



VERBALE N.22
RIUNIONE DEL COLLEGIO DEI DOCENTI DEL DOTTORATO DI RICERCA
IN “SCIENZE DELLE PRODUZIONI VEGETALI E ANIMALI”
20.06.2024

Il giorno **20.06.2024**, alle ore **9.00**, viene aperta, in modalità telematica tramite posta elettronica, la riunione del Collegio dei Docenti del Corso di Dottorato di Ricerca in “Scienze delle Produzioni Vegetali e Animali”, come da convocazione inviata via mail il 14.06.2024 con i seguenti punti all’OdG:

1. Comunicazioni

2. Proposta di composizione della commissione e della data per lo svolgimento dell’esame finale di Dottorato di Ricerca in Scienze delle Produzioni Vegetali e Animali della Dottoranda Linda FELICI (36° ciclo, con richiesta di acquisizione del titolo di *Doctor Europaeus*)

3. Proposta di composizione della commissione e della data per lo svolgimento dell’esame finale di Dottorato di Ricerca in Scienze delle Produzioni Vegetali e Animali dei Dottorandi Sarah GIULIETTI, Fakir MATHLOUTHI, Verdiana PETROSELLI (36° ciclo)

4. Varie ed eventuali

Sono presenti: Prof.ssa Stefania ASTOLFI, Prof. Giorgio Mariano BALESTRA, Prof.ssa Loredana BASIRICO, Prof. Umberto BERNABUCCI, Prof.ssa Roberta BERNINI, Prof.ssa Laura BERTINI, Prof.ssa Mariateresa CARDARELLI, Prof. Raffaele CASA, Prof. Mario CONTARINI, Prof. Valerio CRISTOFORI, Prof. Marco ESTI, Prof.ssa Ljiljana KUZMANOVIC, Prof.ssa Katia LIBURDI, Prof. Roberto MANCINELLI, Prof.ssa Stefania MASCI, Prof. Angelo MAZZAGLIA, Prof. Maurizio MICHELI, Prof. Simone PRIORI, Prof. Francesco ROSSINI, Prof. Roberto RUGGERI, Prof. Luca SANTI, Prof. Daniel Valentin SAVATIN, Prof. Francesco SESTILI, Prof. Cristian SILVESTRI, Prof. Stefano SPERANZA, Prof.ssa Anna Maria TIMPERIO, Prof. Andrea VITALI, Prof. Eduardo Gabriel VIRLA, Dott. Alberto BATTISTELLI, Dott. Aldo CERIOTTI, Dott. Gianfranco DIRETTO, Dott.ssa Anna Maria D’ONGHIA, Dott.ssa Chiara FRAZZOLI, Dott.ssa Chiara VOLPI.

Sono assenti: Prof. Giuseppe COLLA, Prof. Nicola LACETERA, Prof. Andrea MAZZUCATO, Prof. Prof. Rosario MULEO, Prof.ssa Maria Nicolina RIPA, Prof. Thierry GIARDINA, Dott. Eugenio BENVENUTO, Dott. Gianluca BURCHI, Dott. Angelo SANTINO.

Svolge la funzione di Presidente la Prof.ssa Roberta BERNINI, Coordinatrice del Corso di Dottorato di Ricerca, e di Segretario la Prof.ssa Katia LIBURDI.

La Coordinatrice apre la discussione.

1. Comunicazioni

1a. La Coordinatrice comunica di aver inviato al Presidio di Qualità di Ateneo in data 29.05.2024 il *Documento di analisi dei risultati della compilazione dei questionari sulle opinioni dei Dottorandi e Dottori di Ricerca*, redatto dalla Struttura AQ del Corso di Dottorato, per gli adempimenti di competenza inerente all’Assicurazione di Qualità AVA3.

1b. La Coordinatrice comunica che la scheda di attivazione del 40° ciclo di corso di Dottorato di Ricerca in Scienze delle Produzioni Vegetali e Animali è stata completata e chiusa il 07.06.2024 per essere valutata dall’ANVUR ai fini dell’accreditamento quinquennale.

1c. La Coordinatrice comunica che è stato aggiornato il sito web del Corso di Dottorato di Ricerca (<https://www.unitus.it/post-laurea/dottorati-di-ricerca/corsi-di-dottorato-attivi/scienze-delle-produzioni-vegetali-e-animali/>). Inoltre, per i requisiti di Assicurazione di Qualità, sono stati caricati i verbali approvati dal Collegio dei Docenti negli ultimi 5 anni e i nominativi dei componenti del Collegio sono stati linkati ai rispettivi *curriculum vitae* (<https://www.unitus.it/post-laurea/dottorati-di-ricerca/corsi-di-dottorato-attivi/scienze-delle-produzioni-vegetali-e-animali/>).

