NEW APPROACHES TO WHITE MOLD CONTROL

Walter R. Stevenson[1/]

White mold caused by the soilborne fungus *Sclerotinia sclerotiorum* is an economic threat to many broadleaf plants. This fungus attacks most commonly grown vegetables including snap bean, lima bean, pea, potato, tomato and cabbage. Field crops such as soybean, dry bean, lupine, sunflower and canola are also susceptible to attack. Recent outbreaks of white mold on soybeans are a strong indication of the widespread distribution of this pathogen and the level of damage this disease can cause. These outbreaks on soybean also send a strong message regarding the future risk of white mold on soybeans, snap beans and other broadleaf crops in Wisconsin.

Current comprehensive management of white mold on succulent beans includes crop rotation (3-5 years), wide row spacing to favor rapid drying of plants after rain or irrigation, and the application of fungicides during the plant bloom period. Available fungicides include benomyl (Benlate), thiophanate methyl (Topsin-M), vinclozolin (Ronilan), and iprodione (Rovral). Depending on the favorability of environmental conditions during the bloom period (extended wet and warm, but not hot are best for white mold development), sprays can be eliminated or sprays are applied once or twice. Applying fungicide after white mold symptoms are evident is not effective. All of the currently available succulent bean cultivars are susceptible and while breeders are making some progress toward developing white mold resistant cultivars, the release of resistant cultivars will likely be years away.

New and novel disease management strategies are being developed. One of the more interesting strategies is the development of a biological control that uses the fungus *Coniothyrium minitans*. Spores of *C. minitans* are applied to moist soil three to four months prior to the planting of a susceptible crop. The spores of *C. minitans* germinate and infect the soilborne resting structures (sclerotia) of *S. sclerotiorum* and destroy the sclerotia over a period of several months. Contans WG, a commercial product containing *C. minitans*, is produced by Prophyta Biologischer Pflanzenschutz CmbH of Germany and will be distributed in the U.S. by Encore Technologies, LLC. Contans WG is currently going through review by the EPA, but is expected to have label approval prior to the 2001 growing season.

Use of the Contans WG product is expected to help reduce the population of soilborne sclerotia of *S. sclerotiorum* in production fields. The product fits into IPM management systems where fields are scouted and areas of white mold infection are marked for post-harvest application of Contans WG. Assuming that the treated fields

[1/]Vaughan-Bascom Professor of Plant Pathology, Department of Plant Pathology, University of Wisconsin, 1630 Linden Drive, Madison, WI 53706, Phone: 608-262-6291; Fax: 608-263-2626; Email: wrs@plantpath.wisc.edu

will be rotated with non susceptible crops during the next year or two, it should be possible to then plant white mold susceptible crops such as snap beans into these fields with greatly reduced risk to white mold. For those snap bean fields planted in late June to early July, it may be possible to apply Contans WG in early Spring, early April to early May, to allow a three month period between application and the flowering of the snap bean crop, the time when most infection would normally occur. By reducing the source of inoculum, the amount of plant infection should be drastically lowered.

The registration of Contans WG, when approved, will allow product use on all crops including succulent beans, soybeans, dry beans, sunflowers, canola, and other vegetables. The commercial formulation of Contans contains 1×10^9 active spores per gram and easily mixes with water. While Contans should not be mixed with fungicides at application, the material is compatible with some other pesticides as described on the label.

We began field testing Contans WG on snap bean acreage in 2000. During the 2000 cropping season, field trials were established in grower fields in three locations (Table 1) in Wisconsin to evaluate the efficacy of Contans WG, a commercially available preparation of the fungus *Coniothyrium minitans* which has shown activity antagonistic to the white mold fungus, *Sclerotinia sclerotiorum*. At each location, Contans WG was applied at a rate of 4 lb/A prior to bean planting. Areas were marked in each field to make four treatment combinations: Untreated, Standard fungicide application only (grower applied), Contans WG treatment only and Contans WG plus grower-applied fungicide treatment. Four plots (treatment replications), each 10 rows wide by 30 feet long were marked in the central portion of each treatment area for subsequent data collection. These plots were evaluated for white mold development immediately before commercial harvest. Four five-foot-long sections of row, chosen at random from each plot, were rated for pod infection and disease severity (Cumberland, Sep 5; Hancock, Aug 25; Plover, Aug 28). The number of infected pods and the percent infection were determined for each plant in each row being evaluated.

