MARKETABLE SUGAR LOSS IN SUGAR BEETS PARASITIZED BY DODDER (*Cuscuta spp.*) IN THE TREASURE VALLEY OF EASTERN OREGON

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Introduction

Dodder (*Cuscuta* spp.) is an annual obligate plant known to attach itself to and parasitize plants, causing them severe damage. There are about 150 dodder species in the world, all parasitizing different crops and weeds. One species in particular, *Cuscuta campestris*, has been found parasitizing many crops and weed species including alfalfa (*Medicago sativa*), asparagus (*Asparagus officinalis)*, melons (*Cucumis* spp), safflower (*Carthamus tinctorius)*, sugar beet (*Beta vulgaris*), tomato, pigweed *(Amaranthus* spp.), lambsquarters *(Chenopodium album),* and field bindweed *(Convolvulus arvensis).* Dodder seems to lack an elaborate dispersal mechanism, and it is believed that soil movement within and between fields helps to move it from one field to another. Dodder produces a copious number of seeds that will last up to 60 years in the soil. The plant is characterized by cream-colored trailing stems that strangle plant leaves. Unlike other parasitic plants, dodder does not need a host to germinate, but must find one and attach within 10 days or it risks dying. Mature stems that have been removed from infested fields are known to reattach to green vegetations at the disposal site. The objective of this survey was to find out the level of root and sugar yield loss results from field dodder parasitization in sugar beets.

Procedures

A survey of grower fields planted to sugar beets was conducted during October 2007 to determine the effect of field dodder parasitization on harvestable root yield and sugar content of parasitized and nonparasitized plants in eastern Oregon. Sugar beet parasitization by dodder may be related to weed management programs used by growers in eastern Oregon, but may also be attributed to continuous emergence throughout summer.

Recommended production practices including fertilization and spraying for insect and disease prevention were practiced by all growers. The surveyed fields were planted in March, harvested in October, and the beet roots transported to the Snake River Sugar factory for sugar processing. All fields were furrow irrigated and did not show signs of moisture deficit at the time of sampling. Surveyed fields were chosen randomly and were representative of dodder infestation in the area.

Weed control in sampled fields was based on the micro-rate program of phenmedipham plus desmedipham plus ethofumesate plus triflusulfuron methyl plus dimethenamid at 150g plus 5.8 g plus 35 g ai/ha, respectively, plus methylated oil at 1.5 percent V/V. A total of 10 samples (8 sugar beets each) were randomly harvested at crop maturity from 2 rows covering approximately 1 yard^2 each in areas with and without dodder parasitization. Sample weight was recorded before transporting the sugar beet roots for commercial sugar content determination.

Results

Sugar beet root yield and percent sugar content were significantly reduced for parasitized samples compared to dodder-free (Table 1). Overall, sugar beet root yield for parasitized samples ranged between 13.1 and 39.7 ton/acre with an average of 26.4 ton/acre compared to 30.9 and 45.4 ton/acre with an average of 38.6 ton/acre for nonparasitized samples. The average sugar content for parasitized samples was 13 percent compared to 16 percent for nonparasitized roots. As a consequence, the estimated marketable sugar per acre was reduced 43 percent for parasitized areas. Root yield, sugar content, and estimated recoverable sugar varied widely between parasitized and nonparasitized sections within and among sampled fields. These results suggest that grower loss from dodder parasitization is great since both root yield and percent sugar content are used by the sugar processing company to determine payments.

Table 1. Sugar beet root yield, percent sugar, and estimated recoverable sugar in response to field dodder parasitization, Ontario, OR, Summer 2007.

Field (± Dodder)	Root wt	Sugar	Extractable sugar	Gross sugar	Conduc-tivity	Estimated recoverable sugar	
	ton/acre	%	%	lb/acre	mmho	lb/acre	lb/ton
1 +Dodder	38.7	15.1	84.8	11,710	0.73	9,929.0	256.6
1 -Dodder	42.3	15.3	85.8	12,935	0.66	11,094.3	262.1
2 +Dodder	31.6	12.5	84.5	7,915	0.69	6,690.5	211.5
2 -Dodder	45.4	14.8	83.6	13,418	0.82	11,221.5	247.3
3 +Dodder	39.7	13.1	85.6	10,427	0.63	8,925.1	225.0
3 -Dodder	37.8	16.9	87.2	12,762	0.58	11,132.2	294.7
4 +Dodder	25.5	14.7	82.4	7,467	0.91	6,150.9	241.4
4 -Dodder	39.1	14.0	76.6	10,958	1.31	8,395.5	214.5
5 +Dodder	21.7	12.5	83.2	5,439	0.79	4,527.5	208.8
5 -Dodder	37.2	15.8	84.5	11,779	0.77	9,954.6	267.6
6 +Dodder	16.9	11.3	83.8	3,829	0.71	3,209.5	189.5
6 -Dodder	33.1	16.4	85.1	10,869	0.73	9,253.6	279.2
7 +Dodder	17.0	12.1	84.5	4,103	0.69	3,465.9	204.0
7 -Dodder	39.5	15.8	87.7	12,509	0.52	10,971.2	277.7
8 +Dodder	28.6	12.3	84.4	7,016	0.70	5,918.1	206.7
8 -Dodder	39.1	17.4	87.2	13,637	0.58	11,896.5	304.2
9 +Dodder	23.9	13.4	86.8	6,424	0.54	5,576.2	233.1
9 -Dodder	30.9	14.6	85.5	9,005	0.67	7,696.9	248.8
10 +Dodder	20.3	12.2	81.6	4,960	0.91	4,049.6	199.1
10 -Dodder	41.0	15.4	85.6	12,627	0.68	10,804.8	263.8
Mean +Dodder	26.4	12.9	84.2	6,929.2	0.73	5,844.2	217.6
Mean -Dodder	38.6	15.6	84.9	12,049.9	0.73	10,242.1	265.9