

Oil Seed Radish and Mustard for Biofumigation of Soil Borne Pathogens in Sugar Beet Rotations

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Introduction

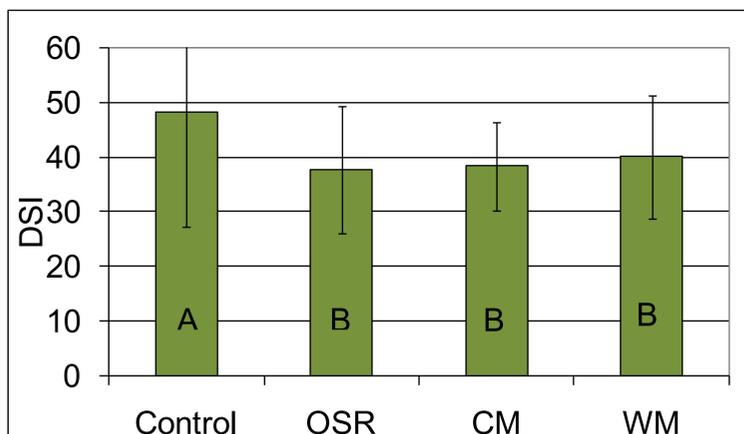
The aim of this investigation was to test if different Brassicaceae crops could be used for biofumigation in Sweden. The crops tested were oil seed radish (OSR, *Raphanus sativa*), white mustard (WM, *Sinapis alba*), chinese mustard (CM, *Brassica juncea*, variety Fumus) specially developed for biofumigation and, commercial mixtures of white mustard from Caliente Brand Mustards (CBM).

Materials and methods

Ten field trials (split plot design) and practical trials were performed during 2004–2008 on soils naturally infested with *Aphanomyces cochlioides*. The crops were sown in the middle of August after cereal harvest and fertilized with 50 kg N per hectare. The amount of biomass produced was measured and finally, half of the field plots were cut and immediately incorporated into the soil in the autumn (after 20 October). The remaining part of the field plot was ploughed in the early spring and sugar beets were sown in all plots.



Results



OSR, CM and WM tested in a bioassay for their effect on DSI on sugar beets. $R^2 = 83\%$, $Prob = 0,0162$.

Field trials

Incorporation of Brassicaceae intercrops in the autumn had no effect on disease severity on the sugar beet seedlings the following spring.

Incorporation of CM (*B. Juncea*) in early spring showed a tendency to reduce disease severity on seedlings of sugar beet.

Decrease in DSI (%) after biofumigation with Brassicaceae intercrops, compared to untreated control. The change in DSI is evaluated in a bioassay with soil collected from field plots ploughed in the autumn and in the spring.

	Autumn	Spring
Control	0	0
CM	-2	-7
OSR	-2	-3
WM	-1	-1
	ns	Prob = 0,08

Sugar yield in the field trials (average 10 trials) was not significantly effected in either direction by the Brassicaceae intercrops.

Practical field trials



Incorporation of a WM crop in the middle of October in the south of Sweden.

The Brassicaceae intercrops were incorporated in the autumn in the practical trials. No effect on disease severity on the sugar beet seedlings the following spring could be shown.

Sugar yield was significantly higher following biofumigation with OSR in one trial (Färlöv).

Sugar yield in practical strip trials with Brassicaceae intercrops (OSR and CBM) incorporated (ploughed) in the autumn before sugar beets

Location	Control	Cassius (OSR)	CBM99	CBM119
Färlöv	100	108 *	-	-
Mörarp	100	101 ns	105 ns	99 ns

Conclusions

Incorporation of OSR or WM intercrops during the autumn in Sweden have only a small effect on disease severity of *Aphanomyces* root rot of sugar beet seedlings the following spring.

Incorporation of CM (*B. Juncea*) in early spring showed a tendency to reduce disease severity on seedlings of sugar beet.

Sugar yield or plant number was not negatively effected by the Brassicaceae intercrops.