De Lucchi, Chiara[1], Linda E. Hanson[2]*, Luca Sella[1], Marco De Biaggi[3], J. Mitch McGrath[2], Lee Panella[4], and Piergiorgio Stevanato[1], [1]Università degli Studi di Padova, Legnaro (Padova), Italy, [2]USDA-ARS Sugarbeet & Bean Research, East Lansing, MI 48824; [3] Massalombarda, Italy, [4]USDA-ARS Sugarbeet Research, Fort Collins, CO 80526. **Variable disease susceptibility and root rot response in sugar beet lines from Italy and the United States to isolates of *Fusarium oxysporum* f. sp. *betae***

The soil-borne fungus *Fusarium oxysporum* may cause severe yield losses in cultivated sugar beet worldwide. Previous research indicated that strains of the fungus can cause either Fusarium yellows or Fusarium root rot. Fusarium yellows was first reported in Colorado by Stewart in 1931, with foliar symptoms of wilting and intervenial yellowing and root symptoms of vascular discoloration. Fusarium root rot was first reported in Texas in 1989 and is characterized by a black rot in the root, as well as vascular discoloration and foliar symptoms similar to Fusarium yellows. In Texas it was reported that the different symptoms were caused by different *formae speciales*, *Fusarium oxysporum* f.sp. *betae* and *F. oxysporum* f.sp. *radicis-betae,* and that different isolates caused varying responses on the same sugar beet variety. Recent work in Europe indicated some varieties had root rot associated with *Fusarium* infection in the field. When these varieties were tested with US isolates of *Fusarium oxysporum* classified as *F. oxysporum* f.sp. *betae* (yellows type), a root rot was observed. To investigate whether this response was due to a misclassification of isolates or an effect of the beet germplasm, we compared the response of four US sugar beet germplasm and a collection of sugar beet lines from University of Padova (Italy) with different *Fusarium oxysporum* isolates (all classified as *F. oxysporum* f.sp. *betae*, from two of the three *F. oxysporum* genetic groups).

For the screening, one month-old seedlings were inoculated with a spore suspension of one of the *Fusarium oxysporum* isolates or mock-inoculated with sterile water. Inoculation was by soaking roots of plants in an aqueous spore suspension for 8 min. Plant were replanted and foliar symptoms were evaluated weekly for four weeks on a rating system from 0 to 5, where 0 was no symptoms and 5 was plants were dead. After the final rating, or when plants died, whichever occurred first, plants were harvested and the roots examined. Samples were taken from two randomly selected plants from each treatment, surface disinfested, and plated to determine presence of the strain used in inoculations and test for any confounding infections.

We observed severe root rot in the susceptible Italian lines inoculated with isolates that had never shown rot root in US sugar beet cultivars, but only internal vascular discoloration. These same isolates caused no external root symptoms in the USDA germplasm.

Figure 1. Sugar beet plants treated with *Fusarium oxysporum* isolate Fob216c. The plants represent two different germplasm, SP7322 from the USDA germplasm collection and germplasm "7" from the Dept. DAFNAE, University of Padova, Italy. Both showed complete foliar collapse by three weeks after inoculation but root symtpoms differed.

Our results indicate that Fusarium root rot is induced not only from different *Fusarium oxysporum* isolates that infect plants, but also due to different host factors.