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Skolkovo Institute of Science and Technology

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Rim Gubaev

PhD Program: Life Sciences

Title of Thesis: Genetic association mapping for agronomically important traits in rapeseed and sunflower

Supervisor: Professor Philipp Khaitovich

Name of the Reviewer: Professor Elena Salina

I confirm the absence of any conflict of interest	
(Alternatively, Reviewer can formulate a possible conflict)	**Date: 09-09-2022**

The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to submit signed copy of the report at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense.

If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.

Reviewer's Report

Reviewers report should contain the following items:

- Brief evaluation of the thesis quality and overall structure of the dissertation.
- The relevance of the topic of dissertation work to its actual content
- The relevance of the methods used in the dissertation
- The scientific significance of the results obtained and their compliance with the international level and current state of the art
- The relevance of the obtained results to applications (if applicable)
- The quality of publications

The summary of issues to be addressed before/during the thesis defense

In recent years, special attention has been devoted to the associative mapping of important agricultural traits of cultivated plants, which makes a significant contribution to the understanding of the genetic basis traits and has obvious application in breeding programs. In this connection, the Doctoral thesis of Rim Gubaev is an interesting and relevant work.

The structure of the thesis is well organized and corresponds to the thesis title. The thesis itself is devoted to the dissection of the genetic architecture of agronomically important traits in oilseeds (rapeseed, sunflower) and scanning for SNP markers for marker-assisted selection. A significant part of the thesis's results was published at three reputable international journals covering the topics of Genetics, Genomics and Bioinformatics.

An introduction and literature review gives a clear problem statement as well as the current status of the research. This gives the opportunity for the reader to familiarize themselves with the relevant problems in sunflower and rapeseed breeding as well as with modern approaches used to solve them. At the same time, the information about the size of the genomes as well as its ploidy is missing and should be added to the text.

The experimental part (methods) is clearly described. The described methods are considered modern and relevant to address the aim and the objectives of the thesis. The plant material includes plant diversity panels and experimental crosses which allow the application of different genetic mapping approaches. The author used a state-of-art genotyping approach based on high throughput sequencing to characterize plant accessions in the study. The phenotyping part of the presented methods section was done in collaboration with research institutions and private breeding companies. The modern bioinformatics and quantitative approaches applied were described in detail. The information on the sunflower and rapeseed lines is missing in the text so it should be added either by citing supplementary materials from published papers or added as a supplementary table to the thesis.

The results of the research are stated and discussed in the three sections, namely, Chapters 4, 5 and 6. The results are devoted to the GWAS and QTL mapping of agronomically important traits in rapeseed in sunflower. In addition to scanning for SNP markers, a basic population structure analysis has been performed. The results of chapter 4 and chapter 6 are of high practical value. The genetic markers for glucosinolate content could be used for marker-assisted breeding after validation. While genetic markers for oil quality in sunflower were validated and could be directly used for the development of marker-assisted selection approaches. The results of chapter six on genetic markers need further validation and additional in the future. This is also stated by the author.

Unfortunately, there are certain inaccuracies in the description of the results presented in Figure 5.2.2 when mentioning mutant and wild-type lines. The data has not been entered in Table 5.2.1 very carefully (mix Russian and English styles) and there is a typo in the correspondence of crosses and chi-square values in the description of Table 5.2.3.

A generalization of the results of the work and future perspectives are presented in some detail in Chapter 7. The significant fundamental and applied contribution of the results obtained to the study of important agricultural traits is obvious.

As a whole the present work represents good practical results. The genetic markers identified in the thesis are of high value for oilseed and sunflower breeders. Several minor issues were highlighted in the preset report and are recommended to be fixed before the defense.

Provisional Recommendation

☒ *I recommend that the candidate should defend the thesis by means of a formal thesis defense*

☐ *I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate's thesis according to the recommendations of the present report*

☐ *The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense*