

# Strategic Placement of Sentinel Plots by Combining Ecoregion and Acreage Maps- South Dakota Observations 2006

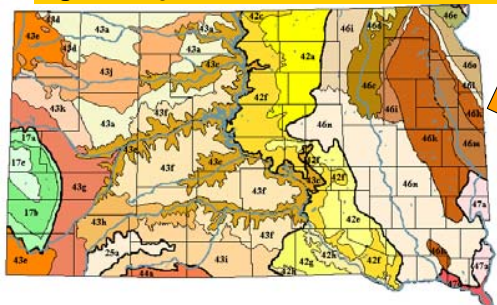


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**Introduction**  
Northern states are less likely to observe soybean rust development until later in the growing season. As a result, SBR monitoring efforts have been heaviest in southern states. Some northern states monitored fewer sentinel plots in 2006 than in 2005. Faced with using fewer plots, our efforts were to strategically locate plots to maximize exposure while adequately representing soybean acreage in the state.

## The Ecoregion Concept

**Fig 1. Ecoregions of SD, From USGS**

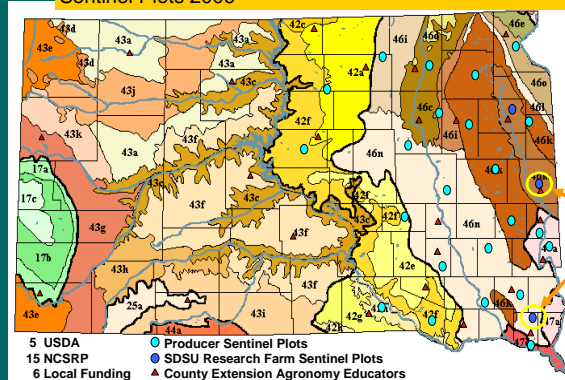


## What Are Ecoregions?

- Established by USGS (US Geological Survey)
- Ecoregions** denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources (Fig 1.).
- They are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components.

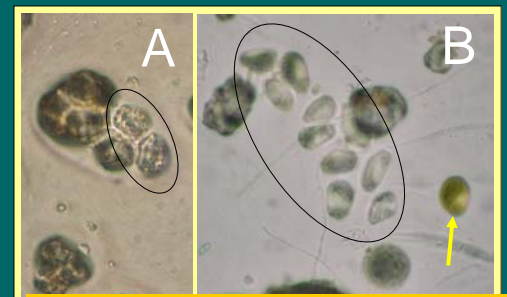
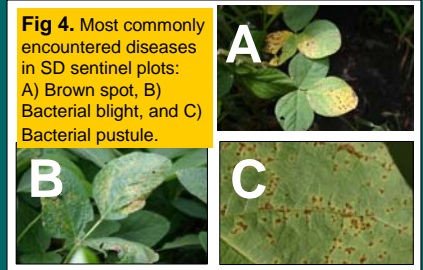
- Objectives**
- Focus sentinel plots to areas of different environmental resources, using ecoregions (Fig.1)
    - Areas are more likely to experience different disease and insect pressures.
  - To the extent possible, balance the locations of plots to satisfy:
    - County aggregations based on soybean acreage (Fig 2.).
    - Relatively uniform geographic coverage of the soybean acreage in the state (Fig 3).
  - Limit evaluation to no more than two plots per Extension Educator, to ease demand for time, due to additional data requirements in 2006.
  - To track the development of various maturity group soybean plants through the season.
  - To track development of diseases that can be confused with Asian soybean rust.
  - To alert producers to presence of Asian soybean rust, aphids & other diseases.

**Fig 3. Ecoregions of SD, Extension Educators and SBR Sentinel Plots 2006**

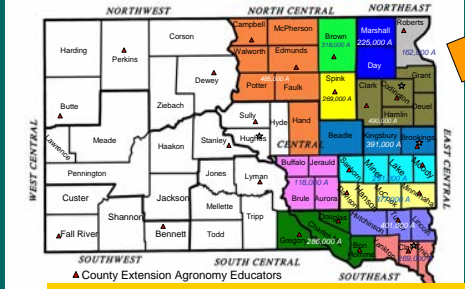


Dry Spore Trapping Sites

**Fig 4. Most commonly encountered diseases in SD sentinel plots:**  
A) Brown spot, B) Bacterial blight, and C) Bacterial pustule.



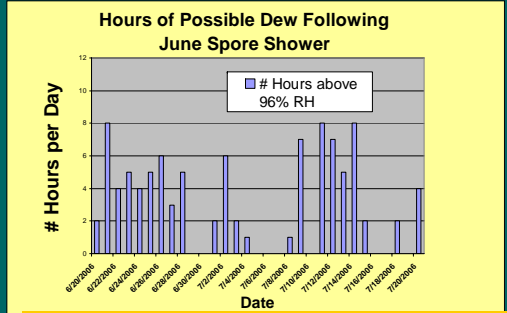
**Fig 5. SBR-like spores (circled) found Jun. 28-Jul. 5 (Photo A) and Aug. 21-Aug. 28 (Photo B). Note the Puccinia-like pigmented spore in photo B (at arrow).**



**Fig 2. County aggregations, soybean acreage and Extension Educator locations.**

## Methods:

- Soybean (*Glycine max*) and dry pea (*Pisum sativum*) sites were established in grower fields or at University research farms.
- 33 plots at 26 sites were established. Sites were 50 feet by 50 feet (2500 ft<sup>2</sup> or 232 m<sup>2</sup>).
- Two sites had side-by-side irrigated vs. non-irrigated plots with identical varieties.
- Two sites (south of I-90) had multiple maturity groups represented. Maturity groups ranged from 0.9 to 2.3 in the plots observed.
- Two sites had "Syntinel" dry deposition spore traps co-located with the sentinel plot.
- Plots were monitored weekly by Extension Agronomy Educators from approximately June 1 to September 1, with additional monitoring until Sep 20 in eastern counties.
- Observation data was faxed to SDSU and posted to the <http://aphis.zedxinc.com> website.



**Fig 6. Hours of Dew for June 20-July 20 at Beresford site. Note the very dry conditions, which limited possible spore germination from SBR-like spores.**

## Results and Discussion:

- Asian soybean rust was not detected in the state.
- Based on diagnostic lab samples received, adequate statewide coverage was obtained with 26 plots strategically located by use of ecoregions and acreage aggregates.
- Foliar diseases were of minor importance in 2006. Septoria brown spot (Fig 4A) became more common late in the season, bacterial blight (Fig 4B), and bacterial pustule (Fig 4C) were also identified, but at low levels. Downy mildew was identified in east-central and south-eastern SD late in the season, but economically significant levels were not encountered.
- Nearly all sentinel plots experienced drought stress throughout the summer. The most severe drought was in the North Central area of the state.
- SBR-like spores were detected three times in the Syntinel spore traps (Fig. 5) (late June, late August and early September). The most significant spore shower occurred between Aug 21 and Aug 28 in Brookings in east-central SD.
- Weather conditions during the June SBR-like spore shower were unfavorable for disease development (Fig 6). Although weather conditions in August and early September favored rust development, a hard frost event on September 20 defoliated soybeans statewide and arrested any potential SBR disease development.
- Significant spore showers during reproductive growth stages indicate the need for further sentinel plot monitoring and spore tracking in the northern states.



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