



Susceptibility of intercrops to infection with *Rhizoctonia solani* AG 2-2IIIB and their influence on disease severity in subsequently cultivated sugar beet

Introduction

The root and crown rot in sugar beet, caused by the soil-borne fungus *Rhizoctonia solani* (AG 2-2 IIIB), represents a disease with significant economical impact in many sugar beet growing areas. Frequently intercrops are cultivated before sugar beet. A lower risk of soil erosion, a reduced eluviation of nitrogen and the potential to reduce cyst nematodes (*Heterodera schachtii*) by resistant mustard and oil radish cultivars are the main aspects for cultivation of intercrops in Europe. However, only limited knowledge is available on their susceptibility to *R. solani* and their influence on the disease severity in subsequently grown sugar beet.

First results from different European institutes shows a great variability in susceptibility to *R. solani* in the commonly used intercrops. Therefore, the susceptibility of different intercrop species (*Brassica juncea*, *B. rapa*, *Raphanus sativus*, *Sinapis alba* and *Phacelia tanacetifolia*) to the pathogen was investigated *in vitro* (Keijer et al., 1997), in greenhouse and in field experiments (Fig. 1) with artificial inoculation. In addition, disease severity and yield in subsequently cultivated sugar beet was monitored in the field.



Fig. 1: Different intercrops in a field trial in Göttingen.

Results

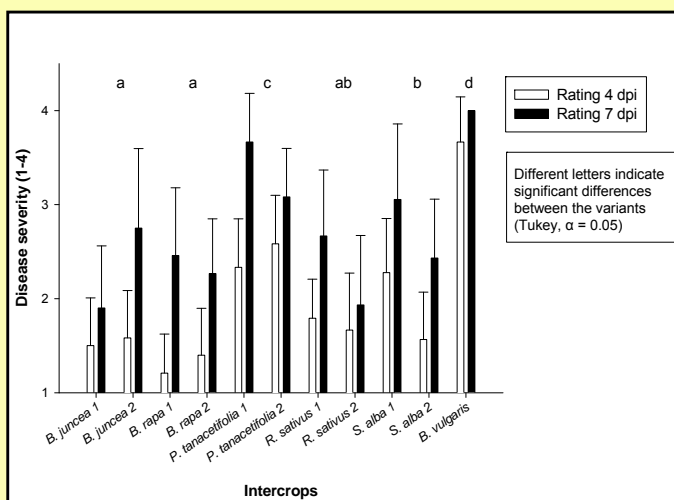


Fig. 2: Susceptibility to *R. solani* of different intercrops and sugar beet *in vitro* test. Disease severity as visual rating from 1 = no disease symptoms until 4 = dead plants.

Figure 2: Difference in disease severity observed between the tested intercrop cultivars in the *in vitro* test as rapid screening test for resistance against *R. solani*.

Figure 3: Difference in susceptibility of the different intercrop species to *R. solani* in a field test after artificial inoculation.

Figure 4: The susceptibility of the intercrops influenced differences in white sugar yield in subsequently cultivated sugar beet.

Table 1: Between all methods applied for investigation of intercrop susceptibility to *R. solani* significant correlations exists.

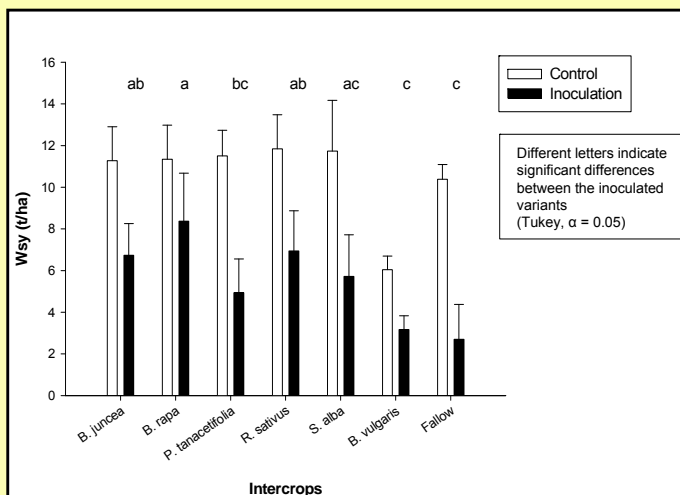


Fig. 4: White sugar yield (w sy) after the cultivation of different intercrops as preceding crops.

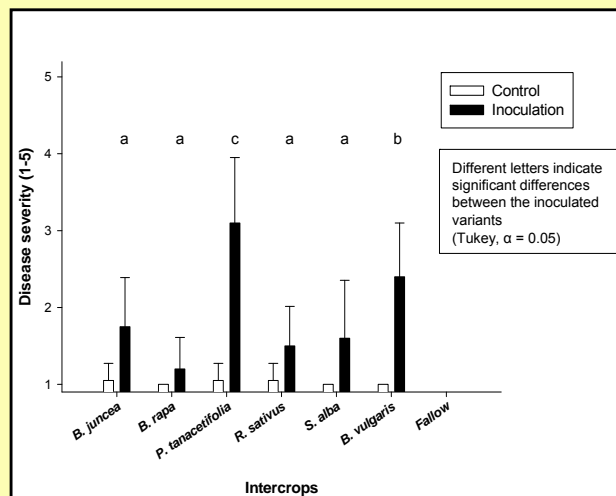


Fig. 3: Susceptibility of different intercrops in the field. Disease severity as visual rating from 1 = no visible symptoms until 5 = completely diseased plant stand.

		Greenhouse		Field
		Low inoculation	High inoculation	
Labor	4 dpi	0.835 ^y ***	0.376 [*]	0.454 [*]
	7 dpi	0.572 ^{**}	0.289 ^{n.s.}	0.537 [*]
Field		0.558 ^{**}	0.193 ^{n.s.}	X

Tab. 1: Correlation between disease ratings in different resistance tests.

Summary

Susceptibility of different intercrops: Intercrops display varying susceptibility to *R. solani*. *B. rapa* and *R. sativus* were less diseased and led to higher white sugar yield in subsequently cultivated sugar beet than the other intercrops. The cultivation of *P. tanacetifolia* should be avoided, if *R. solani* is a problem in sugar beet.

Testing plant species for susceptibility of *R. solani*: Between tested methods for investigation of *R. solani* susceptibility in different plant species significant correlations were observed. Therefore, the *in vitro* and greenhouse tests are suitable for an easy and rapid screening of resistance with a high number of plant species or cultivars.

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