

The Effect of Sugarbeet Tare Dirt Composting Process on the Viability of Sugarbeet Cyst Nematode. S.L. Hafez¹, K. Hara¹, F. Rashid¹ and D.D. Bowers². ¹University of Idaho, Parma Research and Extension Center, 29603 U of I Lane, Parma, ID 83660, ²Amalgamated Sugar Company, P.O. Box 87, Nampa, ID 83653.

Heterodera schachtii creates a disease problem for sugarbeet industry. Poor sanitation practices and returning tare dirt back to the field is considered the major means of nematode spread and reinfestation. Close to one-half million tons of tare dirt is collected annually from the total sugarbeet acreage for Amalgamated Sugar Company in Idaho and E. Oregon. This dirt is a good top soil, high in organic matter and nutrients, and it can be used if we can economically control the nematode present in it.

The objective of this was to study the possibility of controlling sugarbeet cyst nematode in the tare dirt through the composting process and thereby reduce the chances of its spread. During the composting process, organic matter breaks down and releases considerable heat and high concentrations of CO₂ and other toxic gases which could be lethal to nematodes. Soil temperature may rise as high as 70°C. Composting also enhances the activity of other nematode destroying organisms such as bacteria and fungi which may parasitize nematode eggs and juveniles.

Two experiments were conducted over two years during the fall of 1990 to spring of 1991 and fall 1991 to spring 1992. In the first experiment, wooden boxes (inside dimensions of 4' x 4' x 8') with bottoms were filled with tare dirt infested with high populations of cyst nematodes. Boxes were arranged in two rows 4 feet apart and replicated six times. Boxes were covered in fall and winter by black plastic for protection from snow and rain. In the second experiment, nematode infested tare dirt was collected at harvest time and piled in two 8' x 20' x 200' piles next to sugarbeet receiving station in Parma, Idaho. Tare dirt samples were taken from boxes and open piles before composting and five months later to determine nematode populations. Tare dirt was thoroughly mixed, and a 500 cc subsample was processed by a wet sieve method. Nematodes were extracted by the sugar flotation-centrifugation technique. The results indicate that under close system (boxes) no stages of the sugarbeet cyst nematode survived the composting process (Table 1). Under open piling system only 2% of the nematode were able to survive the composting process (Table 2).

To determine the nutritional value of composted tare dirt sample were analyzed for NPK value and the result showing in (Table 3).

Conclusions:

No stages of sugarbeet cyst nematode survived the composting process in redwood boxes. Composting sugarbeet tare dirt in open field piles will kill more than 98% of sugarbeet cyst nematode. Sugarbeet tare dirt may be used as a soil amendment or potting mix after proper and complete composting.

Table 1. The effect of sugarbeet tare dirt composting on sugarbeet cyst nematode populations. Parma, ID 1990-91. (Boxes)

Treatments	Nematode population in 500 cc tare dirt					
	Before composting			After composting		
	V.C.	Total eggs	Total Juv.	V.C.	Total eggs	Total Juv.
		11/1/90		4/5/91		
1	83*	17,813	1,608	0	0	0
2	113	22,850	2,822	0	0	0
3	118	22,317	2,737	0	0	0
4	134	26,439	3,348	0	0	0

* Average of six replicates

Table 2. The effect of sugarbeet tare dirt composting on sugarbeet cyst nematode populations. Parma, ID. 1991-92.

Sampling date	Nematode populations in 500 cc tare dirt			
	V.C.	Eggs/cyst	Juvenile/cyst	Total
12/26/91	29.8 A	73.0 A	19.5 A	2679.8 A
2/28/92	3.5 B	27.0 B	12.7 A	225.7 B
3/09/92*	0.7 B	4.0 C	3.7 B	10.2 B
5/26/92	1.3 B	10.0 C	4.1 B	41.2 B

Treatments followed by the same letter are not significantly ($P < 0.05$) different according to Duncan's Multiple Range Test.

* Tare dirt piles was turned over on that date.

Table 3. Tare Dirt Nutritional Value as Soil Amendment

Nitrate	65 ppm
Phosphorus	41 ppm
Potassium	401 ppm
pH	8.8
Organic matter	2.5

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Composting Effects on Nematode Populations

