Scheda Proposta Progetto

CIP WDXNXE

Dati proposta

Acronimo SPREAD (rev.1)

Titolo Systems of early detection and PREdiction of fungAl Disease dynamics in fruit commodities: from the field to the storage

Durata in mesi 36

Descrizione

SPREAD aims to understand, predict and support the sustainable management of fungal diseases characterized by latent or asymptomatic infection stagesin fruit crops. In these pathosystems, pathogens may persist within host tissues without visible symptoms for extended periods, while only a subset ofinfections progresses toward active colonization and symptom emergence during ripening, storage or commercialization. This transition depends on complexinteractions among host physiology, pathogen activity and environmental conditions, which remain poorly understood and difficult to predict. Consequently,pathogen detection alone is often insufficient to reliably estimate disease risk or support timely management decisions. The project will focus on threeeconomically relevant pathosystems: Colletotrichum spp. on apple and on avocado, and Gnomoniopsis castaneae on chestnut. Despite differences in hostbiology and production systems, these diseases share common epidemiological features related to latent infection dynamics and the need for tools able topredict disease activation before visible tissue damage occurs. SPREAD will address this challenge through an integrated approach combiningepidemiological modelling, pathogen characterization, molecular and biological validation, optical sensing and sustainable disease management. Predictivemodels will describe infection dynamics and the transition from latent infection to active disease development under field and postharvest conditions.Representative fungal isolates will be characterized and used in controlled assays to investigate latent infection processes, host-pathogen interactions andthe biological mechanisms associated with symptom emergence. These experiments will also support the quantification of pathogen inoculum andcolonization dynamics, identifying molecular and biological markers associated with disease activation. Biologically validated samples will then be used todevelop non-destructive optical sensing approaches based on spectral imaging and chemometric modelling, aimed at detecting physiological andbiochemical changes associated with disease emergence. The integration of modelling, biological validation and optical sensing will support risk-baseddisease prediction and the identification of critical windows for timely intervention. Postharvest trials will evaluate sustainable management strategiesconsidering pathogen behavior and infection stage. The project will also assess the economic, environmental and social sustainability of the proposed toolsand strategies, with attention to their practical adoption by growers, storage facilities and supply-chain operators. SPREAD will generate new knowledge onlatent infection dynamics and disease emergence, while providing operational tools to support risk-based monitoring, more rational use of plant protectionproducts and reduced losses along the supply chain.

Stato INVIATA

Proponente CACCIOLA, Santa Olga

Struttura proponente DI3A

Ambito NAZIONALE

Ente finanziatore Ministero dell'Univeristà e della Ricerca (MUR)

Bando di riferimento Bando PRIN 2026 - Decreto Direttoriale n. 2298 del 10-04-2026

Capofila Università di Udine

Partner Università Cattolica del Sacro Cuore; Università di Foggia; Università della Tuscia; Università di Milano

Dati economici

Costo complessivo € 1.598.973

Finanziamento complessivo atteso	€ 1.182.973
Finanziamento previsto UNICT	€ 226.895
Cofinanziamento previsto UNICT	€ 60.750

Componenti (1)

#	Nominativo	Ruolo	Carriera**	Struttura	ERC	Ore*
1	CACCIOLA, Santa Olga	RESP_SCIENTIFICO	PO	DI3A	LS	730

* ore stimate
** PO - Professore Ordinario; PA - Professore Associato; RD o RM - Ricercatore TD; RU - Ricercatore

Distribuzione componenti per struttura