SCHEDA DELLE ATTIVITÀ SVOLTE NEL CORSO DI DOTTORATO DI RICERCA/
ACTIVITIES SHEET CARRIED OUT DURING THE PhD COURSE

(1) INFORMAZIONI GENERALI DEL DOTTORANDO/GENERAL INFORMATION OF THE PhD STUDENT	
Cognome e nome/Surname and name	Marwa Mourou
Corso di Dottorato/PhD course	Plant and Animal Science
Codice del Corso di Dottorato/PhD code	DOT1335834
Ciclo/Cycle	XXXIV
Posizione/Position	X con borsa di studio/with scholarship ☐ senza borsa di studio/without scholarship ☐ altro/other

(2) ATTIVITA' DI RICERCA/RESEARCH ACTIVITY	
Cognome e nome del tutor (o dei tutor)/ Supervisor(s) surname and name	Pr. Giorgio Mariano Balestra Dr. Franco Valentini
Università, Ente di Ricerca, Azienda/ University, Research institution, Company	Università Degli Studi della Tuscia CIHEAM Bari
Titolo dell'attività di ricerca/Research title	Eco-sustainable strategies to control *Xylella fastidiosa* subsp. *pauca* De Donno Strain by novel biological control agents: screening and mode of action in Apulian olive cultivars and Oleander plants

Breve descrizione dell'attività di ricerca/Short description of the research activity
(Max 2500 caratteri, esclusi gli spazi/Max 2500 characters, excluded spaces)

The research activity comprises a series of studies aimed at exploring the cultivable epiphytic communities inhabiting leaf surfaces of the main host species of *Xylella fastidiosa* ST53 present in the Apulia region, screening of potential antagonists, revealing their mechanism of action and identifying possible antimicrobial compounds secreted. Furthermore, evaluating their endophytic efficiency colonization in Apulian olive cultivars and *N. oleander* host. This work starts with the isolation of potential biological control agents (BCAs) from leaves of various hosts present in various *X. fastidiosa* outbreaks occurred in the demarcated area. Later, several isolates were subjected to *in vitro* screening for direct antagonistic activity against *X. fastidiosa* ST53 and were submitted to morphological, biochemical, and molecular characterization. In the present thesis also, several tests were carried out to elucidate and understand the mode of action of different antagonists such as (screening for production of siderophores, proteases, *etc*) and their ability to produce Cell-Free suspension with antimicrobial compounds. Moreover, five bacterial endophytic strains natively obtained from Apulian olive cultivars were also included in the experiment of antimicrobial activity against *Xf* ST53. Besides, the CFS of selected antagonistic bacteria were analyzed for the presence of secondary antimicrobial metabolites using high resolution mass spectrometry technologies coupled with liquid chromatography (HPLC-HRMS). Furthermore, validation of the endophytic colonization efficiency by Real-time PCR, conventional PCR and plat counting. was carried out to monitor the establishment of selected antagonistic bacteria that were chosen upon their strongest antagonistic and antimicrobial activity in Apulian olive cultivars and Oleander plants.

(3) PRINCIPALI ATTIVITÀ FORMATIVE SVOLTE/MAIN TRAINING ACTIVITIES

(Elencare tutte le principali attività svolte e, per ciascuna di esse, indicare i dati richiesti/List the main activities and for each specify of them the requested data)

Partecipazione a seminari, corsi, convegni, workshop, scuole/ Partecipation in seminars, courses, conferences, workshop, schools	Titolo/Title	Località/Location	Data, ore o giorni/ Date, hours or days
Course	Bioinformatic course	Aula Geomatica	48 hours/2019
Course	Statistic Course	Aula Geomatica	15 hours/2019
Course	Italian Course	Room D Santa Maria In Gradi	60 hours/2019
International Symposium (Member of local organizing committee)	4th International Symposium on Biological control of Plant Bacterial Diseases (BIOCONTROL2019)	DAFNE (Aula Magna)	9-11 July 2019
Participation in Monitoring activities of *Xylella fastidiosa* in Apulia	Monitoring activities	CIHEAM Bari	September 2019
Seminar	Genome Editing for Sustainable Agriculture	Magna Classroom Scarascia Mugnozza University of Tuscia	7 March 2019
Seminar	Biological alternatives for Crop Defense	Aula 12	8 May 2019

