Biological control of *Tetanops myopaeformis* (sugarbeet root maggot) using the entomopathogenic fungi *Beauveria bassiana* and *Metarhizium anisopliae*. SMITH, GARRY A.[1], JOHN D. EIDE[1], LARRY G. CAMPBELL[1], and LARRY J. SMITH[2], [1]USDA, Agricultural Research Service, 1307 North 18th Street, Fargo, ND 58105 and [2]Northwest Experiment Station, University of Minnesota, Crookston, MN 56716.

Sugarbeet root maggot is the most serious insect pest affecting sugarbeets in the upper Midwest. Potential loss of chemical controls and variable results with chemical controls led us to examine biological control measures.

Our previous laboratory studies have shown the efficacy of the entomopathogenic fungi *B. bassiana* and *M. anisopliae* on first and third instar sugarbeet root maggots (SBRM). Exposure of third instar larvae to *M. anisopliae* resulted in 94% mortality 15 days post-inoculation. The fungi are also effective against adult flies. In our Fargo ARS laboratory studies, we found that six days after inoculation mortality rates were 100% for *M. anisopliae* treated flies and 65% for *B. bassiana* treated flies.

Based on our laboratory results and on a one-year field pilot study, a three-year field study was initiated to determine the persistence of *M. anisopliae* over seasons and rotations. Autoclaved barley (as a carbon source) inoculated with *M. anisopliae* was dried and applied in the spring immediately prior to planting, fall preceeding planting, or fall plus spring in replicated field plots at Crookston, MN, in 1996.

Sugarbeets inoculated in the fall plus spring had both significantly less damage (Table 1) and significantly greater recoverable sugar per acre (8074 lbs per acre) than the controls (6338 lbs. per acre). These plots also produced more recoverable sugar than Lorsban-treated plots, which averaged 7748 lbs per acre (Table 2). Since sucrose percentage was not significantly affected by any of the treatments, the increase in recoverable sugar is attributed to increased tonnage.

Table 1. Damage rating from field test of *Metarhizium anisopliae*, Crookston, MN, 1996.

	Treatment	Damage Rating
	Lorsban	3.02a*
Metarhizium Applied	Fall + Spring	2.90a
	Fall	3.40b
	Spring	3.61c
	No	4.12d

*Values followed by the same letter are not significantly different at the 0.05 probability level.

Table 2. Field test of *Metarhizium anisopliae* - Recoverable sugar per acre, Crookston, MN, 1996.

	Treatment	Recoverable Sugar Per Acre
	Lorsban	7748a*
Metarhizium Applied	Fall + Spring	8074a
	Fall	6580b
	Spring	6729b
	No	6338b

*Values followed by the same letter are not significantly different at the 0.05 probability level.

Table 3 summarizes the root yield and indicates that the yield resulting from fall plus spring treatment with *Metarhizium* was equal to the Lorsban treatment. The first year of field data suggests that *M. anisopliae*, applied in the right combination, may be as effective in controlling the SBRM as widely used chemical controls.

Table 3. Yield of sugarbeets from field test of *Metarhizium anisopliae*, Crookston, MN, 1996.

	Treatment	Tons Per Acre
	Lorsban	26.40a*
Metarhizium Applied	Fall + Spring	26.26a
	Fall	22.96b
	Spring	22.69b
	No	22.07c

*Values followed by the same letter are not significantly different at the 0.05 probability level.