OVERVIEW
Asian Soyabean Rust (ASR) has been present in Soyabean crops in Brazil since 2001. The disease now affects the entire Soyabean area below the equator. The progression of ASR in Brazil has been as follows:

- 2001: First outbreaks in the South (near to border with Paraguay)
- 2002: Disease spreads to central and Northern areas; found in 60% of planted area
- 2003: Disease found in 90% of planted area
- 2004: Disease found in 100% of planted area below the equator

(Source: Yorinori, J.T., 2005)

The impact of ASR has been significant, both in terms of crop losses and additional fungicide and application costs. These are shown in Figs. 1 & 2 (source: Embrapa).

Agricultural aircraft are widely used in Brazil and have proved a vital tool for the timely application of fungicides against ASR. Productivity of spray aircraft used in Brazil varies from approximately 100 – 300 ha/hr (240 – 720 acres/hr). Most fungicide application is at Low Volume (LV) rates, typically 10 – 30 l/ha (1.1 – 3.3 USG/acre).

The most widely used fungicides are:
- Tebuconazole
- Flutriafol
- Azoxyrstrobin + ciproconazole
- Epoxiconazole + pyraclostrobin

Fungicides are normally applied as follows:
- Preventative applications from R1
- Curative applications on vegetative stages if ASR infection is found before R1
- The average number of applications ranges from 1.5 – 2.5 per season. The number of applications is lower in the South and higher in the central and Northern regions.

TRIAL TO ASSESS PERFORMANCE OF AERIAL APPLICATION FOR SOYBEAN RUST CONTROL WITH FLUTRIAFOL (IMPACT 125 SC)

1. Introduction: application and soybean crop data
- Soybean: Pioneer 98C81 – seeded: 5 and 6 Nov 2004
- 1st fungicide application at R1 (31 Dec 04): Systhane (myclobutanil) at 0.4 l/ha – aerial application at 10 l/ha + oil + emulsifier
- 2nd fungicide application (13 Jan 04): Orius (tebuconazole) at 0.4 l/ha – aerial application at 10 l/ha + oil + emulsifier
- 3rd fungicide application (trial) at R6 (7 Feb 05): Impact (flutriafol) at 0.5 l/ha
- Harvested on Mar 13th, 2005
2. Methods: treatment data

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Spray volume L/ha (USG/a)</th>
<th>Flutriafol* L c.p./ha</th>
<th>Oil** L/ha</th>
<th>Emulsifier*** L/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micronair (10 L/ha with oil)</td>
<td>10 (1.1)</td>
<td>0.5</td>
<td>1.0</td>
<td>0.025</td>
</tr>
<tr>
<td>Micronair (20 L/ha without oil)</td>
<td>20 (2.2)</td>
<td>0.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stol (20 L/ha with oil)</td>
<td>20 (2.2)</td>
<td>0.5</td>
<td>1.0</td>
<td>0.025</td>
</tr>
<tr>
<td>Spectrum (10 L/ha - 71% RH)</td>
<td>10 (1.1)</td>
<td>0.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Spectrum (10 L/ha - 64% RH)</td>
<td>10 (1.1)</td>
<td>0.5</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Impact 125 SC; ** Soybean oil; *** BR 455.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Speed km/h (mph)</th>
<th>Height/swath m (ft)</th>
<th>Atomizer or nozzle</th>
<th>Droplet size ASAE S572</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micronair (10 L/ha with oil)</td>
<td>175 (110)</td>
<td>4 / 18 (12 / 55)</td>
<td>AU 5000</td>
<td>Fine</td>
</tr>
<tr>
<td>Micronair (20 L/ha without oil)</td>
<td>175 (110)</td>
<td>4 / 16 (12 / 48)</td>
<td>AU 5000</td>
<td>Fine</td>
</tr>
<tr>
<td>Stol (20 L/ha with oil)</td>
<td>185 (115)</td>
<td>2 / 15 (6 / 45)</td>
<td>Stol ARD</td>
<td>Fine</td>
</tr>
<tr>
<td>Spectrum (10 L/ha - 71% RH)</td>
<td>175 (110)</td>
<td>4 / 15 (12 / 45)</td>
<td>TXVK6</td>
<td>Very fine</td>
</tr>
<tr>
<td>Spectrum (10 L/ha - 64% RH)</td>
<td>175 (110)</td>
<td>4 / 15 (12 / 45)</td>
<td>TXVK6</td>
<td>Very fine</td>
</tr>
</tbody>
</table>

3. Methods: rust evaluation

Rust infection was assessed on the day of application < 1% (curative treatment). Rust infection and severity were evaluated using the standard pattern for rust assessment on leaves developed by Embrapa, Brazil. This is based on the percentage of the leaf area covered by the rust as shown in Fig. 3:

![Fig. 3 – Embrapa standard test pattern](image)

4. Results: soybean rust control

![Fig. 4 – Reduction on rust infection (% by comparing each treatment with its control plot) The vertical lines represent the Confidence Interval = 95% (\(\alpha = 0.05\))](image)

5. Results: soybean yield

- No statistical differences among the treatments although some plots were lost.
All the plots were influenced by the dry period after the last fungicide application: no rain and sandy soil were significant factors.

6. Results: spray deposits and distribution

6.1 Oil adjuvant: retention and absorption of flutriafol

- Leaves were sampled less than 1 hour after spraying on plots, both with and without soybean oil adjuvant + emulsifier.
- Leaves washed with water.
- Residue analysis on the leaves by chromatography (GC-MS).
- Residues of flutriafol on the leaves (after washing) were 20% higher for the plots sprayed with oil adjuvant. This suggests a potential increase on retention and absorption of flutriafol. This characteristic may result on greater flexibility of the treatment in the event of rainfall shortly after spraying.

6.2 Spray deposits

- The washing solutions from the leaves for all the plots were analyzed by GC-MS.
- Results were adjusted for the leaf area of all samples.
- Data relates to the total amount of chemical deposited on the leaves (the amount of fungicide residue on the leaves after washing plus the amount of fungicide in the washing solution).
- Statistical analysis by Confidence Interval at 90% (α = 0.1); overlapping values mean no significant differences.

Note:
The treatment with Micronair at 20 L/ha (without oil) presented unreliable data related to deposits on the middle leaves: deposits were 2.7 times higher than the average for all other treatments. There is no logical reason for this related to the application technology. This may have been due to anomalies in leaf sampling or sample processing in the laboratory.

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