HANSON, LINDA E.[1]*, REBECCA M. DAVIDSON[1], GARY D. FRANC[2], and LEE PANELLA[1]. 1USDA-ARS, 1701 Centre Ave., Ft Collins, CO; 2 University of Wyoming, Laramie, WY. **Analysis of benzimidazole-tolerance in *Cercospora beticola***

Cercospora beticola causes Cercospora leaf spot (CLS) of sugar beet and several other hosts in the Chenopodeaceae. On sugar beet, CLS is the most important foliar disease worldwide. The primary disease management methods are host resistance and foliar fungicide treatments. Benzimidazole fungicides target beta-tubulin and are used in some production regions for disease control. However, benzimidazole use is increasingly limited as benzimidazole-tolerance becomes more widespread in the pathogen population. In the high plains region (CO, MT, NE, WY), the prevalence of benzimidazole-tolerant isolates has been increasing. For example, 26% of fields tested in 1998 had benzimidazole-tolerant isolates while one or more tolerant isolates were found in 80% of the fields tested in 2003. We examined isolates of *C. beticola* from different years and production regions for sensitivity to benzimidazole fungicides and for their beta-tubulin gene sequence. Isolates with benzimidazole-tolerance had a mutation in the beta-tubulin gene that corresponded to mutations previously determined to confer benzimidazole-tolerance in other ascomycete fungi. A single mutation at predicted codon 198 was identified in all tolerant isolates, collected in different states and different years. This same mutation has been shown to confer sensitivity to N-phenylcarbamates (NPC). When our *C. beticola* isolates were tested for sensitivity to the NPC fungicide diethofencarb (DFC), benzimidazole-tolerant isolates proved sensitive to the NPC, while benzimidazole-senstive isolates showed little or no sensitivity to DFC. Ninety-six *C. beticola* isolates were collected in the central High Plains region of the United States in 2004. These isolates were tested for their response to benzimidazoles and DFC, and forty-three (45%) were highly sensitive to MB (100% growth inhibition at 1 ppm) and tolerant to DFC. Fifty-three (55%) were highly tolerant to MB and did not growth on DFC at 5 ppm (Figure 1). The growth on MB and DFC had a correlation coefficient of -0.971. PCR primers for the benzimidazole-tolerant and benzimidazole-sensitive sequences are being developed to investigate use in a more rapid method for detection of benzimidazole sensitivity. The negative cross resistance and knowledge of the mutation in the beta-tubulin gene may be useful to rapidly screen for shifts in the benzimidazole-tolerant population.

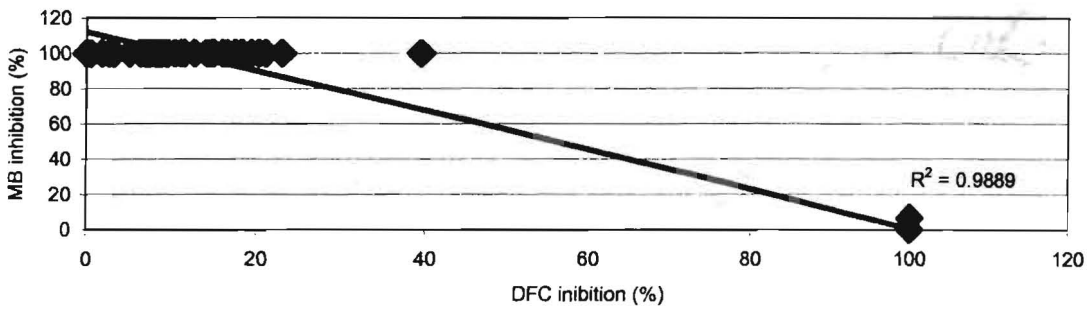

Figure 1. Percent growth inhibition for *Cercospora beticola* field isolates from 2004 on diethofencarb (DFC) versus benlate (MB).