Archival copy: for current recommendations see http://edis.ifas.ufl.edu or your local extension office.

PP-208

UF UNIVERSITY of FLORIDA
IFAS Extension

Powdery Mildew of Strawberries[1]

N.A. Peres and J.C. Mertely[2]

Powdery mildew, caused by *Sphaerotheca macularis*, occurs in most areas of the world where strawberries are grown.

Pathogens and Symptoms

S. macularis infects leaves, flowers and fruit. Early foliar infections are characterized by small white patches of fungus growing on the lower leaf surface. On susceptible cultivars, dense mycelial growth and numerous chains of conidia (spores) give these patches a powdery appearance (Figure 1). Under favorable conditions, the patches expand and coalesce until the entire lower surface of the leaf is covered (Figure 2). In some cultivars, relatively little mycelium is produced, making it difficult to see the white patches. Instead, irregular yellow or reddish brown spots develop on colonized areas on the lower leaf surface, and eventually break through to the upper surface (Figure 3). The edges of heavily infected leaves curl upward (Figure 4). At times, dark round structures (cleistothecia) are produced in the mycelia on the undersides of leaves (Figure 5). Cleistothecia are initially white but turn black as they mature. The fungus also infects flowers, which may produce aborted or malformed fruit. In addition, *S. macularis* colonizes older fruit producing a fuzzy mycelial growth on the seeds (Figure 6). Both types of infection may reduce fruit quality and marketable yields.

Disease Development and Spread

Sphaerotheca macularis is an obligate parasite that only infects living tissue of wild or cultivated strawberry. In temperate areas, the pathogen may survive by producing cleistothecia. The fungus readily infects living, green leaves in the nursery. Thus, infected transplants are normally the primary source of inoculum for fruiting fields in Florida. When conditions are favorable, conidia produced on infected plants are wind dispersed. Development and spread of powdery mildew is favored by moderate to high humidity and temperatures between 60° to 80° F. Rain, dew and overhead irrigation inhibit the fungus. Because dry conditions and high humidity are common in greenhouses and plastic tunnels, powdery mildew is typically more severe in protected culture. In open fields in central Florida, the disease is typically most severe in November and December, usually subsides in January and early February, but may reappear in late February and March.

1. This is document PP-208 a publication of the Plant Pathology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. Publication date: March 2005. Please visit the EDIS Website at http://edis.ifas.ufl.edu.

2. N.A. Peres, assistant professor, Plant Pathology Department, and J.C. Mertely, coordinator programs/services, Gulf Coast Research and Education Center--Dover, FL. Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611.

The use of trade names in this publication is solely for the purpose of providing specific information. UF/IFAS does not guarantee or warranty the products named, and references to them in this publication does not signify our approval to the exclusion of other products of suitable composition.

The Institute of Food and Agricultural Sciences (IFAS) is an Equal Opportunity Institution authorized to provide research, educational information and other services only to individuals and institutions that function with non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, marital status, national origin, political opinions or affiliations. U.S. Department of Agriculture, Cooperative Extension Service, University of Florida, IFAS, Florida A. & M. University Cooperative Extension Program, and Boards of County Commissioners Cooperating. Larry Arrington, Dean

Archival copy: for current recommendations see http://edis.ifas.ufl.edu or your local extension office.

Control

Use of transplants free of powdery mildew is a good method for controlling the disease but even disease free fields can become infected by conidia blown in from neighboring fields. Cultivars differ widely in their resistance to powdery mildew. Unfortunately, the most popular cultivars, Strawberry Festival and Camarosa, are quite susceptible to the disease. Fields with susceptible cultivars should be surveyed regularly for powdery mildew, especially early in the season. Fungicides should be applied at the first sign of disease to control powdery mildew on susceptible cultivars. This is especially important when using protectant fungicides such as elemental sulfur. Systemic fungicides like the benzimidazoles (Topsin M®) and the sterol inhibitors (Nova® and Procure®) can effectively control powdery mildew if the pathogen population has not become resistant to them. Strobilurin fungicides such as Abound®, Cabrio®, and Pristine® are also effective in suppressing the disease, but caution should be taken to not to exceed four to five applications per season. Controlling the foliar infections helps to prevent fruit infections.

