To: The Dean of Graduate Studies
From: PhD student
Name: Raanan Tzarfati
I.D. 034559674
Department: Evolutionary Biology
Stage: (please circle) 1st Stage/ 2nd Stage

Annual Progress Report
Submission to the Graduate studies Authority by the departmental secretary only

Part A – designated for PhD Student

Describe the goals as presented on your letter of intentions/ research proposal, and your current research achievements.

The main objective of this project is to dissect the genetic and genomic differences between cultivated wheat and its wild progenitor, *Triticum dicoccoides*, with respect to trait complexes related to domestication, evolution under domestication, and productivity. Until now, we summarized our results in two scientific papers (Tzarfati et al., 2013; Tzarfati et al., 2014) and the third paper has been submitted recently.

The first part of the research was based on field trials, and phenotypic measurements of domestication traits based on quantitative approach rather than qualitative classification that were characteristic of previous studies. We described in detail the advantages and considerations that were related to the transition to plants with non-brittle rachis and easy threshing. (Tzarfari et al., 2013). This paper was highlighted in the well known scientific journal *Nature*.

The second part of the study is genetic mapping of the quantitative traits loci (QTLs) controlling the differences between the domesticated wheat and its wild progenitor. For QTL analysis, we applied quantitative scores of the domestication related traits, that was more informative in the deciphering the genetic architecture of the main components of the domestication syndrome. We found novel QTLs that relate to major domestication traits and traits that evolved under domestication (Tzarfari et al., 2014).

The third part of the study is to assess the differences in genome expression between domesticate wheat and its wild progenitor, with a special focus on the glumes. To do that, we employ a novel approach for genome expression analysis, RNA-seq analysis based on direct sequencing of the transcripts via next generation sequencing technology. Extracted
RNA was processed and RNA-sequencing conducted using Illumina platform sequencing. The new results should highlight the domestication evolution processes, and could be very beneficial for future breeding efforts.

Estimated date for submitting PhD dissertation to the PhD departmental committee
____________________________ October 2015

Ph.D. student Name: ___Raanan_______ Signature: __________  Date: __________

Part B - designated to the research the Chairperson of PhD Committee

Please refer to the student progress and to the estimated date for submission of dissertation

There was a very good progress in this PhD study. All experimental work and the analysis were successfully completed. In addition to the first paper on phenotypic analysis of domestication traits, that was already published in 2013, a new paper summarizing the results on genetic mapping of these traits was prepared and published 2 month ago in *Molecular Breeding*. In this work, a detailed QTL mapping analysis was conducted with new results on the genetic factors affecting the key domestication traits. The obtained evidence strongly supports our concept of genome asymmetry. More recently, we submitted another paper, devoted to comparative analysis of domesticated wheat and its wild progenitor based transcriptome assay (RNA-seq). We have identified a few genes that may be related to glumes toughness and nutrient remobilization that could probably be involved in wheat evolution under domestication. In general, this work provides a foundation for further study on candidate genes involved in wheat domestication evolution process.

I expect that the thesis will be submitted in time, i.e., till August 2015.
**PhD research evaluation**

(The evaluations relate to all researches previously supervised by you)

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Supervisors Name: Avraham Korol   Signature: __________________ Date: 26.03.2014

Chairperson of PhD Committee Name: __________________ Signature: ____________ Date: ____________