Annex A

<table>
<tr><th colspan="4">PhD PROGRAMME IN "PLANT AND ANIMAL SCIENCES"</th></tr>
<tr><td>Coordinator</td><td colspan="3">Prof. Roberta Bernini</td></tr>
<tr><td>Department</td><td colspan="3">Department of Agriculture and Forest Sciences (DAFNE)</td></tr>
<tr><td>Program duration</td><td colspan="3">Three years: 1st November 2024 - 31st October 2027
Thesis defence: within July 2028</td></tr>
<tr><td>Program objectives</td><td colspan="3">The PhD program aims to train researchers of high scientific qualification able of addressing the various aspects of research in the agricultural sciences, from planning a research project to its implementation, from the interpretation of data to the presentation of results, the writing of articles in scientific journals and, where possible, patents. Over the course of the three years, the PhD students develop research topics and carry out training activities with an innovative and interdisciplinary approach thanks to the different scientific skills of the members of the Academic Board in the fields of agricultural, biological and chemical sciences and the possibility of carrying out internships and periods of research and study abroad at universities and research institutes of high scientific qualification. Research topics are agronomy, animal husbandry, biotechnologies, plant breeding, plant protection, soil science, applications of nanomaterials in agriculture, natural organic compounds, valorisation of agro-industrial wastes, project and development of methodologies for the synthesis of bioactive molecules, production of recombinant products of high added value from plant materials, biosensors for the environmental monitoring and the production chain, study of the role of the environmental factors on the agricultural productions, landscape planning, aspects of technological and nutritional quality of products, food and production safety, models for product, process and organizational innovation of the agrifood system.</td></tr>
<tr><td rowspan="4">Number of positions</td><td>Total positions</td><td>15</td><td>whose</td></tr>
<tr><td>(A) Positions with PNRR DM 630/2024 scholarship</td><td>3</td><td>M4C2 Inv. 3.3. Scholarships for innovative PhD programmes co-funded by companies</td></tr>
<tr><td>(B) Positions with scholarship funded by external stakeholders, Departments and University</td><td>10</td><td></td></tr>
<tr><td>(C) Position without scholarship</td><td>2</td><td></td></tr>
<tr><td>(A) Positions with PNRR DM 630/2024 scholarship
M4C2 Inv. 3.3 Scholarships for innovative PhD programmes co-funded by companies

Note. The acceptance of a PNRR scholarship implies additional</td><td colspan="3">N. 3 scholarships aimed at carrying out the following research:
(A1) "Sustainable control of bacterial diseases by using innovati formulations of low-impact substances on horticultural crops"
Co-funding company: Sofbey SA, Mendrisio (Svizzera)
Scientific responsible: Prof. Giorgio Mariano Balestra
Brief description. The project intends to develop strategies using natural active ingredients, able of reducing damage and losses to</td></tr>
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obligations to those of a regular scholarship; see art. 16 of the Call.	tomato cultivation in a protected environment and on the field, caused by phytopathogenic bacteria. **(A2) "Sustainable crop management through the use of sensors to monitor the physiological state of crops and fertilizers with high agronomic efficiency""** *Co-funding company:* Arcadia Spin Off, Rivoli Veronese (VR, Italy) *Scientific Responsible:* Prof. Mariateresa Cardarelli *Brief description.* The project is addressed to the topic of sustainable vegetable crop production through the identification of plant biostimulants and special fertilizers able to increase the nutrient use efficiency and crop tolerance to abiotic stress. It includes the use of advanced technologies such as digital phenotyping and metabolomics for understanding the biostimulant action from a morpho-physiological point of view and metabolic profile of plant tissue. **(A3) "Biotechnological and molecular approach for the study of traits of agronomic interest in wheat"** *Co-funding company:* Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria (CREA, Rome, Italy) *Scientific responsible:* Prof. Francesco Sestili *Brief description.* Wheat is one of the most widely grown cereals in the world, providing a staple food source for billions of people. Leveraging "omics" and bioinformatics approaches, the PhD student will be able to dissect and manipulate the genetic basis of key agronomic traits, such as yield, disease resistance, stress tolerance and nitrogen use efficiency. Genetically, three gene complexes, which regulate vernalization (Vrn genes), photoperiod (Ppd genes) and plant height (Rht genes), have been identified as key players in the control and determination of wheat agronomic traits. In addition, genes involved in nitrogen metabolism will be investigated for their key role in influencing wheat yield and quality. To this end, TILLING and CRISPR/Cas9 technologies will be used to identify new mutants in the genes of interest. Therefore, activities will focus on assessing the impact of adaptive genes by analyzing wheat varieties of different origins and/or derived genetic populations, and exploring possible functional links with key adaptive genes (Vrn, Ppd, and Rht), which will be crucial for the development of cultivars resilient to climate change.
(B) Positions with fellowship funded by external stakeholders, Departments and University of Tuscia	No.10 scholarships aimed at carrying out the following research topics: **(B1) "Evaluation of the benefits of regenerative agriculture practices applied to durum wheat cultivation to promote sustainability based on climate emergency and food security in the Mediterranean area".** *Scientific responsible:* Prof. Stefania Astolfi. *Funding:* 50% D.I.Ver.S.O Departments of Excellence Project (DAFNE); 50% EU BIOACT Project (PRIMA 2023). **(B2) "Characterization of fungi from extreme environments and their virome and evaluation of their possible use for sustainable agriculture".** *Scientific responsible:* Dr. Laura Bertini. *Funding:* 50% University of Tuscia (FFO); 50% PNRA Project 2022 (code PNRA0000054) and PRIN 2022 (code 20222L5ECJ).