1d. La Coordinatrice comunica che, con Nota Rettorale N.11146 del 07.06.2024, il Senato Accademico, nella seduta del 04.06.2024, e il Consiglio di Amministrazione, nella seduta del 06.06.2024, hanno deliberato di esprimere parere favorevole alle proposte di rinnovo per il 40° ciclo degli 8 corsi di Dottorato di Ricerca di Ateneo, triennio accademico 2024/2025 - 2026/2027, ai sensi dell’art. 4, c. 2 del Regolamento di Ateneo in materia di Dottorato di Ricerca per un totale di 93 posizioni, di cui 75 con borsa (13 riferite al Corso di



Dottorato di Ricerca in “Scienze delle Produzioni Vegetali e Animali”). Inoltre, comunica che il Consiglio di Amministrazione ha approvato la ripartizione della dotazione delle borse di dottorato di cui ai DD.MM. 24.04.2024, 629 e 630, assegnate all’Ateneo nell’ambito del Piano Nazionale di Ripresa e Resilienza (PNRR). Delle borse di cui al DM 630, al Corso di Dottorato di Ricerca in “Scienze delle Produzioni Vegetali e Animali” sono state assegnate 3 posizioni che saranno messe a bando e che potranno essere attivate e avviate solo in seguito all’esito positivo della verifica di ammissibilità e di coerenza dei progetti di ricerca eseguita dal MUR e dall’ANVUR sulla base dei requisiti di ammissibilità individuati dal DM 630/2024.

1e. La Coordinatrice comunica che, in data 18.06.2024, si è svolta la Conferenza di Ateneo dedicata al tema “Sistema Assicurazione Qualità” con finalità formative ed informative.

1f. La Coordinatrice comunica che, con Nota Prot.11669 del 17.06.2024 del Coordinatore del Nucleo di Valutazione Prof. Vincenzo PISCOPO, si svolgerà un *audit* per monitorare il processo di Assicurazione di Qualità del Corso di Dottorato in vista della prossima visita dell’ANVUR. A tale scopo, la Coordinatrice deve redigere un documento da inviare al Nucleo di Valutazione entro il 28.06.2024.

2. Proposta di composizione della commissione e della data per lo svolgimento dell’esame finale di Dottorato di Ricerca in Scienze delle Produzioni Vegetali e Animali della Dottoranda Linda FELICI (36° ciclo, con richiesta di acquisizione del titolo di *Doctor Europaeus*)

La Coordinatrice comunica di aver ricevuto gli esiti dei valutatori esterni della tesi della Dottoranda Linda FELICI (in allegato al presente verbale) che le consentono di accedere all’esame finale. La Coordinatrice ha espresso alla Dottoranda le congratulazioni.

In accordo al Regolamento di Ateneo in materia di Dottorato di Ricerca, e della volontà della Dottoranda di richiedere il titolo di *Doctor Europaeus*, vengono proposti Commissione, luogo, data e ora e di esame.

Commissione

Componenti effettivi

- Prof. Hermann BURSTMAYR, University of Natural Resources and Life Sciences, Vienna (BOKU), Tulln, Austria; E-mail: hermann.buerstmayr@boku.ac.at
- Dr. Hanna FRIBERG, Swedish University of Agricultural Sciences; E-mail: Hanna.Friberg@slu.se
- Prof. Mario PAGNOTTA, Università degli Studi della Tuscia; E-mail: pagnotta@unitus.it

Componenti supplenti

- Prof. Pier Paolo DANIELI, Università degli Studi della Tuscia; E-mail: danieli@unitus.it
- Prof. T. MIEDANER, Universitaet Hohenheim, Germany; E-mail: miedaner@uni-hohenheim.de

Data e ora: 18.07.2024, ore 10.00.

Luogo: Aula 12, Dipartimento di Scienze Agrarie e Forestali (DAFNE).

Modalità di svolgimento: in presenza (candidata e componente Unitus); on line, Zoom (componenti stranieri). Il Collegio dei Docenti del Dottorato approva la proposta.

