

**EFFECTS OF SALICYLIC ACID AND OSMOPRIMING ON  
STRESS TOLERANCE OF CABBAGE SEEDS**

**(*Brassica oleracea* var. *capitata* L.)**

BY

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**Abstract**

The research was conducted in the Research Laboratories of the Plant Research International, the Netherlands. The aim was to study the invigoration and stress tolerance of cabbage (*Brassica oleracea* var. *capitata* L.) seeds. This involved the performance of several experiments: preliminary investigations on the duration of soaking and concentration levels of salicylic acid with cabbage seeds; salicylic acid with various thermogradient treatments; salicylic acid with primed cabbage seeds and salicylic acid with primed and deteriorated cabbage seeds. A completely randomized design was used. The study was carried out between June and November 1999.

Data were taken on germination parameters such as percent maximum germination (Gmax), time in days to 50% maximum germination (T<sub>50</sub>), mean germination time in days (MGT), percent normal and abnormal seedlings and, percent dead and fresh seeds. Data collected were processed using computer software package called SeedCalculator<sup>®</sup> developed at Plant Research International and comparisons of the data means were performed with Student t-Test.

The results obtained indicate that salicylic acid has some invigorating effects that enable cabbage seeds and seedlings to tolerate abiotic stresses such as sub-optimal germination temperatures and osmotic solutions. Higher concentrations of salicylic acid (SA) (3.0-10.0 millimolar (mM)) provide significant effects ( $p=0.05$ ) of lowering the percent maximum germination ( $G_{max}$ ) under 24-hour soaking. Under sub-optimal temperature of  $12^{\circ}\text{C}$  seeds soaked in 0.1 and 0.3 mM SA give significantly higher ( $p=0.05$ )  $G_{max}$  and percent normal seedlings. The addition of salicylic acid to the priming agent polyethylene glycol (PEG) 6000 significantly improves its efficacy in terms of seed germination and seedling development, at sub-optimal temperature of  $15^{\circ}\text{C}$ . Significantly higher ( $p=0.05$ )  $G_{max}$  is recorded with the addition of 0.3 mM salicylic acid to -1.0 mega Pascal (MPa) PEG during priming, followed by controlled deterioration. Soaking of seeds in 0.1 and 0.3 mM salicylic acid followed by controlled deterioration causes significant increases ( $p=0.05$ ) of time in days to 50% maximum germination ( $T_{50}$ ), mean germination time in days (MGT) and percent normal seedlings.

It is recommended that further work should be done with salicylic acid to come up with refined methodologies of testing for stress tolerance, to allow for better assessment of seed quality in various crop species. There is also a need to develop ways and means of performing field tests with seeds treated with salicylic acid to be able to corroborate the laboratory test results with those under the field situations for wider application.