The incidence of white mold was low at all three locations, but there did appear to be a decrease in white mold severity and incidence of infected plants and pods at all three locations in plots treated with Contans WG (Table 2-4). Disease control using Contans WG was equivalent to control associated with the standard fungicide program at each site. At this low level of disease, there did not appear to be an additive benefit of using both Contans WG and a fungicide application. While limited in scope, these data are encouraging. Under normal circumstances, the application of Contans WG would occur three months prior to an anticipated outbreak of white mold, normally the blossoming period of the snap bean crop. In our field plots, the interval between Contans application and crop flowering was substantially less, due to scheduling difficulties related to the timing of pea harvest and snap bean planting. We would anticipate improved efficacy with Contans WG when applied three months prior to the blossoming of the snap bean crop.

Appreciation is expressed to cooperating growers and field personnel for assistance in coordinating these field trials, to Encore Technologies LLC for supplying sufficient supplies of Contans WG for all the field trials and to the MWFPA membership for project funding.

Table 1: Summary of field trial locations and treatment schedule.

Location	Cultivar	Planted	Contans® WG	Fungicide
Cumberland	HyStyle	7/8/00	4 lb/A, 6/9/00	Benlate, 2 lb/A + Kocide 2000, 1.5 lb/A, 8/17/00
Hancock	HyStyle	6/29/00	4 lb/A, 6/28/00	Topsin M, 1.5 lb/A, 8/10/00
Plover	DelMonte 0488	6/27/00	4 lb/A, 5/23/00	Benlate, 1.5 lb, 8/10/00

Table 2. Site #1 – Cumberland, WI. Plot coordinated by Tom Rabaey, Pillsbury Inc.

Treatment and rate	Disease severity (%) [1]	Incidence of infected		Avg. no. infected pods/ plant	% of plants with					
		Plants [2]	Pods [4]		0	1	2	3	4	5
					infected pods/plant					
Untreated	1.8	12.1	2.0	0.2	89.7	4.4	1.9	2.4	0.4	1.2
Fungicide	0.7	5.5	0.7	0.1	95.1	2.9	0.8	0.8	0.4	0.0
Contans® WG	0.6	4.7	0.6	0.1	96.0	1.5	1.8	0.7	0.0	0.0
Contans® WG + Fungicide	0.8	5.3	0.5	0.1	97.5	1.2	0.2	0.6	0.4	0.0
Pr>F [5]	0.22	0.07	< 0.01	0.01	0.03	0.35	0.06	0.20	0.69	0.01
Lsd [5]	NS	5.5*	0.6	0.1	4.3	NS	1.4*	NS	NS	0.6

Table 3. Site #2 – Hancock, WI. Cooperation with Seneca Foods Inc.

Treatment and rate	Disease severity (%) [1]	Incidence of infected		Avg. no. infected pods/ plant	% of plants with				
		Plants [2]	Pods [4]		0	1	2	3	4
					infected pods/plant				
Untreated	2.0	6.5	0.32	0.04	96.8	1.9	1.3	0.0	0.0
Fungicide	0.3	1.4	0.07	0.01	99.0	0.7	0.2	0.0	0.0
Contans® WG	1.2	4.0	0.11	0.02	98.0	2.0	0.0	0.0	0.0
Contans® WG + Fungicide	0.8	2.3	0.04	0.01	99.5	0.2	0.3	0.0	0.0
Pr>F [5]	< 0.01	< 0.01	0.04	0.06	0.03	0.10	0.25	---	---
Lsd [5]	0.7	2.5	0.19	0.03*	1.8	1.7*	NS	---	---

Table 4. Site #3 – Plover, WI. Cooperation with DelMonte Inc. and Prairie Star Ranch.

Treatment and rate	Disease severity (%) [1]	Incidence of infected		Avg. no. infected pods/ plant	% of plants with				
		Plants [2]	Pods [4]		0	1	2	3	4
					infected pods/plant				
Untreated	1.2	2.2	0.04	0.01	99.4	0.6	0.0	0.0	0.0
Fungicide	0.2	0.9	0.00	0.00	100.0	0.0	0.0	0.0	0.0
Contans® WG	0.5	1.2	0.06	0.01	99.5	0.2	0.3	0.0	0.0
Contans® WG + Fungicide	0.3	0.3	0.00	0.00	100.0	0.0	0.0	0.0	0.0
Pr>F [5]	0.07	0.09	0.24	0.22	0.26	0.21	0.09	---	---
Lsd [5]	0.8*	1.5*	NS	NS	NS	NS	0.3*	---	---