3. Proposta di composizione della commissione e della data per lo svolgimento dell’esame finale di Dottorato di Ricerca in Scienze delle Produzioni Vegetali e Animali dei Dottorandi Sarah GIULIETTI, Fakir MATHLOUTHI, Verdiana PETROSELLI (36° ciclo)

La Coordinatrice comunica di aver ricevuto gli esiti dei valutatori esterni della tesi dei Dottorandi Sarah GIULIETTI, Fakir MATHLOUTHI, Verdiana PETROSELLI (in allegato al presente verbale) che consentono loro di accedere all’esame finale. La Coordinatrice ha espresso ai Dottorandi le congratulazioni.

In accordo al Regolamento di Ateneo in materia di Dottorato di Ricerca, vengono proposti Commissione, luogo, data e ora e di esame.

Commissione

Componenti effettivi

- Prof. Vincenzo LIONETTI, Università La Sapienza di Roma; E-mail: vincenzo.lionetti@uniroma1.it
- Dott.ssa Silvia PROIETTI, Università degli Studi della Tuscia; E-mail: s.proietti@unitus.it
- Dr. Fabio STAGNARI, Università di Teramo; E-mail: fstagnari@unite.it

Componenti supplenti

- Dott.ssa Elena DI MATTIA, Università degli Studi della Tuscia; E-mail: dimattia@unitus.it
- Prof. Sergio SAIA, Università di Pisa; E-mail: sergio.saia@unipi.it

Data e ora: 25.07.2024, ore 10.00.

Luogo: Aula Blu, Dipartimento di Scienze Agrarie e Forestali (DAFNE).



Modalità di svolgimento: in presenza.

Il Collegio dei Docenti del Dottorato approva la proposta.

4. Varie ed eventuali

Nulla da discutere.

Il Collegio dei Docenti del Dottorato approva tutti i punti all'OdG e il verbale.

La riunione si conclude **alle ore 16.00**.

Il Segretario
Prof.ssa Katia LIBURDI

Il Presidente
Prof.ssa Roberta BERNINI

PhD Program in Plant and Animal Science, University of Tuscia, Viterbo (Italy)

Coordinator: Prof. Roberta BERNINI

Reviewer report

PhD student: Linda Felici

Title of the thesis: High polyphenolic wheat genotypes: a study on the role of anthocyanin and flavonoid biosynthetic pathways in Fusarium Head Blight (FHB) resistance

Reviewer (surname, name and affiliation): Dr. Steiner, Barbara, Institute of Biotechnology in Plant Production, University of Natural Resources and Life Sciences, Vienna

| Scientific quality | Excellent | Good | Fair | Poor |
|--|-----------|------|------|------|
| Originality of the research | x | | | |
| Suitability of the title with respect to the content | x | | | |
| Efficacy of the abstract | x | | | |
| Clarity of the aims | x | | | |
| Exhaustiveness of the introduction/state of art | x | | | |
| Suitability of the methodology | x | | | |
| Description of the experimental procedure | x | | | |
| Interpretation of the results | x | | | |
| Appropriateness of the discussion | x | | | |
| Completeness of references | x | | | |
| Overall evaluation | x | | | |

General comments and remarks:

This research work investigates the role of phenolic compounds in the wheat-Fusarium-interaction using a multidisciplinary approach, comprising microbiology, biochemistry, plant pathology and plant genomics. The first part of the thesis is an introduction concerning wheat, purple and blue pigmented genotypes and Fusarium head blight of wheat. The introduction gives a very nice overview of the state-of-the-art in the topic leading over to the main section of the thesis presenting specific research experiments: *in vitro* experiments testing the antimicrobial and anti-mycotoxigenic activity of four anthocyanin compounds using *F. avenaceum* as a model and extensive characterization of durum wheat and bread wheat genotypes contrasting in Fusarium head blight resistance and pigmentation after artificial inoculation with *F. graminearum*.

In general, the work was carried out thoroughly and the materials and methods were appropriate, although a larger number of genotypes or segregating populations would make the results more meaningful, especially in the fourth research task.

The analyses were proper and well executed, and the tables and figures are informative and clear. The results and discussion sections are well written, if sometimes somewhat speculative. The conclusions were supported by the results and finally discussed in a broader framework in the last part of the paper. So far, this research has not been published in peer reviewed journals, but I am confident that this shortcoming will soon be rectified.

To summarize, this is a convincing dissertation that presents scientific results that have a significant impact on the Fusarium head blight/wheat research. I therefore propose that the thesis be accepted in its present form and wish the candidate all the best for her scientific future.

