

FELIX, JOEL* and JOEY ISHIDA, Oregon State University/Malheur Experiment Station, 595 Onion Ave, Ontario, OR 97914. **Effect of *Cuscuta spp* parasitization on sugar beet root yield and sugar content.**

ABSTRACT

Dodder (*Cuscuta spp*) is among a few unique plants that are true obligate parasites. The host plant (in this case sugar beet) receives no benefit whatsoever from dodder, whereas the parasite receives all of its nourishment from the sugar beet. Dodder produces hard-coated seeds that remain dormant in the soil for more than 20 years. The sandy loam soils along the Snake River Plain in Eastern Oregon is favorable for sugar beet production, but unfortunately seem to also harbor the parasitic weed, dodder.

A survey of grower fields planted to sugar beets was conducted during October 2007 and 2008 to determine the effect of field dodder competition on harvestable root yield and sugar content of parasitized and non-parasitized plants in Eastern Oregon. Surveyed fields were planted to conventional and Roundup Ready sugar beet hybrids during March 2007 and 2008, respectively. All fields were furrow irrigated and production practices including fertilization and spraying for insect and diseases were based on the recommendations for the area. Weed control in fields sampled in 2007 was based on the micro-rate program of phenmedipham plus desmedipham plus ethofumesate + triflurosulfuron methyl + dimethenamid at 150 g + 5.8 g + 35 g ai/ha, respectively, plus methylated oil at 1.5% V/V. The 2008 survey indicated that most of the growers used two to three sequential applications of Roundup to control weeds. The use rates ranged from 630 to 950 g ae/ha and 790 to 1260 g ae/ha for the first and second application, respectively. For those who used three applications, the final application rates ranged from 630 to 1260 g ae/ha. Application timing commenced early April and the second application was done during mid-May to early-June, 2008. Timing for the third application was between mid-July and mid-August, invariably in a mixture with fungicides. Ten fields were arbitrarily chosen for the survey in 2007 and six in 2008, and were representative of dodder infestation in the area. A total of 10 samples (with 8 sugar beets each) were randomly harvested during October from two rows covering approximately 1 m² each in areas with and without dodder parasitization. Sugar beet root weight for each sample was recorded before transportation to the Amalgamated Sugar factory laboratory for commercial sugar content determination.

Sugar beet root yield and percent sugar content were significantly reduced for parasitized samples compared to non-parasitized areas. The root yield in the fields surveyed in 2007 ranged from 76 to 116 and between 42 to 84 T/ha for non-parasitized and parasitized areas, respectively. The corresponding sugar content for non-parasitized and parasitized roots ranged from 14.8 to 17.4 and 11.3 to 15.1%, respectively. Correspondingly, the estimated recoverable sugar was greater in non-parasitized areas (8,556 to 12,298 kg/ha) compared to parasitized areas (3,649 to 6,912 kg/ha). As in 2007, the root yield in 2008 was greater in non-parasitized compared to parasitized roots. The yield ranged from 85 to 112 and 59 to 91 kg/ha for non-parasitized and parasitized, respectively. The corresponding root sugar content in 2008 ranged from 15.3 to 16.9% and 12.7 to 15.7%, respectively. Similarly, the estimated recoverable sugar was greatest in non-parasitized compared to parasitized areas in 2008. The overall root yield, % sugar content and estimated recoverable sugar reduction in 2007 due to dodder parasitization was 36%, 19%, and 44%, respectively. There was a marked improvement in 2008 when Roundup tolerant sugar

beet hybrids were planted. The root yield, % sugar content and estimated recordable sugar loss in dodder parasitized plants in 2008 was 25%, 10%, and 28%, respectively.

Grower loss from *Cuscuta* parasitization is measurably high since both root yield and percent sugar content are used to determine payments. Research on the effectiveness of soil-active herbicides (Ethofumesate and *s*-Metolachlor) to control mid- and late-season emergence of dodder is greatly needed.