Seminar	National Day of the Bioeconomy: The Bioeconomy and the UniTus Research - University of Tuscia	Aula Magna	23 May 2019
Seminar	Molecular Interaction between 2 resistance inducers and the plant immune system	Campus Riello – Classroom 7 Carlo Caporale University of Tuscia	25 June 2019
Seminar	*Xylella fastidiosa* in Argentina: brief summary about the studies carried out on vectors and its natural enemies - University of Tuscia	Aula DBAC	20 May 2019
Course	Approccio metabolomico per la caratterizzazione e la valorizzazione dei prodotti agroalimentari	Google meet	8 hours 2020
Course	Caratterizzazione della sequenza amminoacidica con tecnica di spettrometria di massa	Google meet	8 hours 2020
Course	Meccanismi di difesa delle piante, UNITUS	Google meet	8 hours 2021
Webinar	*32° Forum di Medicina Vegetale*	Via Zoom Platform	10-11 Dec (2020) and 12 Jan (2021)
Webinar	Plant Health webinar	Via Zoom Platform	7 November 2020
Webinar	Sorveglianza fitosanitaria e ricerca: reti e azioni per la protezione delle piante	Via Zoom Platform	10 December 2020
Webinar	International workshop on Plant health research priorities for the Mediterranean Region 2021	Via Zoom Platform	12 May 2021

Workshop	Workshop on microbiomes in plant health and disease	Via Zoom Platform	22 September 2021

(4) ATTIVITÀ DI DIDATTICA E DI RICERCA/TEACHING AND RESEARCH ACTIVITIES (Elencare tutte le attività svolte e, per ognuna, indicare i dati richiesti/List all activities and specify for each of them the requested data)	
Attività di tutoraggio e didattico-integrative/Tutorship activities (Specificare/Specify)	Bacterial classical techniques and approaches course with researchers from Bosnia and Herzegovina (Univ. Banja Luka and Phytosanitary Authority from Sarajevo, Mostar and Banja Luka)
Pubblicazioni scientifiche/ Scientific publications (Indicare tutte le informazioni bibliografiche dei lavori pubblicati e sottomessi/Indicate all references of published and submitted papers)	- Marwa Mourou, Arafat Hanani, Anna M. D'onghia, Salvatore W. Davino, Giorgio Mariano Balestra and Franco Valentini. *In vitro* screening of antagonism and antimicrobial capacity of epiphytes and endophytes against the phytopathogen *Xylella fastidiosa*. *Phytopathologia mediterranea Journal* (submitted). - Hanani A., Valentini F., Sanzani S.M., Santoro F., Minutillo S.A., Gallo M., Cavallo, G., Mourou, M., El Moujabber M., D'Onghia A. M. and Salvatore W. Davino, (2022). Community Analysis of Culturable Sapwood Endophytes from Apulian Olive Varieties with Different Susceptibility to *Xylella fastidiosa*. Agronomy 2022, 12, 9. https://doi.org/10.3390/agronomy12010009 - Mourou M., Valentini F., Cavallo G., D'Onghia A. M. & Balestra G. M., (2021). Screening of a novel Biological Control Agent targeting the phytopathogen *Xylella fastidiosa*. 3rd European Conference on *Xylella fastidiosa* and XF-ACTORS Final Meeting (Xylella21), 26-30 April 2021, Doi: 10.5281/zenodo.4683142
Comunicazioni a congressi/ Conferences communications (Specificare se comunicazioni poster o comunicazioni orali/Specify if poster or oral communications)	3rd European conference on *Xylella fastidiosa* and *XF*-ACTORS final meeting (26-30 april 2021) with a presentation and a Poster titled: " Screening of a novel biological control agent targeting the phytopathogen *Xylella fastidiosa*".
Partecipazione a progetti di ricerca/ Partecipation in research project (Indicare il titolo e la tipologia/Indicate the title and type)	- Monitoring activities of *X. fastidiosa* in demarcated areas in Apulia. - Support to project activities: "Essay center" – NEMESI - Research activity (September), sampling, detection, molecular analysis and Isolation.

UNIVERSITÀ DEGLI STUDI DELLA Tuscia

	- Cure *XF* project: In the framework of training with other Master Students: Practical session about *X. fastidiosa* (Isolation, detection, and identification in host plants).
Stage in Italia e/o all'estero/ Internship in Itali and/or abroad (Indicare la località e descrivere brevemente il tipo di attività svolta/Indicate the location and describe briefly the activity carried ou)	Internship with CIHEAM-Bari (12 MONTHS) in the framework of Cure XF project: exploring the cultivable epiphytic and endophytic communities for the biocontrol of *X. fastidiosa* De Donno strain.
Altre attività formative/ Further educationa activities (Indicare la località e descrivere brevemente il tipo di attività svolta/Indicate the location and describe briefly the activity carried out)	

Data/Date
09 February 2022

Firma/Signature