Abstract

Sorghum (*Sorghum bicolor* L.) Germination Dynamics at Extreme Temperatures †

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**Abstract:** Water and heat stressors during flowering are predominant limitations of dryland sorghum yields across Australia’s north-eastern cropping zone. Crops sown early could flower before seasonal heatwaves, but the seed must uniformly germination and emerge at soil temperatures between approximately 10 to 15 °C. Furthermore, chemical coatings applied to commercial hybrid seed lots effectively protected the developing crop from pest, disease and herbicide damage but the combined influence of low temperatures and seed coatings on germination of hybrid sorghum seed batches is unknown. In this experiment, germination dynamics were modelled for 10 commercial sorghum hybrid-seed lots (with or without seed coating of a.i. thiamethoxam, oxabetrinil and thiram) incubated at continuous temperatures ranging from 9.4 to 46.1 °C. Results also show commercial seed treatments negatively affect final germination proportion especially at sub- and supra-optimal temperatures. Some hybrid-seed lots in current experiment were more sensitive to seed coatings at either sub- or supra-optimal temperatures regardless of seed germination capability (i.e., germination proportion at 25 °C). Seeds took 5 days to reach 50% germination (t50) at 9.4 °C but germinated within 24 h at constant temperatures between 20 and 40 °C. The spread of germination (time between 10 and 90% germination) increased from 0.5 days at 30 °C to 3.8 days at 9.4 °C. Therefore, some hybrid-seedlots are suited to early sowing because they can maintain high germination proportion (>90%) even at soil temperatures (9.4 °C) as long as the seedbed remains moist for a least 12 days. Research continues identify the basis of cold tolerance in some-hybrid seedlots.

**Keywords:** chilling; lethal temperatures; seed quality

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