	(B3) "Innovative and low-impact strategies for the management of mites, agents of damage to hazelnut production". Scientific responsible: Prof. Mario Contarini. *Funding:* 50% University of Tuscia (FFO); 50% Research contract DAFNE/FERRERO HCO. **(B4) "Biotechnology for genetic improvement of yield and tolerance to abiotic and biotic stresses".** *Scientific responsible:* Dr. Ljiljana Kuzmanovic *Funding:* 50% D.I.Ver.S.O Departments of Excellence Project (DAFNE); 50% Research Contract DAFNE/ISEA; Prof. Carla Ceoloni. **(B5) "*Erysiphe corylacearum*, an invasive alien species causing the new hazel powdery mildew".** *Scientific responsible:* Prof. Angelo Mazzaglia. *Funding:* 50% D.I.Ver.S.O Departments of Excellence Project (DAFNE); 50% Research contract TerrEmerse (DAFNE). **(B6) "Identification of environmentally friendly solutions for peach tree pest management".** *Scientific responsible:* Prof. Angelo Mazzaglia. *Funding:* 50% University of Tuscia (FFO); 50% PRIN 2022 project (code 2022ZHTRBE), Dr. Silvia Turco. **(B7) "Nature Based Solution (NBS) for the protection of lake systems".** *Scientific responsible:* Prof. Nicoletta Ripa. *Funding:* 50% CaRiViT Foundation; 50% EUROLakes EU project (code 101157482). **(B8) "Traceability of tomato supply chains and study of molecular mechanisms involved in water stress in tomato".** *Scientific responsible:* Prof. Francesco Sestili. *Funding:* 50% University of Tuscia (FFO); 50% Research contract DAFNE/CREA. **(B9) "Biotechnology and *in vitro* culture in olive tree".** *Scientific responsible:* Prof. Cristian Silvestri. *Funding:* 50% University of Tuscia (FFO); 50% PRIN2022 (SO-LIVE) and PRIN2022PNRR (ROOTOLEA) Project. **(B10) "Innovative breeding and release strategies of useful organisms for biological control of *Halyomorpha halys*".** *Scientific responsible:* Prof. Stefano Speranza. *Funding:* 50% University of Tuscia (FFO); 50% Research contract DAFNE/ARSIAL.
(C) Position without scholarship	No. 2 positions without fellowship aimed at carrying out the following research topics: **(C1) "New hop cultivation techniques in the Mediterranean environment".** Scientific responsible: Prof. Francesco Rossini. **(C2) "Determination of emission factors, analysis of life cycle environmental impacts and LCC economic analysis for new circular supply chains and biorefinery technologies in the agri-food sector."** Scientific responsible: Prof. Andrea Vitali.
Admission requirements	Admission is open to candidates of any nationality and age who have one of the following requirements by the deadline of the call for application: ▪ Italian degree "Laurea Vecchio Ordinamento"

	▪ Italian degree "Laurea Specialistica" or "Magistrale" ▪ International academic qualification (degree) awarded in a foreign University or in the context of inter-university cooperation and mobility agreements. Admission is also open to students will obtain their degree within 31 October 2024.
Evaluation of candidates (Max score: 80/80)	The candidates are evaluated by qualifications and exam (interview). **The maximum score given to the overall evaluation of the candidates is 80/80.**
Evaluation of the qualifications (Maximum score: 15/80)	According to the University Regulations on Doctoral Research (Art. 13), the evaluable qualifications are as follows: ▪ Research project attached to the application for admission to the competition ▪ Dissertation accompanied by an abstract in English language ▪ Undergraduate career (profit examinations taken and graduation grade) ▪ Scientific publications ▪ Participation in research projects ▪ Professional experience and other qualifications held by the candidate present in the *curriculum vitae et* studiorum, including any letters of recommendation from university professors **The maximum score given to the evaluation of qualifications is 15/80.** Before the interview, the scores awarded to the candidates will be posted on the Ph.D web page.
Evaluation of the interview (Minimum score: 40/80; maximum score: 65/80)	The interview is designed to ascertain the candidates' preparation and aptitude for scientific research and includes an assessment of English language proficiency. **The minimum score given to the evaluation of the interview is 40/80; the maximum is 65/80.**
Topics of the interview	The interview is mainly concerned with the discussion of the research project submitted by each candidate, attached to the application for admission to the competition. The project, described in a maximum of N.5 pages, can be written in Italian or English; it must be inherent to the educational objectives of the PhD Program. English proficiency will be ascertained by reading and translating a few paragraphs of a scientific text. After the interview, the scores will be posted on the Ph.D web page.
Location and dates of the interview	The examination tests will be held by September 12, 2024. The location and schedule of the interview will be published on the Ph.D web page by the deadline of the application call.
Contacts for information	Prof. Roberta BERNINI E-mail: dottorato.spva@unitus.it