

Spore Release in Powdery Mildews

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ABSTRACT

Diurnal periodicity in several powdery mildews was studied in Australia from July to December 1969, with a Kramer-Collins spore sampler. In *Sphaerotheca fuliginea* on *Cucumis*, *S. pannosa* on rose, *Erysiphe cichoracearum* on *Pentstemon*, *E. polygoni* on *Lathyrus*, *Podosphaera leucotricha* on *Malus*, and *Oidium* sp. on *Eucalyptus*, spore release was periodic with peaks about midday.

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Additional key words: powdery mildew of cucumber, sweet pea, beard's tongue, apple.

Periodicity in spore release in powdery mildews with daytime peaks under field conditions is reported for *Erysiphe cichoracearum* DC. (2, 4, 9, 13), *E. graminis* DC. (1, 5, 7, 8, 9, 11), *E. polygoni* DC. (9, 12), *Uncinula necator* (Schw.) Burr. (10, 13), *Sphaerotheca pannosa* (Walbr.) Lev. (13), *Podosphaera leucotricha* (E. & E.) Salm. (13), and *Oidium* sp. on *Euonymus* (13). Further evidence of diurnal periodicity based on studies of several powdery mildews in Australia from July to December 1969 is reported here.

Most of the mildews occurred naturally on potted plants being grown in greenhouses. Sampling was in a small undisturbed room in the greenhouse with two Kramer-Collins spore samplers (6) using previously described techniques (9, 10). Temperatures fluctuated during the day from 21 to 32 C. Bench heat was used at night and evaporative cooling during warm days; under these conditions, both hosts and parasites grew well. Spores from single infected leaves were sampled so long as sporulation continued, usually 6-8 days, but sometimes up to 14 days. All species studied yielded a characteristic spore release pattern with maximum numbers of spores released near midday.

Sampling of *Podosphaera leucotricha* on apple (*Malus sylvestris*) began on 17 November on a plant inoculated 1 week earlier. The pattern of spore release was similar on 14 consecutive sampling days with spore release beginning shortly after daybreak,

reaching a peak about midday, then declining gradually through the afternoon and early evening (Fig. 1).

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. on cucumber (*Cucumis sativus*) appeared on seedlings in November and was sampled from 10 to 30 November. The daytime pattern was similar to that of *Podosphaera*, with peaks between noon and 3 PM (Fig. 1). *S. pannosa* appeared on hybrid tea roses (*Rosa*) that had been potted in August. Samples were taken on 7 days in September and 11 days in December. Despite considerable hour-to-hour variation, the spore release pattern was similar to that of other species with peaks between 11 AM and 1 PM (Fig. 1).

Erysiphe polygoni occurred in abundance on mature sweet pea plants (*Lathyrus odoratus*), and spore release was studied between 30 July and 11 August. Many conidia were released with wide hourly variation in numbers, but peak numbers were always between 9 AM and 3 PM. These results support earlier observations (2, 9, 12) of a midday peak. *E. cichoracearum* was observed on mature *Pentstemon barbatus* in a border garden, and on one infected plant transplanted into the greenhouse and sampled for 8 consecutive days beginning 5 September. The spore release pattern was similar to *E. polygoni*.

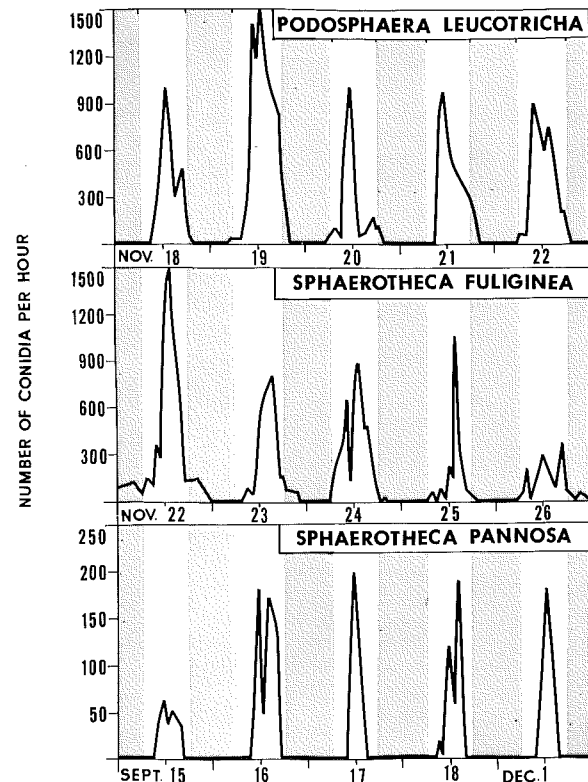


Fig. 1. Numbers of conidia of *Podosphaera leucotricha*, *Sphaerotheca fuliginea*, and *S. pannosa* recorded under continuous sampling of a single leaf in a greenhouse. Stippled areas indicate darkness.

An *Oidium* sp. was observed on *Eucalyptus campaspe* seedlings, and samples were taken from 31 October to 9 November. Mycelium was scanty and spore production was low, but numbers were sufficient to indicate a pattern. The first spores appeared shortly after daybreak; spore number peaked between 9 and 10 AM, then decreased during the afternoon.

Powdery mildews are important plant pathogens in Australia, where summers are dry and hot and winters are cool and wet. Under those conditions, cleistothecia rarely develop and many species occur only in their conidial, *Oidium* stage (3). Information on conidial dissemination is thus of considerable importance. Yarwood's early discovery of a cyclic daytime pattern in spore release in *E. polygoni* (12) and his conclusion that most powdery mildews possess diurnal periodicity (13) have been confirmed by subsequent work (4, 8, 9, 10, 11) and by these results.

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