PROGRESSIVE ACTIVITY REPORT

General information	
Title of the PhD:	Innovative plant nutrition and water use efficiency technologies for improved productivity of farmer-managed banana systems in North-Central Tanzania.
Name of the PhD researcher:	Boniphace Mokiri Nkombe
Student number	U0032395a
Name of the supervisors:	Prof. Jan Diels, Prof. Rony Swennen, Prof. Roel Merckx, Prof. Patrick Ndakidemi, Dr. Kelvin Mtei
Status of the PhD:	1 year (Officially registered on 19thDec, 2019)
Progress report	
Brief introduction of the project/study and specific objectives	The overall goal of this doctoral project is to develop and test improved plant nutrition and water use efficiency technologies to increase banana yields in North-Central Tanzania. Current farmer's practices and improved technology packages will be tested and compared in farmer's fields. This will allow testing the yield stability of the technological packages across fields differing in management and soil types. The generated trial data will be used to calibrate the FAO AquaCrop crop water productivity model which will be used to assess yield stability and variation across seasons using 30 years of historical weather data. Therefore this pilot study will explore the following specific objectives; 1) To assess current farmer's practices on crop water productivity management and plant nutrition in banana production. 2) To develop and test innovative nutrient and water use efficiency technological packages for higher yield across fields differing in management and soil types. 3) To develop, calibrate and validate the AquaCrop model using the results conducted to reach specific objective 2. 4) To assess with AquaCrop the temporal yield stability of banana for conventional and improved technologies using 30 years of historical weather data. 5) To estimate the return on investment of the implemented technological packages using a partial budget analysis and recommend an appropriate package for upscaling and out

	scaling.
Activities undertaken/implemented for the period July, 2019 – January, 2020. **(Completed activities and ongoing activities)**	**Objective 1 (ongoing)** **Activity 1: Baseline survey.** Completed activities in this work package include: o Household survey conducted with the aid of a questionnaire to assess the existing banana fields in the study area-Meru, Hai and Moshi rural districts. The survey described the household characteristics, the farming systems, nutrient and water application and management in banana fields. o Focus Group Discussion to validate the responses gathered with the aid of a questionnaire. o The first round of allometric measurements in banana fields managed by farmers. We measured the height and girth at base of a banana tree in 40 fields between the study areas. We also measured the number of suckers and their height in each hole. Ongoing activities to be completed in this work package: o Soil sampling in 40 banana fields managed by farmers in the study area. o Three rounds of allometric measurement in banana fields managed by farmers. o Market survey within the study areas to measure fresh bunch weight, number of hands and fingers to help in estimating banana yield under farmers conditions. **Objective 2 (on going)** Completed activities in this work package include: o Identification of fields to establish researcher managed/researcher implemented on farm banana trials. 21 farms, 7 in each proposed district are identified. o Experimental layout/set up in 21 fields. o Preparation of holes ready for planting in 21 fields (3150 holes). Ongoing activities to be completed in this work package: o Soil sampling in 21 fields before planting. o Construction of irrigation furrows. o Collection of cattle manure for planting. o Actual planting in 21 fields. o Start data collection in the new established trials. **Objective 3, 4 & 5 (on going)** o Accomplishment of these objectives depends on the

	activities implemented in objective 1 & 2.
Achievements per project expected outputs and objectives	o Existing water and nutrient technologies applied in farmers banana fields documented. o Soil status in farmers banana fields to be analyzed (ongoing). o Attainable average banana yields in farmers' fields to be quantified (ongoing) o 21 on farm banana field trials (researcher managed/researcher implemented) in three different districts to be established.
Overall reflection and challenges toward project objectives	o Generally the project is making a good progress as objectives are being implemented in phase and data collection continuing well. Some activities in objective 1 and 2 are completed and the remaining being ongoing as indicated. o There are also some challenges. Some activities are a bit behind schedule, for example planting. This will make data collection go beyond the anticipated time. o Due to the scale of the project, some activity such as allometric measurement in farmers banana fields coincide with planting activities that will have to take place soon. o There could be a room to host one MSc.Student. But this need a thorough discussion with promoters.