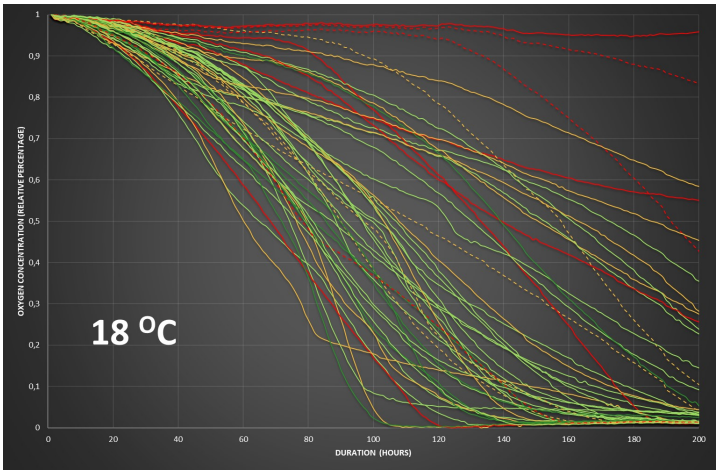
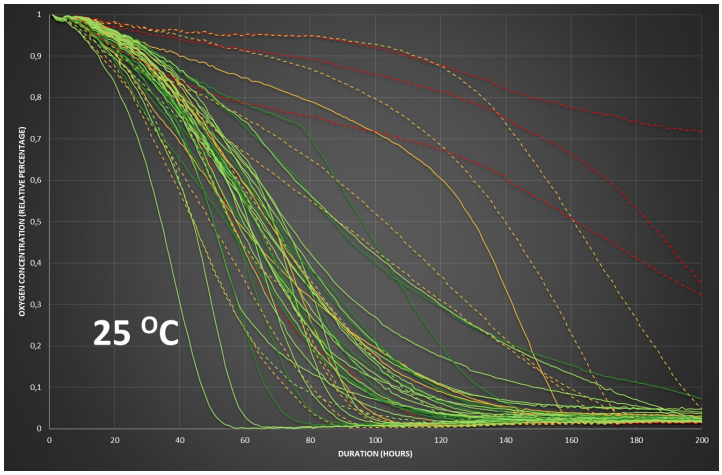
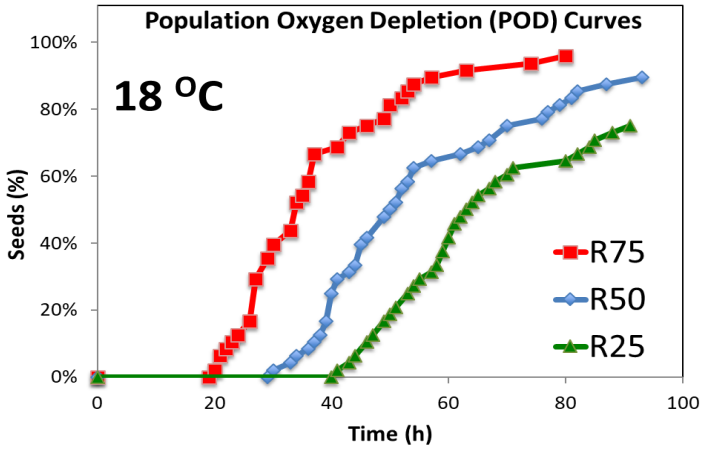
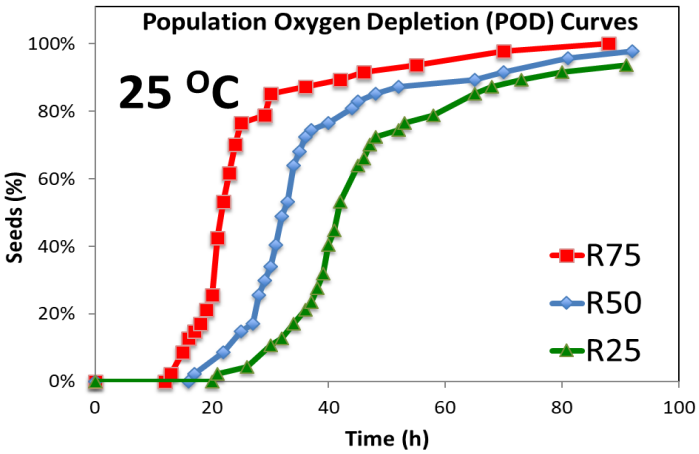




The SRA provides for 4 different temperature zones. The zones can be set independently to different temperatures to test temperature dependency of the seed performance. The examples above show the oxygen consumption of individual hemp seeds at 18 °C and 25 °C. At the higher temperature the seeds are about twice as fast and show more homogeneity. Using a more advanced analysis of these data, such as population oxygen depletion curves (Pedro Bello and Kent J. Bradford, Seed Science Research (2016) 26, 199–221), the differences between performance at 18 °C and 25 °C are clearly visible (graphs below).





Fytagoras

With over 20 years history of seed research at Fytagoras, a strong knowledge base for shaping innovations and applications in seed science and technology is guaranteed. In cooperation with different partners, both from industry and academia, the acquired knowledge not only resulted in a vast number of scientific publications (>40) but in innovative seed technology equipment, practical procedures and patents as well.

System specifications

Maximum number of trays: 16

Maximum number of seeds: 560/768/1536 in 35/48/96 tube/well tray

Scanning speed: 768 seeds (full 48-tube plate) in 28 minutes

Shortest scanning interval: 30 minutes (60 minutes when more than 800 seeds are scanned)

Zone temperature stabilization time maximal: 1 hour

Temperature resolution: 0.1 °C Temperature accuracy: +/- 0.5 °C

Oxygen concentration range : 0 – 100 % relative to O2 conc. in ambient air

Oxygen concentration accuracy : +/- 3%

Zone temperature range, all zones equal temperature +/- 10 °C compared to ambient temperature

Max. temp. difference between zones: 10 °C

Weight: 215 kg Dimensions (h x w x d) : 110 x 126 x 104 (cm)

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