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Fusarium Head Blight of small grains is dependent on ascospore inoculum each spring to initiate the disease. However, relatively little is known about the conditions under which *Fusarium graminearum* overwinters and what conditions induce the fungus to produce ascospores in the spring. Our long-term objective is to understand this process. Management of the crop residue to minimize inoculum development is a critical part of disease reduction strategies. As part of this long-term goal, our specific objectives for this proposal are as follows:

1. To determine the environmental parameters affecting the development of perithecial initials and initiation of dormancy and the breaking of dormancy and subsequent formation of perithecia.
2. To identify physiological processes important to the commitment of *Fusarium graminearum* to over-wintering in wheat stems and to sexual development.

To achieve these goals, we will combine field, greenhouse and laboratory studies to define the environmental conditions which promote winter dormancy and, in the spring, peritheciun production. We will examine the physiological changes accompanying these processes using gene expression studies.

These gaps in our knowledge are recognized in the USWBSI action plan which identifies the need for research on genes for pathogenesis and calls for the development of new strategies to reduce the sporulation of the fungus on potential inoculum sources (PBG, Goal #3). An understanding of the trigger for dormancy and the trigger for peritheciun induction may be keys to understanding the development of this fungus in residues and should guide us in targeting control measures directed to *Fusarium*-infested crop residues. A potential outcome of this research may be to identify the most effective time to introduce biocontrol agents (MGMT, Goal #1).