30. May 2024

Date



Signature

PhD Program in Plant and Animal Science, University of Tuscia, Viterbo (Italy)

Coordinator: Prof. Roberta BERNINI

Reviewer report

PhD student: Linda Felici

Title of the thesis: High polyphenolic wheat genotypes: a study on the role of anthocyanin and flavonoid biosynthetic pathways in Fusarium Head Blight (FHB) resistance

Reviewer (surname, name and affiliation): Picot, Adeline, Université de Bretagne Occidentale

| Scientific quality | Excellent | Good | Fair | Poor |
|--|-----------|------|------|------|
| Originality of the research | × | | | |
| Suitability of the title with respect to the content | × | | | |
| Efficacy of the abstract | | | × | |
| Clarity of the aims | | × | | |
| Exhaustiveness of the introduction/state of art | | × | | |
| Suitability of the methodology | | × | | |
| Description of the experimental procedure | | × | | |
| Interpretation of the results | × | | | |
| Appropriateness of the discussion | | × | | |
| Completeness of references | | × | | |
| Overall evaluation | | × | | |

General comments and remarks:

- Structure of the manuscript

The 176p-manuscript, written in English, consists of an introductory chapter followed by 4 chapters written in the forms of articles and a general conclusion of one page. The introductory chapter is very clear and well written. It sets the context of this thesis and justifies the relevance and importance of the research questions and study model. This introduction ends with a brief explanation of the aim of the thesis and the experimental strategy used to address the research objectives.

Chapter 2 investigates the impact of anthocyanins on *Fusarium avenaceum* growth, enniatin production as well as expression of enniatin and oxidative stress-related genes, under *in vitro* conditions.

Chapter 3 and 4 compares the responses of three wheat varieties, including a resistant, susceptible and purple pericarp genotypes, after inoculation with *F. graminearum* in terms of physiological and morphological traits (chapter 3) and expression of genes involved in the flavonoid and phenylpropanoid pathways (chapter 4).

Chapter 5 provides a comparative transcriptomic analysis of various pigmented genotypes characterized by different susceptibilities to Fusarium Head Blight after inoculation with *F. graminearum*.

Overall, the thesis is well-structured and relatively well-written. Also, the candidate should be congratulated for including very comprehensive figures related to metabolic pathways (e.g. Figure 4.5 P 105, Figure 5.11 to 14 P. 145-148), thereby demonstrating her ability to overview and interpret the impressive amount of data that has been generated. The overall general conclusion section (1 page), however, is very short to me and more a summary of the main findings of the scientific papers of the project. A more in-depth discussion of how the different findings of the project relate to one another and to those of the literature as well as how they open new avenues of research would have been nice.

- Methodological choices and quality of the main findings

This work thesis focuses on wheat resistance mechanisms against Fusarium Head Blight and mycotoxin contamination. Among wheat resistance mechanisms, the biochemical component, particularly flavonoids and their role in the plant's defense mechanisms against causal agents of FHB and toxin production, is at the core of this thesis topic. While the literature reviews (chapter 1) and experimental works described in chapters 2 to 5 nicely address the research objectives, there are a few methodological choices that would have needed to be more clearly justified to me.

First, in chapter 2, *F. avenaceum* was used to study the effect of anthocyanins on fungal growth and mycotoxin production under *in vitro* conditions whereas *F. graminearum* was chosen for *in planta* assays. The justification provided P.46 (because of its ability to produce mycotoxins at lower starting pH important to maintain anthocyanin activity and stability) is not very convincing to me. I believe it would have been relevant to determine the impact of anthocyanins on *F. graminearum* to help interpret the results obtained in chapters 3 to 5. Also, the concentrations of anthocyanins tested against *F. avenaceum* were chosen according to their optimal concentration for solubility. Are these concentrations consistent with the amount of anthocyanins expected to be encountered by the fungus during grain colonization?

In addition, I wonder why tip inoculation (therefore addressing type II resistance) was chosen over spray inoculation. May type I resistance also be at stake? In other words, could initial penetration be reduced by flavonoids found in external layers of the grain?

Last, why not measure the amounts of mycotoxins in the grains of the three varieties tested in chapter 3/4? Would it have been interesting to determine the levels of resistance to mycotoxin production since some anthocyanins were shown to interfere with toxinogenesis in chapter 2?

- Publications

Two oral presentations concerning the results of chapter 2 and 5 were presented at the European Fusarium Seminar held in Rome in June 2023 and at the congress of the Italian Phytopathological Society held in Napoli in September 2023. Two articles on the results presented in chapters 3 and 4 of the thesis have been submitted for publication and are currently under review. One article related to the results in chapter 5 is in preparation.

