

Investigation of Aqua-Gro in Disease Reduction

Objective: To determine if Aqua-Gro can reduce disease incidence and the mechanism involved.

Materials:

- a) 36 - 4" clay pots containing 6-month-old stands of Pennlawn red fescue maintained at a 3" height of cut.
- b) 1 liter hand pump spray bottle
- c) "Bell jar"-type plastic enclosure constructed to allow light penetration and humidity build-up, without exposing plants to exterior mist.
- d) Mist chamber in greenhouse
- e) Pathogen: Helminthosporium sorokinianum
- f) CO₂ small plot sprayer (1 liter capacity)

Procedure: On October 30, 18 pots of Pennlawn red fescue were treated with Aqua-Gro at the rate of 16 fl oz/1000 ft², the application being made with a CO₂ small plot sprayer. The Aqua-Gro was immediately drenched into the soil with 1/4" of water. The other 18 fescue pots were left untreated. All pots were then placed in the greenhouse and given normal maintenance for the next two weeks.

On November 13 (2 weeks after treatment) six of the treated pots and six untreated controls were inoculated with a Helminthosporium sorokinianum spore suspension. This suspension was created by washing the fungal spores from the agar plate surfaces with water. Spore concentration was determined with a hemacytometer. The spore suspension was diluted 1:1 with a 1% Potato Dextrose Agar slurry to provide a final concentration of approximately 30,000 spores/ml suspension. This spore suspension was applied at a precise volume of 10 ml/pot with a hand sprayer to insure that equal inoculum pressure would be exerted on each pot.

Immediately following inoculation, 6 inoculated pots (3 treated, 3 untreated) were placed in a bell jar apparatus within the mist chamber and 6 inoculated pots (3 treated, 3 untreated) were placed within the mist chamber proper. All pots were held at room temperature (about 70°F) and were exposed to an approximate 12 hr daylight-darkness cycle.

After 48 hours, all pots were removed from the mist chamber and the bell jar. The 6 pots exposed to the mist showed heavy, large droplets of free water, interspersed with small droplets, extending the entire length of the leaves. The bell jar pots, however, showed large guttation droplets with much smaller droplets extending up and down the leaves .

Results: All 12 pots were placed in the greenhouse for 2 days to allow the disease to incubate. Disease ratings were then made for each pot on a scale of 1-9 (1, no disease - 9, severe disease). These ratings are as follows:

Table 14. Mist Chamber

<u>Treatment</u>	<u>Replication</u>				
	I	II	III	AVE	DMR (5%)
Aqua-Gro	9	8	9	8.7	A
Control	9	8	8	8.3	A

Table 15. Bell Jar

<u>Treatment</u>	<u>Replication</u>				
	I	II	III	AVE	DMR (5%)
Aqua-Gro	8	8	8	8	A
Control	9	9	8	8.7	A

On November 27, the above inoculum procedure was repeated with Pennlawn red fescue pots which had now gone almost 4 weeks without an Aqua-Gro treatment. Once again, observations were made regarding water droplet formation as the plants were removed from the mist chamber (November 29). The bell jar group showed no differences in droplet size or formation between the Aqua-Gro treated pots and the untreated pots. Many small droplets lined the leaves with large guttation droplets on the leaf tips. Within the mist chamber group, the leaves were lined with droplets of various sizes. In no instance were any obvious differences in droplet size or frequency noted between the Aqua-Gro pots and the untreated control pots.

After an incubation period (48 hrs) in the greenhouse, ratings were again taken (December 1). This data appears below:

Table 16. Mist Chamber

<u>Treatment</u>	<u>Replication</u>				
	I	II	III	AVE	DMR (5%)
Aqua-Gro	6	7	6	6.3	A
Control	6	5	7	6	A

Table 17. Bell Jar

<u>Treatment</u>	<u>Replication</u>				
	I	II	III	AVE	DMR (5%)
Aqua-Gro	7	8	7	7.3	A
Control	7	7	7	7	A

On November 27, all previously treated Aqua-Gro pots were given a second treatment at the rate of 16 fl oz/1000 ft², using the same procedure employed on October 30.

On December 11, the remaining pots (6 Aqua-Gro treated, 6 controls) were inoculated using the previously explained procedure. the "treated" pots had now received two Aqua-Gro treatments during the 6 week period.

Upon removal of the plants from the mist chamber and the bell jar apparatus on December 13, infection levels appeared to be uniform throughout. Droplet formation for each group was similar to previous descriptions. Similarly, there were no obvious differences in leaf wetness or disease level between the "treated" and the check plants.

On December 15, the plants were rated for disease incidence as previously described. The disease levels were as follows:

Table 18. Mist Chamber

<u>Treatment</u>	<u>Replication</u>			AVE	DMR (5%)
	I	II	III		
Aqua-Gro	8	7	8	7.7	A
Control	8	9	8	8.3	A

Table 19. Bell Jar

<u>Treatment</u>	<u>Replication</u>			AVE	DMR (5%)
	I	II	III		
Aqua-Gro	6	7	8	7	A
Control	6	7	8	7	A

Results and Discussion

Aqua-Gro under the above conditions failed to reduce the incidence of *Helminthosporium* leaf spot on Pennlawn red fescue caused by *Helminthosporium sorokinianum*. This is not to imply that Aqua-Gro may not reduce the severity of other diseases or *Helminthosporium* leaf spot under field conditions. Perhaps Aqua-Gro would be more effective in reducing diseases such as *Sclerotinia* dollar spot where "dew" or guttation water plays a greater role in disease development.