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Radio Frequency Heat Treatment: An Alternative Seed Treatment for Seed-Borne Fungi in Barley (*Hordeum vulgare*)

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Abstract

Fungi contamination during the malting process is a major problem in the brewing industry. The conventional seed drying techniques do not eliminate fungi. The aim of this study was to evaluate the efficacy of radio frequency (RF) heat treatment in eliminating seed borne fungi in barley (*Hordeum vulgare*). Barley seed, “Bauding” variety with initial moisture content of 14.5% were treated with RF at 27.12 MHz. The power input was 24% of the maximal output power of 2800 W. Seed health status was determined using the blotter method and standard germination test was carried out using the ISTA rule 2006. The first experiment was set to determine the use of the temperatures: 60, 65, 70, 75 and 80°C over 3 minutes duration. Treating barley seed at 70°C gave the most promising results in controlling seed borne fungi. The infectivity of *Aspergillus flavus*, *Alternaria* sp., *Penicillium* sp. and *Rhizopus* sp. were reduced to 16.67, 11.11, 0 and 0%, respectively at this temperature level. However, at this temperature, seed germination was reduced from 91 to 41%. Therefore while RF heat treatment significantly controlled seed borne fungi in barley seed, it reduced their viability. In the second experiment, barley seed was heated at 65°C RF for 1, 3, 5 and 10 minutes. Heating for 5 and 10 minutes were the most effective. *Aspergillus flavus*, *Alternaria* sp., *Penicillium* sp. and *Rhizopus* sp. infectivity were decreased to 16.67, 0, 0 and 0% at 5 minutes duration while at 10 minutes duration, respective infectivity were reduced to 25, 11.11, 0 and 0%. Germination in this case was decreased from 91 to 78 and 62% on the 5 and 10 minutes duration, respectively. These results show that using 65°C RF heat treatment for 5 minutes is suitable for controlling seed borne fungi in barley seed and leads to reasonable germination percentages. Therefore, RF heat treatment may be used as an alternative method to control seed borne fungi in barley seed.

Keywords: Barley, heat treatment, phytosanitary, radio frequency, seed borne fungi