I would recommend to also publish the results of chapter 2 in a peer-reviewed journal.

Overall, the experimental work is sound and clearly reported, and the candidate has clearly demonstrated the ability to do research.

The thesis is accepted:

- ***In the present form:***
- ***After minor revisions* : ×**

I suggest to review the whole document as a few typos and grammatical errors were found throughout the manuscript.

- ***After major revisions***

With major revisions, is it requested a revised version after 6 months?

- ***YES***
- ***NO***

Date 31/05/2024

Signature



A. PICOT

PhD Program in Plant and Animal Science, University of Tuscia, Viterbo (Italy)

Coordinator: Prof. Roberta BERNINI

Reviewer report (template)

N.B. The following template should be intended as a flexible model. The actual report may be adapted by the reviewer according to his/her needs.

PhD student: Sarah Giulietti

Title of the thesis: Elucidation of role of the Arabidopsis NPK1-related Protein kinases (ANPs) in immunity and development

Reviewer (surname, name and affiliation): Ferrari Simone Sapienza Università di Roma, Dip. Biologia e biotecnologie “Charles Darwin”

| Scientific quality | Excellent | Good | Fair | Poor |
|--|-----------|------|------|------|
| Originality of the research | X | | | |
| Suitability of the title with respect to the content | | | X | |
| Efficacy of the abstract | X | X | | |
| Clarity of the aims | X | | | |
| Exhaustiveness of the introduction/state of art | X | | | |
| Suitability of the methodology | X | | | |
| Description of the experimental procedure | X | | | |
| Interpretation of the results | X | | | |
| Appropriateness of the discussion | | X | | |
| Completeness of references | X | | | |
| Overall evaluation | X | | | |

General comments and remarks:

The thesis describes an excellent research aimed at elucidating the role of ANPs in mediating plant responses to ER stress and cell wall damage. The candidate showed a striking similarity between the root phenotypes of plants lacking ANPs or treated with tunicamycin (an inducer of ER stress) or isoxaben, a cellulose inhibitor. Interestingly, her results indicate that JA signalling is involved in these phenotypes in a multifaceted way, with low doses of the hormone exacerbating the defects and high doses suppressing them. Moreover, loss of ANPs or treatment with elicitors appear to trigger expression of ER stress marker genes, and altered levels of ANPs affect sensitivity to tunicamycin, suggesting a complex regulatory role of these proteins in regulating ER stress in plants. Notably, tunicamycin also induces the subcellular relocalization of ANPs, like previously shown for OGs. The candidate also described the results of a proteomic analysis of proteins co-immunoprecipitated with ANP1-GFP or ANP3-GFP, identifying some ER-resident proteins, which is quite intriguing considering that ANP1 and ANP3 were not found in the ER by confocal microscopy. The thesis is well organized; the introduction is very exhaustive, and figures and results description are, for most parts, complete and well interpreted. The overall style and English use should be revised, as there were several mistakes, the use of acronyms is not consistent across the text, and some sentences were not very clear. Some points should be addressed more in details in the thesis; in particular:

- 1) The title does not really reflect the exact content of the thesis, since it is very general. A more specific title should highlight that the interaction between ANPs, ER stress and cell wall damage was investigated.
- 2) In the introduction, a paragraph on the general organization and structure of plant cell walls should precede the extensive description of the biosynthetic pathways for the different cell wall structural components.
- 3) It is shown that MeJA at low doses enhances root swelling in amiR3 or isx-treated seedlings but suppresses this phenotype at mM concentrations. Indeed, JAs inhibit primary root growth already at micromolar concentrations (likely without affecting meristem size - see Noir et al 2013 - but likely reducing cell expansion). I assume that, at 1 mM MeJA doses, root cell expansion completely stops. This could prevent root swelling while ISX or Tm is present in the medium, because cell expansion does not occur, and therefore cell walls are not under mechanical stress, without necessarily causing irreversible damage to the cells. This possibility should be addressed. An alternative way to reduce cell wall damage in the presence of isx or Tm (or in amiR3 seedlings) could be to provide osmotic support (e.g. sorbitol or high agar); it would be interesting to verify if these conditions (like MeJA) also prevent root swelling.
- 4) Induction of ER stress marker genes upon induction of amiR3 with estradiol is transient (Fig. 12). Is this also observed with tunicamycin or isx? Also, is this response specific to OG or can be triggered by PTI in general? Moreover, besides showing induction of UPR marker genes, is there an independent way to support the conclusion that lack of ANPs triggers a bona fide UPR? One way could be to evaluate accumulation of aggregated/misfolded proteins in amiR3 roots (see Cho and Kanehara 2017).
- 5) In Fig. 13, Evans blue staining was performed in cotyledons. Does cell death also occur in roots in response to Tm and/or in plants lacking ANPs?
- 6) The Co-IP results showing that ANP1 and ANP3 physically interact with ER resident proteins are indeed quite interesting, though quite unexpected, as confocal microscopy experiments do not show localization of these proteins in the ER. In the absence of an independent verification (e.g. BiFC or FRET analysis), these results should be not overinterpreted. Also, Fig. 20 only show the set of proteins identified that are annotated as ER or ER bodies resident. How many other proteins were identified in the analysis and what predicted subcellular localization do they have? It would help to have a graph representing the number of proteins and their putative localization in control- and OG-treated amiR1 and amiR3 plants.
- 7) In the discussion section, it would be helpful to have a figure summarizing the obtained results in a (even speculative) model representing the possible links between CW damage, CW-DAMPs, regulation of ER stress and the role of JA signalling in this model.

