

# High-Throughput screening of drought stress related traits in a set of *Brassica napus* genotypes

Sebastian Albrecht, Hans-Ulrich Jürgens, Christiane Balko and Frank Ordon

Julius Kühn-Institut, Institute for Resistance Research and Stress Tolerance, Quedlinburg

Email of corresponding author: sebastian.albrecht@jki.bund.de

Rapeseed (*Brassica napus* L.) has become the most important oilseed crop in Europe concerning production. Since high yielding modern varieties are based only on a thoroughly selected subset of the available genetic diversity, the project of the Pre-Breed Yield consortium aims at estimating the genetic diversity present in oilseed rape on the phenotypic and genotypic level as the base for a directed improvement of yield and yield stability. In this respect drought as one of the most serious production constraints worldwide came into focus in rape seed breeding. Therefore, a diverse panel of cultivars is evaluated for drought stress tolerance in rain-out shelter trials and in parallel a high throughput screening is established.

Physiological parameters indicating diversity of drought stress tolerance are examined, e.g. the concentration of osmotically active molecules like free proline, total soluble sugars, and relevant traits relating to water balance of plant tissues like membrane stability as well as osmotic adjustment and relative water content. As an indicator for drought stress induced leaf senescence, the chlorophyll content was measured indirectly by Minolta SPAD readings. Results indicate significant effects ( $P \geq 0,001$ ) of induced drought stress

relative to the control treatment for all traits analysed.

By screening the PBY-collection at BBCH16, genotypic differences under drought were identified for the traits; proline, total soluble sugars, membrane stability and chlorophyll content.

Characterization of physiological and agronomic traits in a two-year field trial at Groß Lüsewitz, Germany displayed a significant treatment effect for almost all traits between the irrigated control and drought stress, generated by a rain-out shelter set-up.

The evaluation of adult plants in field pointed out genotypic differences for yield and thousand kernel weight. Drought related variations in physiological response were detected confirming the examined traits as drought stress indicators.

Results of growth chamber experiments were correlated to agronomic traits examined in rain-out shelter trials. Correlations among all traits were calculated and ranged from 0.04 to 0.5 for the physiological traits to yield per plant and thousand seed weight. Based on this, two parameters, i.e. the accumulation of total soluble sugars and the membrane stability index were chosen to be tested on a population comprising 1064 genotypes in growth chamber experiments.