

**CHEMICAL CONTROL OF SOYBEAN RUST
(*PHAKOPSORA PACHYRHIZI*) ON SOYBEANS**

by

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ABSTRACT

Soybean rust (SBR) caused by *Phakopsora pachyrhizi* Syd. is an aggressive wind-dispersed fungal disease which has spread around the world at an alarming rate in the last decade. The disease was first reported in South Africa (SA) in 2001. It has become well established in the province of KwaZulu-Natal. Reports are occasionally made from eastern Mpumalanga, late in the growing season, in years with good rainfall. Yield losses of 10 – 80% have been reported due to SBR infection. Literature was reviewed to better understand the pathogen in an attempt to find suitable disease management strategies. Many strategies involve delaying, rather than preventing, SBR infection. Of the two strategies to prevent infection, the use of fungicides was the only option for disease control in SA, as no resistant cultivars are available. Field trials were conducted to determine which fungicides are effective in controlling SBR. Further research was conducted to determine the timing, frequency and rate of fungicide applications for optimal control of SBR. Trials were evaluated for disease severity, seed yield and the effect of fungicides on seed quality.

Fungicides from the triazole class of the sterol biosynthesis inhibiting group of fungicides were found to be the most effective in controlling SBR. A fungicide from the strobilurin group was found to be less effective than the triazoles at the suggested rate, but was found to be as effective when evaluated at higher dosage rates. Triazoles premixed with fungicides from the benzimidazole and strobilurin groups were also effective in controlling SBR. Timing of application was found to be critical for strobilurin fungicides, but not for triazole fungicides, which have a curative ability, unlike strobilurins. Strobilurin fungicides applied preventatively, before the appearance of disease symptoms were as effective as triazole fungicides applied after disease symptoms, but before infection levels had reached 10%. Across both wet and dry seasons two fungicide applications applied at 21d intervals at the R2 growth stage resulted in effective disease control. In wet seasons, a third fungicide application resulted in yields that were higher, albeit not statistically significant, than two fungicide applications. Assessments of individual fungicides for optimal dosage rate found that

registered rates were already optimal for some fungicides, but for others it appeared as if alterations were necessary to the rate suggested for registration.

This study was one of the first to extensively evaluate the efficacy of the new triazole and strobilurin fungicides on SBR control. The results have been shared globally, but particularly with newly affected countries in South and North America. Although this research has been groundbreaking, there are still many aspects of fungicide control which need to be studied in order to further optimise chemical control of SBR.