The thesis is accepted:

- In the present form***
- After minor revisions***
- After major revisions***

With major revisions, is it requested a revised version after 6 months?

- YES***
- NO***

Date 21-5-2024

Signature


PhD Program in Plant and Animal Science, University of Tuscia, Viterbo (Italy)

Coordinator: Prof. Roberta BERNINI

Reviewer report

PhD student: Sarah Giulietti

Title of the thesis: Elucidation of role of the Arabidopsis NPK1-related Protein kinases (ANPs) in immunity and development

Reviewer (surname, name and affiliation): MATTEI Maria Benedetta, University of L'Aquila

| Scientific quality | Excellent | Good | Fair | Poor |
|--|------------------|-------------|-------------|-------------|
| Originality of the research | X | | | |
| Suitability of the title with respect to the content | | X | | |
| Efficacy of the abstract | | X | | |
| Clarity of the aims | X | | | |
| Exhaustiveness of the introduction/state of art | X | | | |
| Suitability of the methodology | | X | | |
| Description of the experimental procedure | | X | | |
| Interpretation of the results | X | | | |
| Appropriateness of the discussion | X | | | |
| Completeness of references | X | | | |
| Overall evaluation | X | | | |

General comments and remarks:

The thesis work is focused on the role of ARABIDOPSIS NPK1-RELATED PROTEIN KINASES (ANPs) in plant defense mechanisms triggered by cell wall damage. The results address a gap in knowledge regarding the connection between ANPs, endoplasmic reticulum (ER) stress, and cellulose biosynthesis.

The study reveals a previously unknown function of ANPs in regulating ER function and signaling in response to cell wall damage-associated molecular patterns (DAMPs).

Clear research questions are addressed about the molecular mechanisms underlying cell wall perturbations, and novel findings on a convergence of OG treatment, ER stress response, and ANP activity on JA-regulated pathways are provided. This suggests a role for MAP3Ks in plant ER function. Moreover, the identification of novel ANP interactors by co-immunoprecipitation analysis reveals potential ER-resident proteins interacting with ANPs, suggesting at a deeper connection.

However, no association with the endoplasmic reticulum was observed by LSCM: could you comment on how the connection could be further explored, and what further investigation could be useful to this purpose?

Overall, this work offers a significant contribution to our understanding of plant defense mechanisms and the involvement of ANPs in ER stress response. The identification of a novel role for ANPs and the potential link between cell wall DAMPs and ER stress pave the way for future research in this area.

Minor revisions:

Page 57: “A 3D structural model of ANP1 was obtained by homology-based molecular modelling, using as template the known structure of *Homo sapiens* ASK1 (UniprotKB-Q99683)”.

If a known 3D structure of ASK1 was used as template, the pdb code (and not Uniprot code) should be cited.

As far as I understood, there are only 3D structures of the kinase domain, while the homology modelling for ANP1 was performed on the Alpha-fold model of ASK1. It should be clarified what was the template for the modelling.

I have highlighted in the attached pdf some words or sentences that need text revision. I suggest a final proofreading step, to submit a thesis free of minor typos and grammatical errors.

The thesis is accepted:

- In the present form***
- After minor revisions***
- After major revisions***

With major revisions, is it requested a revised version after 6 months?

