

Urediniospore Release and Escape from Rust-Infected Soybean Fields

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ROTORODS BY LOCATION

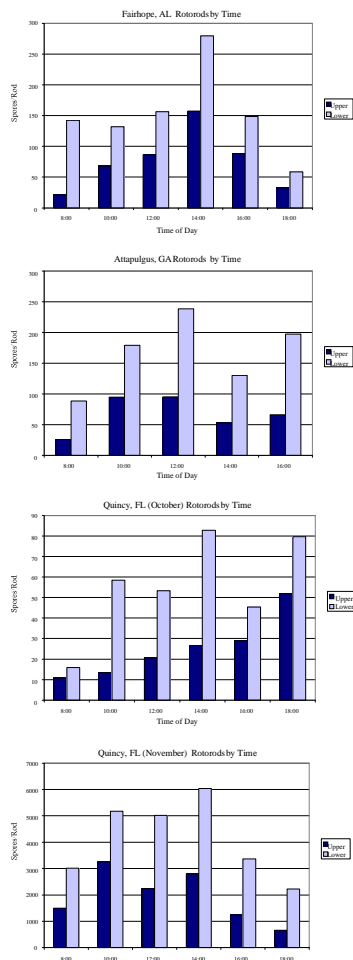


Fig 2. Rotorod collections by location and time over all sampling days. Typical spore release increased during the morning, peaked midday, and decreased during the afternoon.

*Samples taken before November occurred during Daylight Saving Time, while those taken in November occurred during standard time.

ROTORODS AND RAIN EVENTS

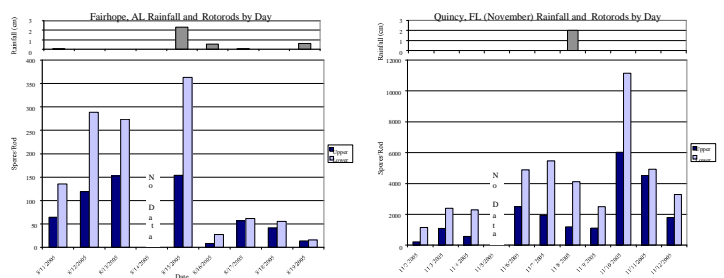


Fig 3. Rotorod collections by day. Subsequent to rain events, spore release as measured by rotorod collections decreased for 24-48 hrs.

OBJECTIVE:

To monitor release, dispersal, and germination rates of soybean rust spores produced from epidemics at various stages of development using rotorods, passive traps, and water agar plates, respectively, at three locations for 6-10 days each in 2005 (Table 1).

METHODS:

- Two pairs of **rotorod samplers** were positioned at 75% canopy height and above the canopy at a distance equal to 25% canopy height (Fig 1). Rotorod samples were collected daily at 2 hr intervals from 08:00 to 18:00, with each sampling interval lasting 30 min.
- Sixteen **passive traps** were positioned around the infected field at each study site, 50 ft and 200 ft from the edges of the plots at N, NE, E, SE, S, SW, W, and NW orientations. Passive trap samples were collected at 24 hr intervals (Fig 4).
- Spores were collected onto water agar plates from the lower, mid, and upper canopy at 10:00, 14:00, and 18:00. After incubating in the dark for 20-24 hrs spores were observed and enumerated under a dissecting microscope to estimate **germination rates**.

RESULTS:

- Enumerating spores on rods indicated a typical pattern of spore release and escape over the course of a day. In the morning, before dew dried, spore release was minimal. However, spore release increased after leaves dried, peaked during midday, then tapered off toward the evening (Fig 2). Rainfall events drastically reduced spore release for a 24-48 hr period (Fig 3).
- Spores enumerated on passive trap slides indicated that spores dispersed in the direction of prevailing winds less often than expected (1 of 22 observation days) (Fig 5b); more often, they dispersed in the direction opposite prevailing winds (7 of 22 observation days) (Fig 5a).
- Spores collected on water agar plates germinated at rates ranging from 0.8% to 99% with an average of 52% overall. At Attopulugus, GA, germination rate dropped during the 18:00 sample time, relative to the other sample times; likewise, at Fairhope, AL, the 14:00 sample time saw a relative decrease in germination rate. At Quincy, FL during cooler November temperatures, germination rate was similar over all sample times (Table 2).

Location	Sampling Dates	Soy Growth	Epidemic	Rotorods	Passives	Germ Rates
Fairhope, Alabama	8/11/2005 - 8/19/2005	R6-R7	Late	•	•	•
Attopulugus, Georgia	10/5/2005 - 10/11/2005	R7-R8	Late	•	•	•
Quincy, Florida	10/5/2005 - 10/12/2005	R3-R4	early	•	•	•
Quincy, Florida	11/2/2005 - 11/12/2005	R4-R5	peak	•	•	•

Table 1. List of locations and sampling methods used at each.

Fig 1. Image of rotorod samplers in rust-infected field at Fairhope, AL.

PASSIVE TRAPS



Fig 4. Sixteen passive traps were positioned around the infected field at each study site, 50 ft and 200 ft from the edges of the plots at N, NE, E, SE, S, SW, W, and NW orientations.

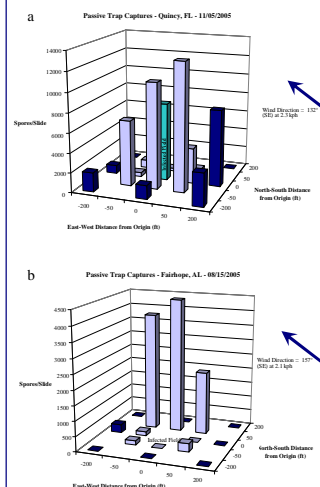


Fig 5. At Quincy, FL on 11/05/2005 (a), spores dispersed from the infected field in the direction opposite the prevailing wind (as on 7 of 22 observation days), while at Fairhope, AL on 8/15/2005 (b) spores dispersed in the same direction as the prevailing wind (the only 1 of 22 observation days).

GERMINATION RATES (%)

Location	Time	High	Mid	Low	Mean
Attopulugus, GA	10:00	27.9	23.3	26.8	21.4
	14:00	25.3	21.9	20.2	22.3
	18:00	13.4	16.0	12.8	22.7
	Mean	21.9	21.6	21.5	21.3
Fairhope, AL	10:00	16.3	19.9	17.4	15.1
	14:00	8.0	8.4	9.6	15.1
	18:00	12.6	15.6	23.1	15.9
	Mean	14.9	14.7	14.5	14.5
Quincy, FL	10:00	91.8	97.7	97.8	96.1
	14:00	95.0	97.6	97.6	96.7
	18:00	93.7	97.9	96.9	96.9
	Mean	96.2	96.7	96.8	96.2

Table 2. Germination rates varied more by location than by time of day or canopy height. Rates ranged from 0.8% to 99% and averaged 52%.

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Fig 6. *Phakopsora pachyrhizi* spores under 200x magnification.

