

Seasonal decline of sugarbeet cyst nematode juvenile and egg populations in Idaho. Hafez, Saad L.¹, Farzana Rashid¹, and Kikuye Hara¹. ¹University of Idaho, Parma Research and Extension Center, 29603 U of I Lane, Parma, ID 83660.

Sugarbeet cyst nematode (*Heterodera schachtii*) has been recognized as one of the most serious problems for the sugarbeet industry in Idaho and Eastern Oregon. The degree of loss caused by this nematode depends on the initial nematode population density at planting, which is influenced by various edaphic and climatic conditions that affect its survival. The objective of this study is to determine the survival of sugarbeet cyst nematodes over winter at different soil depths and to predict the spring population of viable eggs and juveniles from samples collected in the previous fall.

The experiment was conducted under field conditions during the fall seasons of 1990 and 1991. Five pairs of 30-cm-deep and 30-cm-d plastic containers filled with sugarbeet cyst nematode-infested soils were buried, one on top of the other. The top container was at the 0-30 cm soil depth, and the bottom one was at the 31-60 cm depth. Soil samples were taken from each bucket in the fall and spring to determine population of sugarbeet cyst nematode eggs and juveniles.

The number of juveniles was reduced by 47% and 12.7% at the 0-30 cm and 31-60 depths, respectively. The number of eggs was reduced by 39% and 29.4% at the upper and lower depths, respectively. The results suggest that the population reduction will be higher at the 0-30 cm soil depth compared to 31-60 cm depth. During the summer, these containers were kept in cold storage at 1.6C, and samples from these were assayed in fall 1991. The number of juveniles was reduced by 28.4% at 0-30 cm and by 38.6% at 31-60 cm depth, and the numbers of eggs were reduced by 52% and 31%, respectively. The total % of reduction of eggs, juveniles and viable cyst at the 0 - 30 cm depth were 72, 71 and 62% and at the 31 - 60 cm depth were 61, 63 and 43.6% respectively as shown in Table 2.

Table 1. Seasonal decline of sugarbeet cyst nematode populations at different soil depth. Parma, ID. 1990-92.

| Nematode | % of Nematode Reduction | | | | | |
|-------------|-------------------------|----------|---------|---------|----------|---------|
| | Sampling Depth (cm) | | | | | |
| | 0 - 30 | | | 31 - 60 | | |
| | 4/12/91 | 11/25/91 | 3/12/92 | 4/24/91 | 11/25/91 | 3/12/92 |
| Eggs | 39 | 52 | 3.4 | 29 | 31 | 24 |
| Juvenile | 47 | 28 | 19 | 13 | 37 | 30 |
| Viable Cyst | 23 | 38 | 20 | 14 | 19.6 | 18 |

Table 2. Sugarbeet cyst nematode soil populations reduction (%) at two different depths over a two year period.

| Nematode | Sampling Depth (cm) | |
|-------------|---------------------|---------|
| | 0 - 30 | 31 - 60 |
| Eggs | 72 | 61 |
| Juveniles | 71 | 63 |
| Viable cyst | 62 | 43.6 |

The objective of this was to study the possibility of controlling sugarcyst nematode in the late 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 organisms 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 7') with bottoms were filled with late dirt infested with high population 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 late dirt was collected at harvest time and piled in two 8' x 30' x 30" piles next to sugarbeet receiving station in Parma, Idaho. Late dirt samples were taken from boxes and open piles before composting and five months later to determine nematode populations. Late 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 sugarcyst nematode survived the composting process (Table 1). Under open piling system only 25% of the nematode were able to survive the composting process (Table 2).

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

conclusion:

No stages of sugarcyst nematode survived the composting process in redwood boxes. Composting sugarcyst late dirt in open field piles will kill more than 90% of sugarcyst cyst nematode. Sugarcyst late dirt may be used as a soil amendment or potting mix after proper and complete composting.