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PROJECT 1 ABSTRACT
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Widespread use of chemical pesticides is often viewed as a non-sustainable agricultural practice because of concerns over increasing pest resistance and potentially deleterious environmental consequences. Using naturally occurring microorganisms to biologically control plant diseases is a sustainable agricultural practice but faces several challenging hurdles during product development. A serious impediment to the commercialization of biocontrol agents is the lack of adequate knowledge of the cultivation and formulation technologies needed to maximize strain tolerance of the biological stresses encountered during industrial cultivation, cell separation, processing (drying or dewatering biomass), formulation and storage. Additionally, information is lacking in how to preserve the investment in producing stabilized, viable biocontrol cells once cells are deployed on the plant infection court. The overall goal of our USDA-ARS and Ohio State University research team is to develop strategies and microorganisms to play a key role in the integrated management of FHB. In the currently proposed research, a primary objective will be to develop a formulation of biocontrol agent *Cryptococcus nodaensis* OH 182.9 that specifically enhances agent establishment and activity on wheat heads through the use of UV-protectants. UV –protectants will be evaluated using both artificial and natural sunlight. The best UV-protectant formulations will then be tested in greenhouse and field environments in Peoria, Illinois and Wooster, Ohio. A second objective of the proposed research will be to discover new strains of biocontrol agents that would possibly be more effective than our most effective current strain. Our current culture collection of more than 700 microbial strains isolated from the anthers of field-grown wheat will be screened for strains that are able to utilized choline, a compound that is reported to stimulate early germ tube growth of *Gibberella zeae*. Prescreening potential FHB antagonists for ability to utilize choline can reasonably be expected to identify strains with a high probability of being successful antagonists since such strains would metabolize a growth stimulant signal normally used by the pathogen. Completion of this research will advance the development of a first generation FHB biocontrol product based on our patent pending yeast *C. nodaensis* OH 182.9 and continue the process of identifying even more effective antagonists of *Gibberella zeae*. Upon further scale–up and testing with a commercial development partner, a biocontrol product of FHB based on OH 182.9 or a newly discovered antagonist should significantly contribute to an effective integrated control program against Fusarium head blight.