Candidate (first name – last name): Samuele Bumbaca

Title of the Thesis: Geomatic Techniques to Support Phytosanitary Products Tests whithin the EPPO Standard Framework

Supervisor (first name – last name): Enrico Corrado Borgogno Mondino

Name of the reviewer: Daniela Stroppiana

Reviewer's institution: CNR IREA Milano

Please rate the following points

	Insufficient	Sufficient	Good	Excellent
Overall scientific merit (originality, relevance, completeness)		X		
Introduction and bibliography (sufficient information provided by the introduction, appropriate cited references)	X			
Methodology (clearly described methods, adequate and exhaustive data analysis (if applicable)	X			
Results (convincing and clearly presented results, adequate number and quality of tables and figures)		X		

Overall evaluation (please check one)

☐ **The candidate can be admitted to the final examination**

☒ **The candidate can be admitted to the final examination but the thesis requires minor revision; further evaluation by the reviewer is not required**

☐ **To be admitted to the final examination the thesis requires extensive revision; the revised version must be provided within 6 months and must be re-evaluated by the reviewer**

Specific comments and suggestions [mandatory]

The thesis document presented by the candidate is not ready to be submitted; there are substantial revisions that should be implemented to the document before the final examination.

Overall, the thesis text is not well structured and organized, it is difficult to follow and read. Major weakness is that it lacks an overall view of the scientific work carried out by the candidate, who should emphasize the novel contribution of his work to the scientific gap in the specific field of application of geomatic techniques. The candidate should also better highlight the results from the three case studies, and he should provide on overall summary. The text is verbose and at certain sections too long. I suggest the candidate to revise and to shortened where necessary. Figures and tables could help to summarize relevant information.

More attention should be paid to the text's structure and style (also graphical readability of figures).

I provide below some general comments.

- Throughout the text the candidate should clearly describe his contribution to the methodology and to the results; he should highlight the actual contribution of the doctoral research. Description of the background is necessary to better highlight the innovative contribution of the doctoral work.
- An extended abstract is missing at the beginning of the document. This abstract should be concise but informative on the major content of the work and on the innovative contribution compared to the research/operative gaps that the thesis should fill. The abstract should clarify research gaps, objectives, methods, results, specificity of the field of application (in this case of geomatic techniques) and study cases.
- This abstract could guide through the very long text; a *file rouge* is missing in the text that is often verbose. Some paragraphs could be shortened.
- Most of the text describes theoretical and background information, such as in the case of introduction to chapter 1 often loosing the focus on the actual thesis contribution. To give one example: in 1.3 (Geomatic Techniques) the focus should be, first, on geomatic techniques that are apparently introduced after six pages ('*Today, digital technologies such as georeferenced imaging, ensure a very high precision of measurements…*"). The text should be clear on the topic of each section: what are geomatic techniques, what are the advantages to traditional techniques, etc…but again focused on the work done and not as a general description of background.
- The same comments apply to the objectives of the work: a separate section at the beginning (besides the description in the abstract) is needed to let reader know what the work aimed at. Apparently in the text, objectives are described for the first time at page 32. Section 1.4 could be a good summary of the objectives if better focused: what is the advantage of geomatic techniques? To provide continuous spatially distributed information overcoming the need of randomized selected sites given by geostatistics? Specifically, what is the definition of geomatic techniques (please avoid imprecise and general definition as '*geomatics techniques such as photogrammetry, spectral imaging*', page 32).
  The text should be more specific on the study cases; since the very early beginning, the reader should understand what are the study cases. Please avoid general and imprecise definitions such as '*Through a series of study cases addressing each variable type described*' (page 32) and '*In the second study case…*' and '*Through a series of complementary study cases*' (page 199) (what about the first? How many are there?).
- The methodology is lost in the details of descriptions that probably can be shortened.
- The concept of binary, ordinal…are very general; indeed, the study focused on specific variables that should be clearly stated, e.g. plant counting.

- The '*Conclusions'* section provides a good overview of the work; it needs minor revisions. It needs to discuss also the contribution of geomatic, besides ML, since this is the core of the thesis. As it is now, it is more focused on the advantages of ML that are relevant but not essential (the title is in fact '*Geomatic Techniques to Support Phytosanitary Products Tests whithin the EPPO Standard Framework*'). The candidate should complement the text with the advantages of geomatic (specifically the data/techniques used in the work): we all agree on the general advantages of geomatic, but the contribution of the doctoral work is to show them quantitatively and in an innovative way. As suggested above also clear reference to the type of study cases (besides first, second and third) could improve the summary and the conclusions.
- Probably, there is a misspelling the title words.
- Please add *ideas* on future developments and further applications.
- Rephrase too general sentences ('*Unlike manual methods, which are inherently limited by human capacity and time constraints, automated and semi-automated systems can continuously gather data with minimal interruption*' (page 19) (such as? What systems are you referring to?); '*nadiral or supposedly nadiral images*' (What are the supposedly nadiral?); '*while also implementing a handcrafted algorithm as baseline*' (what do you mean with handcrafted?)
- Add clear description of what you refer with '*validation'* throughout the text. At page 20, when you refer to benchmarks for validation are these values extracted from the literature? Do these values apply to all variables in the same category? Testing, validation, cross-validation and independent validation are different concepts.
- Final minor comment, the doctoral thesis is personal work, I think it is better to avoid using first plural pronoun ('*we'*).

Date and Signature **17/06/2025**

Daniela Stoppiana