- YES***
- NO***

Date 04/06/2024

Signature



PhD Program in Plant and Animal Science, University of Tuscia, Viterbo (Italy)

Coordinator: Prof. Roberta BERNINI

Reviewer report (template)

N.B. The following template should be intended as a flexible model. The actual report may be adapted by the reviewer according to his/her needs.

PhD student: FAKIR MATHLOUTHI

Title of the thesis: Development of fertilizers with high environmental sustainability

Reviewer (surname, name and affiliation):

Pr. BESMA KHIARI

Université de Carthage. Ecole Nationale d'Ingénieurs de Carthage

basma.khiari@enicar.ucar.tn

| Scientific quality | Excellent | Good | Fair | Poor |
|--|-----------|------|------|------|
| Originality of the research | x | | | |
| Suitability of the title with respect to the content | x | | | |
| Efficacy of the abstract | | | x | |
| Clarity of the aims | | x | | |
| Exhaustiveness of the introduction/state of art | | | x | |
| Suitability of the methodology | | | x | |
| Description of the experimental procedure | | | x | |
| Interpretation of the results | | | x | |
| Appropriateness of the discussion | | | x | |
| Completeness of references | | x | | |
| Overall evaluation | | | x | |

General comments and remarks:

The thesis is accepted:

In the present form

After minor revisions

After major revisions

With major revisions, is it requested a revised version after 6 months?

YES

NO

Date : 05/14/2024

Signature

DocuSigned by:

Besma Khiari

19FABD65070C436...

PhD Program in Plant and Animal Science, University of Tuscia, Viterbo (Italy)

Coordinator: Prof. Roberta BERNINI

Reviewer report

N.B. The following template should be intended as a flexible model. The actual report may be adapted by the reviewer according to his/her needs.

PhD student: Fakir Mathlouthi

Title of the thesis: Development of fertilizers with high environmental sustainability

Reviewer (surname, name and affiliation): Dr. Njiekak, Gautier. Affiliation: Bayside Geoscience Inc.,
Thunder Bay, Ontario, Canada.

| Scientific quality | Excellent | Good | Fair | Poor |
|--|-----------|------|------|------|
| Originality of the research | | x | | |
| Suitability of the title with respect to the content | | x | | |
| Efficacy of the abstract | | x | | |
| Clarity of the aims | | x | | |
| Exhaustiveness of the introduction/state of art | | | x | |
| Suitability of the methodology | | | x | |
| Description of the experimental procedure | | | x | |
| Interpretation of the results | | | x | |
| Appropriateness of the discussion | | | x | |
| Completeness of references | | x | | |
| Overall evaluation | | x | | |

General comments and remarks:

The thesis is accepted:

- In the present form*
- After minor revisions (Thesis Abstract: minor changes have been suggested to improve text clarity)*
- After major revisions*

With major revisions, is it requested a revised version after 6 months?

- YES*
- NO*

Date: May 20, 2024

Signature



PhD Program in Plant and Animal Science, University of Tuscia, Viterbo (Italy)

Coordinator: Prof. Roberta BERNINI

Reviewer report (template)

N.B. The following template should be intended as a flexible model. The actual report may be adapted by the reviewer according to his/her needs.

PhD student: Verdiana Petroselli

Title of the thesis: “Evaluation of sustainable and diverse cropping systems: crop rotation (wheat-potato) and next generation varietal selection of wheat”

Reviewer (surname, name and affiliation): Gazza, Laura CREA-Research Centre for Engineering and Agro-Food Processing

| Scientific quality | Excellent | Good | Fair | Poor |
|--|-----------|------|------|------|
| Originality of the research | | X | | |
| Suitability of the title with respect to the content | X | | | |
| Efficacy of the abstract | | | X | |
| Clarity of the aims | X | | | |
| Exhaustiveness of the introduction/state of art | | X | | |
| Suitability of the methodology | X | | | |
| Description of the experimental procedure | X | | | |
| Interpretation of the results | X | | | |
| Appropriateness of the discussion | X | | | |
| Completeness of references | | X | | |
| Overall evaluation | X | | | |

General comments and remarks:

The PhD thesis of Dr. Petroselli addresses a very current and important topic such as that of sustainability in agriculture in the context of climate change and increase in the world population. In particular, the candidate evaluates the impact of sustainable agricultural systems on the yield of wheat and on soil health, also under potato crop, without neglecting the quality of weeds, from the perspective of an agroecological approach. In addition the thesis faces the implementation of a ‘next generation’ VCU (Value for Cultivation and Use) experimental trial for the phenotypic and agronomic evaluation of a set of durum wheat varieties, taking in consideration the response of grain yield (the most important parameter for farmers) and other quality-related traits to different abiotic and biotic stresses.

