

Possible **MSc student projects** as part of the three-year-project “Knowledge-exchange for enhanced genomic analysis of potato to control late blight, and increase drought tolerance” led by Erik Alexandersson (SLU) and Lerato Matsaunyane (ARC Pretoria) funded by a STINT and NRF.

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- a. Characterisation and comparison of *Phytophthora infestans* strains in South Africa and Sweden
 - Characterisation will include phenotyping, determination of the prevalent mating types and metagenomics. The project will require extensive bioinformatics to ensure analysis of sequence data. In addition, the project will entail a significant amount of mycology since, in South Africa, maintenance of *P. infestans* in culture is currently problematic.
- b. Evaluation of South African and Swedish breeding lines for drought tolerance
 - Evaluation will entail glasshouse and field trials to identify breeding lines with drought tolerance. The screening will include phenotyping, physiological evaluation as well as molecular characterisation. A best practice protocol for drought stress in potato will be established. SSRs available at the University of Rostock will be used during the molecular characterisation of the drought tolerant breeding lines. For SSR analysis material can also be made available from the Rwandan potato breeding program. In addition, the potential yield penalty of drought tolerance will also be evaluated.
- c. Evaluation of South African breeding lines for late blight resistance
 - Evaluation will entail glasshouse and field trials to identify breeding lines with late blight resistance. The screening will include phenotyping, physiological evaluation as well as molecular characterisation. Currently available genotyping data will be used in this study to build on to the characterisation of the breeding lines.
- d. Control of late blight using phosphite and investigation into resultant induced drought tolerance
 - The study will focus on application of phosphite as a crop protection agent that induces resistance to late blight. Drought tolerance screening will also be performed concurrently to determine if cross-resistance has been induced through the application of phosphite. The study will be conducted under rain-out shelters using plastic mulching as well as in field trials to control availability of water to the potato plants.
- e. Enhanced drought tolerance using BABA
 - The study will focus on application of BABA as a crop protection agent that will induce drought tolerance. The study will be conducted under rain-out shelters using plastic mulching as well as in field trials to control availability of water to the potato plants. Analysis will entail phenotyping, physiological analysis such as chlorophyll content determination as well as molecular characterisation targeting genes linked to drought tolerance. The molecular characterisation will be based by qRT-PCR.
- f. Control of late blight using *Lantana camara*-based plant extracts and investigation into the potential of induced drought tolerance.
 - This study will focus on application of Lantana-based extracts as a crop protection agent that will induce resistance to late blight. Drought tolerance screening will also be performed concurrently to determine if cross-resistance has been induced through the

application of Lantana-based extracts. The study will be conducted under rain-out shelters using plastic mulching as well as in field trials to control availability of water to the potato plants. Analysis will entail phenotyping, physiological analysis such as chlorophyll content determination as well as, molecular characterisation targeting genes linked to drought tolerance. The molecular characterisation will be based on qRT-PCRs.