



# Sampling urediospores of *Phakopsora* spp. with spore traps in Argentina

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## INTRODUCTION

In Argentina asian soybean rust (ASR) (*Phakopsora pachyrhizi* Syd. & P. Syd.) urediniospores are the most common spore and the primary inoculum. They are produced abundantly during the growing season (Melching *et al.*, 1979) and are disseminated by the wind long distances (Marchetti *et al.*, 1975; Isard *et al.*, 2004).

In order to develop management measurements for the disease, it is necessary to understand their epidemiology (Fry, 1982). Two important epidemiological questions are monitoring the presence of pathogen propagules and environmental conditions to develop forecasting systems (Campbell & Madden, 1990). Marchetti *et al.* (1975) reported that maximal infection of ASR occurred at 20-25°C with 10-12H of dew and at 15-17.5°C with 16-18H of dew. The minimal dew period for infection was 6H and did not occur above 27.5°C.

The use of spore traps to capture air-borne inoculum is common because is very simple and inexpensive (Reis & Santos, 1985; Reis, 1988). In previous studies, de Souza & Formento (2004) verified that a slide placed at 45° (inclined against the wind), at 120cm height inside the spore trap, was sensitive to detect urediniospores of ASR in the air.

This study is part of a 5 provinces network inside the National Soybean Rust Project (SAGPyA, INTA, SENASA, EEAOC) and the objective was to analyze the temporal development of inoculum of *Phakopsora* spp. captured in spore traps. Here we report parcial results of studies carried out in INTA EEA Reconquista (29° 11' S; 59° 52' O) (Santa Fe Province) and INTA EEA Paraná (31° 51' S; 60° 31' O) (Entre Ríos Province) during 2004-05 growing season (Fig. 1).



Fig. 1. Map of the localities with spore trap, INTA EEA Paraná & EEA Reconquista, Argentina.

## MATERIALS AND METHODS

We used a spore trap at 120cm height (Fig. 2) and spores were collected in a slide placed at 45° inside. Solid vaseline was used as adhesive and the spore traps were placed near to soybean fields.

The delimitation of urediniospores of *Phakopsora* spp. was carried out following Ono *et al.* (1992): spores sessile, 1-celled, obovoid to broadly ellipsoidal, 15-24 x 18-37µm, walls minutely and densely echinulate, colorless to pale yellowish brown, pale cinnamon-brown in age. We consider that others spores of Uredinales, possibly present in the area, differ in some of this characteristic.

The slides are placed during 24H and they are observed under microscope (100-400X). The *Phakopsora* spp. type urediniospores count were carried out on two area of 4cm<sup>2</sup> on the slide, 2 times for week. Between 20 December, 2004 and 21 March, 2005, the urediniospores count was daily in Paraná. The study was finished when locally, soybean fields were in R6 state (Fehr & Caviness, 1977) and the potential risk to yield losses decrease.

The presence of ASR in the field was confirmed through characteristics symptoms and signs using wet chambers in soybean fields near to the spore trap if *Phakopsora* spp. type urediniospores were observed on the slides. Temperatures and leaf wetness records were taken in local meteorological stations.

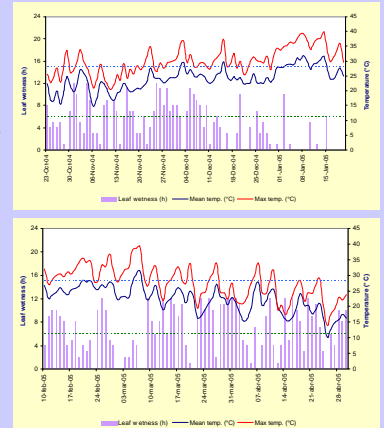
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## RESULTS AND DISCUSSION

The number of urediospores collected in EEA Reconquista during the growing season was 516 (Fig. 3). Between October and December 113 spores were collected in the spore trap and environmental conditions were conducive to ASR (Fig. 4) but ASR was first observed on 6 January before to collect 17 urediniospores on 16 December.

Fig.4. y Fig. 5. Mean daily temperature, maxima daily temperature and daily leaf wetness at INTA EEA Reconquista. The point lines represent the low est leaf wetness (green) and the highest temperature (blue) for ASR development (Marchetti *et al.*, 1976).



The environmental conditions that followed were not conducive for disease development and a progress of ARS was not observed. In February and middle of March it was observed 38 urediniospores.

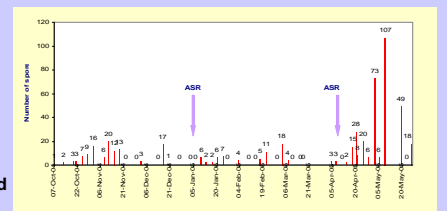


Fig.3. Number of urediniospores of *Phakopsora* spp. collected each day in the INTA EEA Reconquista. Arrows indicate the day when ASR was detected locally.

Environmental conditions were conducive to ASR due to long periods of leaf wetness, but ASR development could have been limited by maxim temperatures.

Late in March and the beginning of April it was detected 6 urediniospores and it was recorded a decline of temperatures and extended periods of leaf wetness (Fig. 5).

For the second time ASR was detected on 7 April. From April to May, 333 urediniospores were collected and ASR was observed in several locations near to Reconquista.

The number of urediospores collected in EEA Paraná during the growing season was 32 (Agost 30 to May 21) (Fig. 6). ASR was first detected on 5 March in Paraná, 7 days later to collect 12 urediniospores. The conditions follows the first detection were conducive for disease development in the field until the end of the growing season (Fig. 7).

Fig. 7. Mean daily temperature, maxima daily temperature and daily leaf wetness at INTA EEA Paraná. The point lines represent the low est leaf wetness (green) and the highest temperature (blue) for ASR development (Marchetti *et al.*, 1976).

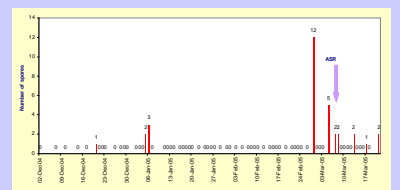


Fig. 6. Number of urediniospores of *Phakopsora* spp. collected each day in the INTA - Paraná Experimental Station. Arrow indicates the day when ASR was detected locally.

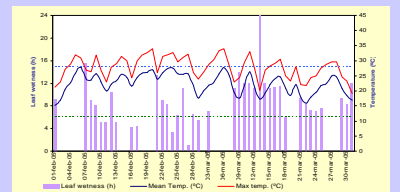


Fig. 2. Spore trap. Inside the weather-vane box, the urediniospores are collected in a slide placed at 45°. (Photos by J.C. Velázquez, INTA EEA Paraná).