The thesis structure is well conceived, with a logical sequence of the topics covered, which allows to well interpret the results. State of the art, research questions, objectives, aim of the study and structure of thesis are clearly explained.

I have highlighted the minor corrections required and some comments on the PDF of the thesis, herewith attached.

The candidate Dr. Petroselli results as the first author in one of the published paper (Chapter 1) and the third and fourth author in the other published papers (Chapter 2 and 3, respectively), thus indicating her contribution in the main aspects of the thesis (conception of ideas, methodology, writing original draft, data curation and validation). In Chapter 4, it is not clear to me if this is a submitted paper, anyway her contribution to the research, even if not cleared stated, is valuable.

In conclusion, the thesis fulfills all requirements posed for obtaining PhD degree. I recommend the candidate Dr. Petroselli pass without further examination or amendment because her thesis reveals original results, that add knowledge to the international scientific community about sustainable agriculture, agroecology and 'next gen' decision support system (DSS), aiming at providing farmers with a list of scientific-based advice for supporting their decision-making under different climate and environmental conditions.

The thesis is accepted:

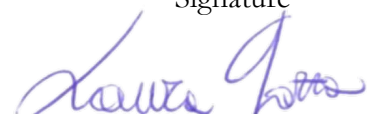
- In the present form***
- After minor revisions***
- After major revisions***

With major revisions, is it requested a revised version after 6 months?

- YES***
- NO***

Date 28/05/2024

Signature



PhD Program in Plant and Animal Science, University of Tuscia, Viterbo (Italy)

Coordinator: Prof. Roberta BERNINI

Reviewer report (template)

N.B. The following template should be intended as a flexible model. The actual report may be adapted by the reviewer according to his/her needs.

PhD student: Verdiana Petroselli

Title of the thesis: Evaluation of sustainable and diverse cropping systems: crop rotation (wheat-potato) and next generation varietal selection of wheat

Reviewer (surname, name and affiliation): Antichi Daniele, Department of Agriculture, Food and Environment, University of Pisa

| Scientific quality | Excellent | Good | Fair | Poor |
|--|------------------|-------------|-------------|-------------|
| Originality of the research | | | X | |
| Suitability of the title with respect to the content | | | | X |
| Efficacy of the abstract | | X | | |
| Clarity of the aims | X | | | |
| Exhaustiveness of the introduction/state of art | | | X | |
| Suitability of the methodology | | X | | |
| Description of the experimental procedure | | | X | |
| Interpretation of the results | | X | | |
| Appropriateness of the discussion | X | | | |
| Completeness of references | | X | | |
| Overall evaluation | | X | | |

General comments and remarks:

The thesis reports on three years of experiments carried out to test the effects on crops, soil and weeds of major components of cropping systems, namely tillage, fertilization and genotype selection, based on wheat and potato crops. The title of the thesis is not appropriate, from my point of view, as it emphasizes too much crop rotation and next generation variety selection, that actually are not the core of the thesis but only some of its frames. The thesis is written in a clear style and by using what I can only consider an acceptable English, as I'm not native speaker. The thesis is a collection of three published papers plus a fourth chapter that reports on an additional trial on genotype selection. The tested factors and the aims of the thesis are framed within the broader context of agroecological approaches to sustainable agriculture. Actually, in the introduction there is room to improve on the link between the specific treatments and agroecological principles, as well as on making more logically consistent the different parts. Nevertheless, the background is well presented and exhaustive. In the materials and methods of the four chapters, I found the description of the experimental methodology a bit lacking details for the

full reproducibility of the experiments. Conversely, results and discussion are well conceived and documented. The conclusions, both the specific ones and the general ones, are only missing of identification of future research steps. The reference lists are well formatted and completed. Only minor issues were identified. In the revised pdf document of the thesis, I added notes to write my specific comments, suggestions and requests to definitively improve the thesis. When the text is simply highlighted in yellow but without any notes, this means that the text should be checked and edited for language or style issues.

The thesis is accepted:

- In the present form*
- After minor revisions*
- After major revisions*

With major revisions, is it requested a revised version after 6 months?

- YES**
- NO**

Date June the 1st, 2024

Signature
Daniele Antichi



Firmato il 01/06/2024 alle 20:29
da DANIELE ANTICHI