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### ABSTRACT

*Fusarium* species can cause a number of problems in sugar beet and dry bean, including wilts, yellows, and root rot. The most important of these diseases involve *forma specialis* of *Fusarium oxysporum*. We surveyed dry beans and sugar beets from Colorado, Nebraska, Oregon, and Wyoming to determine which *Fusarium* species and which *F. oxysporum* *forma specialis* were associated with yellowing of the plants. From sugar beets, 65% of the *Fusarium* isolates were *F. oxysporum*. The remaining isolates included *F. avenaceum*, *F. equiseti*, *F. lateritium*, *F. proliferatum*, *F. scirpi* and *F. solani*. Other pathogenic fungi also were isolated, including *Alternaria*, *Pythium*, and *Rhizopus*. Fifty-three *F. oxysporum* isolates obtained during three years in the survey and an additional 18 isolates from our pre-existing collection were tested for pathogenicity on dry bean and sugar beet using a root clip method. Of the 71 sugar beet isolates in the collection, 14 % were highly virulent, 11 % moderately virulent and 75 % non-pathogenic on sugar beet. Five *F. oxysporum* strains isolated from sugar beet caused stunting and vascular discoloration in dry bean. Of four bean isolates tested, one caused symptoms on highly stressed sugar beet. Other isolates could be recovered from symptomless sugar beets, indicating that sugar beet is a potential symptomless carrier for *F. oxysporum* that can infect dry bean. Sugar beet pathogens similarly could be isolated from symptomless roots of dry bean. This is of concern since it would allow for increased inoculum in a rotation involving both sugar beet and dry bean, thus limiting the effectiveness of rotation as a disease control method.

Of the other *Fusarium* species isolated, *F. solani* and *F. avenaceum* have been reported as pathogens of sugar beet. However, the isolates obtained in our survey did not cause symptoms in our greenhouse assay.

Using RAPD primers, a high level of diversity was found between the different isolates of *F. oxysporum* from sugar beet. While the majority of the sugar beet pathogens clustered based on their RAPD pattern, non-pathogenic isolates appeared in the same group as the pathogens, and some pathogenic strains were in divergent groups. The RAPD banding patterns could not be used reliably to differentiate between either the dry bean and sugar beet pathogens, nor between pathogenic and non-pathogenic isolates.

Twenty-five sugar beet lines with reported *Fusarium* resistance were tested for their response to three different *F. oxysporum* f. sp. *betae* isolates from our collection; two were highly virulent and one was moderately virulent in our initial tests. All of the sugar beet lines developed disease with at least one of the *Fusarium* isolates.