

DEVELOPMENT OF A CLIMATIC SOYBEAN RUST MODEL AND FORECASTING FRAMEWORK

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ABSTRACT

Soybean rust (SBR), caused by the fungus *Phakopsora pachyrhizi* Syd., is a real threat to soybean crops in South Africa. Its ability to spread rapidly and its potential to severely reduce yields have earned it the reputation as the most destructive foliar disease of soybeans. SBR has been reported in South Africa every year since its arrival in 2001. While extensive research had been done on the epidemiology and fungicide application requirements in South Africa, no work into the long term climatic vulnerability of soybean production areas to SBR had been done. This meant soybean producers do not know whether SBR is a threat in their areas. Through this research a SBR algorithm was developed using readily available climate data, viz. temperature and rainfall, to create a daily index specifying the climatic vulnerability of SBR infection. The algorithm was applied to a 50 year historical climate database, and a series of maps was created illustrating the long term vulnerability of different areas to SBR infection. These maps allow soybean producers to understand the climatic vulnerability of their area to SBR infection. Time series graphs were created for selected key soybean production areas to allow soybean producers to distinguish periods of high and low climatic risk during the season. This may help with decisions regarding the planting times, the maturation rate of different cultivars as well as the timing and application of fungicides. The framework for a near real time forecasting system was created outlining how the system could amalgamate recently recorded and forecasted weather data, run it through the SBR algorithm and provide a near real time, as well as forecasted vulnerability, based on the climatic conductivity for SBR infection. Anticipated limitations and difficulties on developing the forecasting system are also outlined.