

# What is the origin of the initial inoculum for strawberry powdery mildew epidemics ?

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**Introduction** The UK now grows 80% of the strawberries consumed here. This has been achieved by precision choice of varieties, the use of fertigation and also the use of fleece in the spring and polythene tunnels, primarily during harvest. Everbearer strawberries are harvested from May through to the end of September, so crops will be under polythene tunnels for up to 5 months. Some plants are grown for one season only, others are grown for 3 to 4 seasons. Environmental conditions in the tunnels can be conducive to the build up of epidemics of strawberry powdery mildew (SPM). Controlling SPM is a major cost for strawberry growers. Growers tend not to see early disease development and then be taken by surprise when the epidemic builds up very suddenly.

**Aim** to show that SPM inoculum enters the crop from plants delivered to the growers as well as overwintering as chasmothecia on perennial crops.

## Materials and Methods

2013 - Strawberry plants (cv. E\*\*\*\*) were bought from a propagator and were planted in the glasshouse at Hatfield in February 2013. These plants were monitored weekly for 4 months for powdery mildew development. The plants for the fertigation trial were assessed for SPM on arrival at the growers.

2014/2015 - Strawberry plants were delivered to the farm from propagators and leaves were randomly sampled before planting. Sampled leaves were assessed for SPM in the lab at UH.



Figure 1 Trading routes for strawberry crowns to Maltmas Farm, Wisbech, UK. The star represents Maltmas farm. The purple line indicates crops imported from Spanish propagators; the yellow line indicates crops imported from the Netherlands and green lines indicate UK propagators.

## Results

2013: (i).14% of strawberry plants had developed infection of *Podosphaera aphanis* by July 2013;

(ii).The pre-assessment of the 2013 fertigation trial showed that 4% of the strawberry plants had symptoms of *p. aphanis* on delivery.

2014/15: Figure 1 shows the source of plants for 2014/15. The disease assessment results are provided in Table 1.

Table 1 *P. aphanis* infection rate of strawberry plants from the propagators in 2014/15

Sampling date	Strawberry Cultivar	Country of origin	Number of leaves sampled	Percentage of infected leaves (%)
19/03/2014	S****	Netherlands	48	12
24/02/2015	S****	Netherlands	200	15.5
10/03/2015	A****	Spain	48	6.3
	A****	Netherlands	64	7.8
18/03/2015	J****	Netherlands	103	7.8
23/03/2015	J****	Netherlands	100	7
30/03/2015	J****	Netherlands	100	5
07/2015	Misted tips	UK	-	90

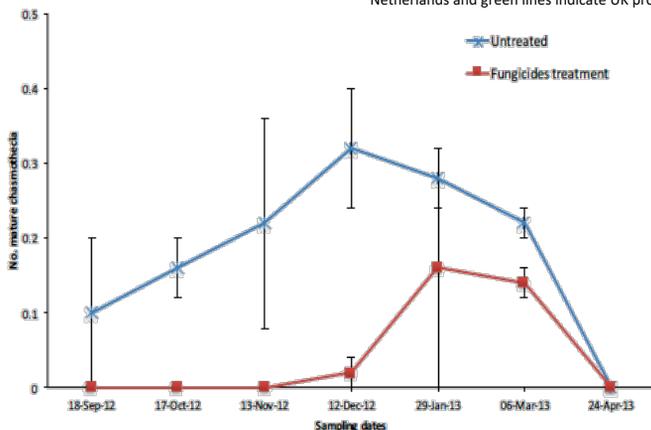


Figure 2 The average number of chasmothecia per leaflet on 50 strawberry leaves sampled in the open field monthly from September 2012 to April 2013 at Maltmas Farm.

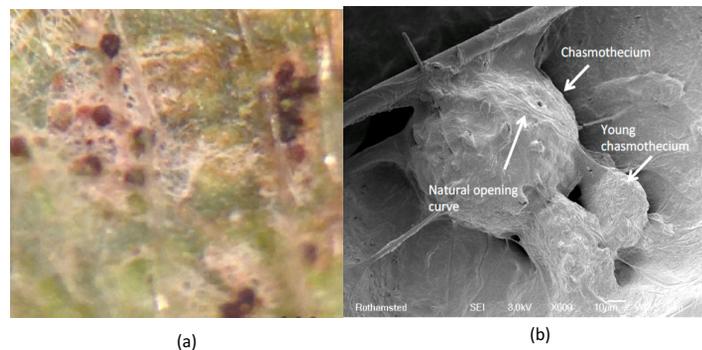


Figure 3 (a) Microscope and (b) SEM images of chasmothecia (Jin, 2015)

**Discussion (i).Where does the inoculum come from?** The results presented here (and others not presented) show that the disease overwinters as chasmothecia (Fig 2 & 3) on perennial plants. They also show that SPM arrives at the farm in the delivery of the plants from the propagators (Fig 1 & Table 1), though the disease levels vary considerably. **(ii). What are the implications for strawberry growers?** Strawberry growers need to expect inoculum to be present and be prepared to use fungicides “off season” (Fig 2) on perennial plants to reduce disease inoculum. Also, they invariably need to use fungicides on newly delivered plants to prevent disease build up.

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