The effect of seed moisture content and hot water treatment on carrot seed viability and *Alternaria radicina* control

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**Introduction**

- Hot water treatment of seeds to control seedborne pathogens is an important tool for organic seed production. To be practical, the seed’s thermal tolerance must be much greater than that of the pathogen.
- Techniques that can increase the seed’s thermal tolerance and/or reduce the pathogen’s heat tolerance could improve hot water treatment.
- Seed moisture content (SMC) is known to affect seed’s heat tolerance (TeKrony 1995).
- Reducing SMC may have the potential to increase seed tolerance to treatment.
- The effect of altered SMC on the tolerance of *A. radicina* to heat treatment is unknown.

**Method**

- Experiment 1: Studied the effect of SMC (5, 10, 15 and 20%), temperature (45, 50, 55°C), and treatment duration (0, 10, 20, 30 min) on the germination of carrot seed that was free of *A. radicina*, in a three factorial design.
- Experiment 2: Studied the effect of SMC (5, 10, 15 and 20%) and treatment duration (0, 10, 20, 30 min) on infestation levels of *A. radicina* in carrot seed, and seed germination, in a two factorial design. Carrot seed was artificially inoculated with *A. radicina* two months prior to harvest.
- SMC was altered by either adding water before treatment or by air drying at 30°C and then stabilising for 24 h at 5°C prior to treatment.
- Seeds were treated by loosely placing in stainless steel tea infusers then immersing in 11 l of water at the required temperature and duration and then immediately cooling them in 15°C water for 15 min.
- The germination tests and detection of *A. radicina* was conducted as per (ISTA 2004).

**Results**

- In experiment 1 germination was significantly reduced (p<0.001) by increasing treatment duration and temperature, and there was a significant interaction between these two factors (Figure 1), in that at 45°C germination did not differ among treatment durations, but at 55°C was reduced after 50 minutes, and at 55°C after 20 minutes.
- Germination was reduced slightly by increasing SMC (p<0.001) from 68% at 5% SMC to 63% at 20% SMC.

**Conclusions**

- In experiment 2, SMC (Figure 2) had a significant effect (p<0.003) and duration (Figure 3) had a highly significant effect (p<0.001) on infestation levels.

**References**


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