ABSTRACT OF HABILITATION THESIS

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THE ETIOLOGY OF SELECTED DISEASES OF SUGAR BEET ROOTS

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Key words: sugar beet, root rot, Aphanomyces cochlioides, Rhizoctonia solani, girth-scab, Rhizopus arrhizus

Some severe symptoms of the root rot on sugar beets have been observed in Poland since 2001. The cause of the disease was not known and because of this field, laboratory and greenhouse experiments were carried out in 2003–2006. As a result of these experiments, symptoms observed on sugar beet roots were categorized as Aphanomyces cochlioides Drechsler symptoms and girth-scab symptoms. Prior to this A. cochlioides had been known in Poland only as a pathogen of seedlings and young plants but not as a pathogen of mature roots. Typical symptoms of the disease occur mainly on the upper part of the root. The root surface becomes distorted, cracked and constricted below the crown. Light-brown or brown to black water-soaked lesions can occur. In severe cases the whole lower part of the root is damaged; on some tissues light brown to dark brown rot spots are observed, instead of this sometimes a thick layer of cork develops; in some cases only folds without rotten parts can be observed on the root surface. The pathogen is not uniformly distributed in rotten tissues. The symptoms of girth-scab can develop in many cases at the beginning of the disease and can promote A. cochlioides infections. The disease is enhanced by rainy and hot weather and can develop during the summer until harvest. Typical symptoms of girth-scab are stripes of cork tissue around the root surface: the stripes are light brown to brown, sometimes with cal- lus protuberances. Small to big, round or irregular spots made of cork tissue are possible. Rotting of tissues was not observed, even when such roots were stored in a refrigerator or at room temperature for three months. Until recently both types of symptoms described above have been known only as girth-scab in the Polish phytopathological literature.

Sugar beet crops can be affected by other pathogens as well, such as Rhizopus arrhizus, Rhizoctonia spp., Fusarium spp., Pythium spp. Their severity depends on some environmental factors. The root rot of sugar beets caused by Rhizopus arrhizus...
Fisher was observed in 2006. The fungus tends to be a problem only when a crop is negatively affected by some other factors such as high temperature (30–35°C), excess of soil moisture, crown injuries or insect injuries to roots.

The population of *Rhizoctonia solani* isolates from sugar beets was also examined. Results showed that they belonged to anastomosis groups: AG 5, AG 1 I-B, AG 2-1, AG 2-IIIB, AG 4 HG and AG 11. The occurrence of AG 11 isolates on sugar beets had been observed for the first time. Most of the *R. solani* and *Rhizoctonia* spp. isolates were obtained from seedlings and showed different virulence against sugar beets. The binucleate *Rhizoctonia* (BNR) isolates were the anastomosis groups E and K.

Results of the field experiments showed that weak injuries of the sugar beet roots surface can be conducive to an increase in sugar content.

The root rot diseases develop with greater intensity in irrigated fields, although the yield is more infected than in fields without additional irrigation, the total yield weight is greater. The tested sugar beet cultivars showed different susceptibility to the damage by *A. cochlioides*.


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