Management of Asian Soybean Rust

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Introduction

The identification of Asian soybean rust in Paraguay in 2001 (Morel and Yorinori 2002) and its spread to more than 95% of the soybean production in Brazil through the 2004 growing season has heightened the awareness of this disease worldwide. The rapid spread of *Phakopsora pachyrhizi* and the potential for severe yield losses makes this the most destructive foliar disease of soybean. Yield losses of 20 to 60% were reported in Asia with losses of 80% reported from experimental fields in Taiwan (Hartman et al. 1992). Yield losses of 40 to 60% were reported in southern Africa with reports of 100% loss in individual fields (Caldwell et al. 2001). During the 2003–2004 growing season in Brazil, yield losses were estimated at 10% of the annual crop, an increase from the 5% yield loss estimate reported for the 2002–2003 growing season (Yorinori, personal communication). Soybean rust, if introduced into the United States, could have a major impact on both total soybean production and production costs.

In the near future, the primary tool to control soybean rust will be fungicides (Miles et al. 2003a). Fungicides have been used effectively in southern Africa and South America to manage the disease. Cultural practices have not been shown to be effective in controlling the pathogen; recommendations were inconsistent and varied by location. The most effective cultural practices were those that maximized yields in the absence of the disease or planting during seasons when the disease could be avoided. Incorporation of resistance into commercial cultivars is several years away and will be made more difficult by the need to use nonrace specific resistance.

Trade and manufacturers' names are necessary to report factually on available data; however, the USDA neither guarantees nor warrants the standard of the product, and the use of the name by USDA implies no approval of the product to the exclusion of others that may also be suitable.

Fungicide Efficacy

Many fungicides have been evaluated to control soybean rust. Early research from Asia indicated that mancozeb was effective (Hartman et al. 1992). Other compounds available at the time were compared with mancozeb and were effective, but results varied by test (Miles et al. 2003b). Fungicide trials in India (Patil and Anahosur 1998) and southern Africa (Levy 2004) identified several triazole compounds and triazole mixes that controlled soybean rust. More recent trials in Africa and South America have identified additional triazoles, tebuconazole and tetraconazole, as well as several strobilurins and strobilurin mixes, including, azoxystrobin, pyraclostrobin, pyraclostrobin + boscalid, and trifloxystrobin + propiconazole (Miles et al. 2003c). Additional triazoles are commercially available in Brazil; among these are epoxiconazole, cyproconazole, and metconazole. These fungicides have been shown to be very effective when mixed with one of the strobilurin compounds.

Labeled and Section 18 Compounds

There are three fungicides that are registered for use on soybean, labeled for soybean rust, and are commercially available in the United States (Table 1). These fungicides are Bravo®, Echo®, and Quadris®. Quadris® is an azoxystrobin; Bravo and Echo are both chlorothalonil products. There has been a Section 18 Emergency Exemption request for seven compounds or mixtures of compounds submitted to the Environmental Prection Agency (EPA) by the Departments of Agriculture of Minnesota and South Dakota (http://plantsci.sdstate.edu/draperm/SoybeanRustSection18). At least 24 other soybean-producing states have followed with requests of their own. Not included on any of the lists are the sulfur, lime, elemental compounds, various oils, and other organic products that may not be viable management tools in large commercial operations.

The fungicides that will be available for managing soybean rust fit into three classes: chlorothalonil, strobilurin, and triazole. The strobilurins and triazoles have single site mode