Disease Susceptibility and Pathogenicity Trials with *Phaeomoniella chlamydosporum* on Concord Grape and 3309 Grape Rootstock at Lake Erie Grape Research and Extension Center North East, Pennsylvania

Phaeomoniella chlamydosporum (Pch), is a fungus that has contributed to decline of grapevines in many grape growing parts of the world. Isolates of this fungus have been found in grapevines in vineyards in New York and Pennsylvania. The objective of this research is to determine whether these New York and Pennsylvania isolates of Pch can cause symptoms of disease on Concord grape and 3309 grape rootstock cuttings in the greenhouse and field. Six Isolates of Pch, collected from trunks and roots of five grapevine varieties from two vineyards in New York and two vineyards in Pennsylvania, were used to inoculate cuttings in this experiment.

Inoculation of Dormant Cuttings

Single node dormant cuttings of Concord grape and 3309 grape rootstock were inoculated by drilling a small hole into each cutting just below the bud. The hole was filled with sterile water (water-inoculated checks) or spores of the fungus and sealed. Each treatment was replicated on ten cuttings. Nine to 14 weeks after inoculation, at least five replicates of each treatment were selected for symptom development and re-isolation of the fungus. Any cuttings that had not initiated shoots and/or roots were selected first. The remaining cuttings of each treatment that had produced shoots and roots were repotted and maintained in the greenhouse until later in the season (6-8 months after inoculation) when they too were processed for re-isolation and symptom development. The results are as follows.

<u>Nine to 14 weeks after inoculation:</u>

· Shoot growth initiation occurred in all water-inoculated Concord and 3309, whereas in cuttings inoculated with a Pch isolate, shoot initiation ranged from 80-100 % for 3309 and 0-50 % for Concord.

· Root initiation occurred in 90 % and 70 % of water-inoculated 3309 and Concord respectively. For cuttings inoculated with Pch isolates, root initiation was 100 % for the 3309 and 40-80 % for Concord.

· All water-inoculated 3309 showed some light brown discoloration of vascular tissue emanating from the hole, but no dark brown-black streaking or necrosis associated with the inoculation site. In water-inoculated Concord, discoloration of vascular tissue associated with the inoculation site was limited to the immediate margin of the hole. Cuttings inoculated with Pch exhibited dark brown-black streaking in vascular tissue typical of symptoms observed in Pch infected vines in the field.

· Callous development: The water-inoculated 3309 typically showed healthy green callous development around the inoculation hole, whereas the Pch inoculated 3309 cuttings showed no callous development around the hole, but dark necrosis. This would suggest that these Pch isolates inhibit callous development on 3309. However, this difference was not yet observed between the Pch and water-inoculated Concord.

· *Phaeomoniella chlamydosporum* (Pch) was re-isolated from all 3309 and all but one Concord cutting inoculated with Pch, but could not be isolated from any of the water-inoculated cuttings. Nine to 14 weeks after inoculation, Pch was re-isolated 20-27 mm from the inoculation site on 3309 cuttings. Detailed measurements of the extent of Pch colonization were not kept for all Concord cuttings of each treatment, but are generally comparable to the results in 3309.

<u>Approximately 6 months (for Concord) and 8 months (for 3309) after dormant inoculation</u>

· All water-inoculated cuttings had healthy looking tissue surrounding the hole that was not sunken or cankered, and a cylinder of healthy new wood had been produced. Older wood exhibited light brown/amber discoloration. In water-inoculated 3309, callous tissue had partially grown over the hole, but none of the holes

had completely calloused over. Inoculation holes of water-inoculated Concord were almost completely covered with healthy green callous tissue.

· Cuttings inoculated with Pch exhibited dark brown/black streaking in vascular tissue, extending the entire length of the cuttings. Streaking was typical of symptoms observed in Pch infected vines in the field. The Pch inoculated cuttings showed no callous development around the hole. The area around the hole was always black, sunken, and cankered, and new wood growth was inhibited in the cankered area. *Phaeomoniella chlamydosporum* was isolated from all 3309 and all but one Concord cutting inoculated with Pch, but could not be isolated from any of the water-inoculated cuttings.

Inoculation of active cuttings

The previous experiment was repeated on cuttings that had been allowed to develop small shoots before inoculation. Inoculation and experimental setup was conducted in the same manner with the same Pch isolates. However, re-isolation of the fungus and examination of internal symptoms would not be conducted until after vines had undergone a winter dormancy period. After inoculation in late July, cuttings were kept in the greenhouse until dormancy when they were transferred outdoors. The following spring, five Concord and five 3309 grapevines from among the water-inoculated vines and vines inoculated with four of the six Pch isolates, were planted in the vineyard (50 plants total) in a randomized complete block design. These vines will be evaluated over several seasons for growth effects and external symptoms of grapevine decline. The remainder were processed for re-isolation of the fungus about 10 months after inoculation.

<u>Ten months after inoculation</u>

Symptom expression and re-isolation were very similar to the results of the dormant inoculation.

· Most water-inoculated cuttings of 3309 and Concord showed light brown discoloration of older vascular tissue, but no black streaking or necrosis and no canker development associated with the inoculation site. Cuttings inoculated with Pch exhibited dark brown, sometimes black streaking in vascular tissue typical of symptoms observed in Pch infected vines in the field. Most water-inoculated cuttings showed some callous development around the inoculation hole. The Pch inoculated cuttings showed no callous development around the hole. Instead, the area around the hole was generally sunken, cankered, and necrotic.

· *Phaeomoniella chlamydosporum* (Pch) was re-isolated from all but one 3309 and all Concord cuttings inoculated with Pch, but could not be isolated from any of the water-inoculated cuttings.