# A REVIEW OF THE PHYSIOLOGICAL BASIS OF SEED DORMANCY IN WILD OATS, *AVENA FATUA*

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*Abstract*.. The wild oat (*Avena fatua* L.) is an important weed in the temperate cereal-growing regions of the world. Sporadic germination due to variable duration of dormancy and the trail of long-term viability of buried seed are the major factors contributing to its persistence.

For a number of years studies have been undertaken to determine the mechanism of persistence of this weed; particular attention has been directed towards the mechanism of seed dormancy. Research using genetically pure lines has advanced our knowledge of the physiology and biochemistry of the primary and secondary dormancy mechanisms.

Available evidence suggests that in most lines two dormancy states exist in primary dormant caryopses, while only one exists in secondary dormant caryopses. The longer-lived dormancy state, present in both primary and secondary dormant caryopses, is sensitive to germination promotion by nitrate or azide and has been associated with a partial block in the operation of the Krebs cycle. It is thought that nitrate overcomes this partial block by diverting NADH from ATP synthesis for its own metabolism, and that azide inhibits the activity of the normal cytochrome-mediated respiration pathway and promotes the activity of the alternative respiration pathway which produces less ATP. Thus, both compounds stimulate the activity of the Krebs cycle by removing a high energy charge control imposed by the quiescence of the embryo. Other germination-promoting substances (ethanol, citric acid, malonic acid), plant growth regulators (gibberellic acid, ethylene, fusicoccin) or environmental parameters (light, chilling, wounding) are also thought to overcome dormancy by promoting the activity of the Krebs cycle.

Very little research has been done to elucidate the mechanism of the first, shorter-lived dormancy state present only in primary dormant caryopses; however, the few findings available suggest a possible role for a membrane system.