Fusarium head blight (scab) is a disease of wheat and barley that can cause reduction both in crop yield and grain quality. In our previous studies, one polyketide synthetase gene PKS1 was found to be important for plant infection. The GPMK1 MAP kinase gene has also been shown to play critical roles in reproduction and plant infection in F. graminearum. Functional analyses of the upstream kinases and one downstream transcription factor of GPMK1 are currently under the way. The goal of this study is to utilize the recently available genome sequence to further characterize the GPMK1 pathway and the role of PKS1 during plant infection. Objective 1 of this proposal is to determine the function of two G-protein coupled receptor (GPCR) genes. These two GPCR genes may function above the GPMK1 MAP kinase pathway and recognize various signals for sexual differentiation or fungal-plant interactions in F. graminearum. The second objective is to examine the expression pattern of PKS1. The expression and function of three genes located near PKS1 will also be studied. Some of these genes may be associated with PKS1 for synthesizing phytotoxic metabolites. Overall, the proposed research will improve our knowledge about signaling pathways and secondary metabolism involved in fungal developmental processes and pathogenesis in F. graminearum. In the long run, further characterization of the GPMK1 pathway and PKS1-related metabolism will be helpful to develop novel targets for fungicide screens or disease control strategies.