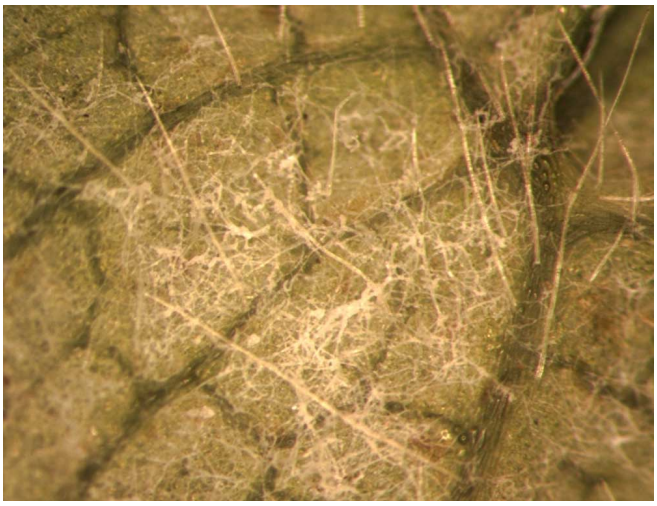

Figure 1. Mycelia of *Sphaerothecs macularis* on strawberry leaf surface. Credits: UF, GCREC

Figure 2. Lower leaf surface of strawberry covered with powdery mildew. Credits: UF, GCREC

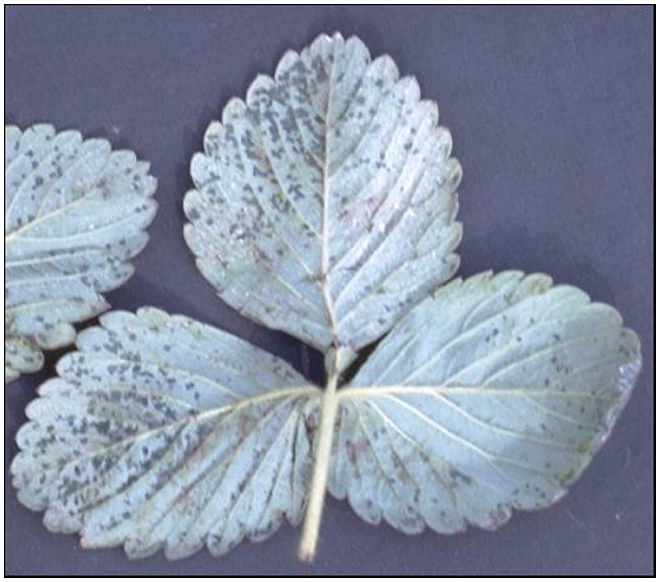

Figure 3. Reddish-brown spot reaction caused the *Sphaerotheca macularis* in some cultivars. Credits: UF, GCREC

Archival copy: for current recommendations see http://edis.ifas.ufl.edu or your local extension office.

Figure 4. Curling leaves on severely infected plants.
Credits: UF, GCREC

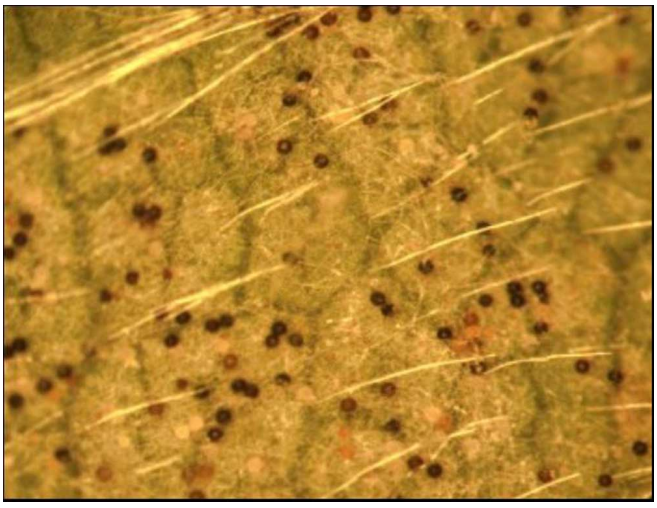

Figure 5. Micrograph of cleistothecia on leaf surface.
Credits: UF, GCREC

Figure 6. *Sphaerotheca macularis* on seeds. Credits: UF, GCREC

Archival copy: for current recommendations see http://edis.ifas.ufl.edu or your local extension office.

Table 1. Products labeled in Florida for control of powdery mildew of strawberry.

Trade Name	Active ingredient	Type	PHI or REI	Comments
Abound	azoxystrobin	strobilurin	4	Do not add silicone sufactants or mix with EC formulations.
Armicarb, Kaligreen	potassium bicarbonate	salt	4	Do not mix with highly acidic products.
Cabrio EG	pyraclostrobin	strobilurin	24	No more than two sequential applications.
Nova 40W	myclobutanil	sterol inhibitor	24	Do not apply more than 30 oz/A/season.
Pristine	boscalid + pyraclostrobin	carboxamide + strobilurin	24	No more than 115 oz product/A/season.
Procure 50WS	triflumizole	sterol inhibitor	24	No more than 32 oz/A/season.
Topsin M 70WSB	thiophanate methyl	benzimidazole	24	No more than 4 lbs product/A/season.
Wettable sulfurs (numerous trade names)	sulfur	elemental	24	Suppresses mites, including predatory populations in biological control programs.

* PHI = Post harvest interval; REI = Restricted entry interval.
Recommendations given in this fact sheet are based on experimentation and statements from the manufacturer. Consult the label of all products for specific use requirements and restrictions.