



Seed Dormancy and Germination in *Solanum nigrum* and *S. physalifolium* as Influenced by Temperature Conditions

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Abstract

Solanum nigrum L. (black nightshade) and *Solanum physalifolium* Rusby (hairy nightshade) are two important weeds in many crops. They reduce crop quantity by competition and crop quality by contaminating harvested products.

The timing of different control measures is a key factor in integrated weed management, which must be related with emergence of the weeds. Since emergence timing of the species is controlled by seed dormancy and temperature conditions, the effect of temperature on dormancy and germination has to be well understood.

Experiments were conducted to study seed dormancy, the temperature effect on dormancy, dormancy cycle, germination characteristics, and emergence of the species. In addition, a simulation model was developed to study the effect of temperature on the dynamics of dormancy release and induction under different temperature conditions.

I found differences in primary dormancy among populations of *S. nigrum* collected on two dates and in different locations. Fresh seeds of *S. nigrum* were conditionally dormant and germinated at higher alternating temperatures and in light, while seeds of *S. physalifolium* were deeply dormant. Seed dormancy is reduced during autumn, winter and early spring in seeds buried in the soil. The rate of dormancy release and induction is low at lower temperatures and increases as the temperature rises. High temperatures cause short-lasting breakage of dormancy followed by induction.

Short-lasting dormancy induction in spring is likely to delay emergence of the species. Seedling emergence of both species showed a bi- or three-modal pattern during an extended period in late spring and early summer. This enables the species to survive natural catastrophes or escape weed control operations. This information can be used to maximize the efficacy of weed management strategies by timing weed control tactics to coincide with seedling flushes.

Dormancy is mainly induced during summer due to higher temperatures. This prevents seedlings from emerging too late and being killed by frost in autumn before reproduction.

Keywords: black nightshade, hairy nightshade, dormancy, emergence, germination, modelling, seed, seedling, weed

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