Using *Trichoderma harzianum* for Vegetable Soybean Basal Stem Rot Control

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Introduction and Methods

Most Thai farmers grow the same crop in the same area year after year. This growing system results in increased amounts of the disease causal agents in the soil. The fungus *Rhizoctonia solani* is one of the major soil-borne diseases, which normally causes 50% loss of the vegetable soybean seedlings. The damping-off symptom is seen both pre and post emergence. Although seed dressing with carbendazim 0.01% carboxin or PCNB is the most effective method of controlling this disease, it may cause soil pollution and destroy useful soil organisms. Moreover, it increases farmers' cost of production (Cook and Baker, 1983). Biological control using *Trichoderma Harzianum* an antagonistic fungus was studied on sunflower basal stem rot in 1991 and 1992. The results showed that *R. solani* was inhibited by *T. harzianum*. The spores of *T. harzianum* entered into the mycelium of *R. solani* so that the mycelia of the casual organism were shrunken and broken (Nuntapunt, et al., 1994a and Nuntapunt, et al, 1994b). It was also found that the mycelia of *R. solani* were bound by the mycelia of *T. harzianum*. Thus, *T.harzianum* could stop epidemics of this disease. Accordingly, it was reasonable to study the control of basal stem rot in vegetable soybean using *T. harzianum*.

The two experiments using *T. harzianum* for vegetable soybean basal stem rot were conducted in the greenhouse at Chiangmai Field Crops Research Center in the dry and late wet seasons, 1994. Vegetable soybean cv. TVB7 (AGS292) were grown in 16 cement blockplots with a spacing of 50 cm between rows and 20cm between hills. They were laid out in Completely Randomized Design with four replications. The size of the cement blockplot is 1m in width and 5m in length. The four treatments were: T1 (treatment1), the inoculum of *R. solani* was mixed into the fumigated soil at a rate of 80g/300g of soil; T2, the inoculum of *R. solani* and *T. harzianum* were mixed thoroughly in the fumigated soil each at a rate of 80g/300g of soil; T3, only the inoculum of *T. harzianum* was mixed into the fumigated soil at the same rate as previously described; T4, seed dressing with carboxin 0.2% was planted in the fumigated soil which was mixed with the inoculum of *R. solani* at the same rate as described above. In the first experiments, *T. harzianum* was added into the soil and seeds of vegetable soybeans were planted immediately. In the second experiment, the *T. harzianum* inoculated soil was incubated for three days before planting.

Results

Both of the two experiments showed that adding the inoculum of *T. harzianum* in the *R. solani* infested soil did not increase seed germination and decreased the percentage of seedling mortality. Seed dressing with carboxin 0.2%gave a good germination of 64% and 10%less seeding death in the dry season and 91% germination and 4% seedling death in the wet season. However, the effect of *T. harzianum* was shown 30 days after planting. The percentage of plants infected by *R.solani* was decreased by 19% in the dry season and 62% in the wet season. There were no statistical differences between using *T. harzianum* and seed

dressing with carboxin in the percentage of diseased plants. Moreover, the plant height, fresh weight, pod weight and fresh seed weight per plant of the treatments inoculated with *T. harzianum* were greater than those of the other treatments (table1, 2).

Both experiments distinctly showed that the effect of *T. harzianum* decreases the number of plants infected by *R. solani* by 62%. The results were the same as Marshall (1982) found for snapbean, that seed dressing with *T. harzianum* caused the number of plants infected by *R. solani* to decrease by 65%. In addition, adding T. harzianum had a great effect on the height and yield components of vegetable soybeans. Elad and Matan (1980) found the same results when they used *T. harzianum* to control *R. solani* caused damping-off in beans.

Table 1. Comparison of using *T. harzianum* and seed dressing with carboxin 0.2 % for basal stem rot control on vegetable soybean cultivar TVB7, at Chiangmai Field Crops Research Center in dry season, 1994

Treatment	Germ.[1/] (%)	Seedling mortality (%)	Dis.pl[2]. (%)	Height (cm)	wt./pl.[3] (gm)	Pod wt./pl. (gm)	Seed wt./pl (gm)
R. *solani*	32 b	23 a	86 a	37 b	19 ab	16	5 ab
R. *solani*+ T. *harzianum*	47 b	19 a	67 a	50 a	25 a	19	6 a
T. *harzianum*	77 a	6 a	23 b	52 a	20 ab	16	5 ab
R. *solani*+ carboxin 0.2 %	64 a	10 b	71 a	33 b	16 b	13	4 b
F-test	**	**	**	**	**	NS	*
CV (%)	13.3	22.3	16.7	6.4	12.5	15.1	13.8

1/ Germination
2/ Percentage of diseased plant at 30 days after planting
3/ Weight per plant (gm)

** Highly significant at 0.01 level
* Significant at 0.05 level

Table 2. Comparison of using T. *harzianum* and seed dressing with carboxin 0.2 % for the vegetable soybean cv.TVB7 basal stem rot control at Chiangmai Field Crops Research Center in lately wet season, 1994

Treatment	Germ.[1/] (%)	Seedling mortality (%)	Dis.pl[2]. (%)	Height (cm)	wt./pl.[3] (gm)	Pod wt./pl. (gm)	Seed wt./pl (gm)
R. *solani*	85 b	13 a	94 a	39 b	49	32 b	17
R. *solani*+ T. *harzianum*	84 b	13 a	32 b	43 a	53	35 b	19
T. *harzianum*	89 ab	9 ab	5 c	43 a	61	44 a	21
R. *solani*+ carboxin 0.2 %	91 a	4 b	37 b	36 b	53	39 ab	21
F-test	*	**	**	**	NS	*	NS
CV (%)	3.9	32.1	21.1	4.3	10.7	13.2	13.3

1/ Germination
2/ Percentage of diseased plant at 30 days after planting
3/ Weight per plant (gm)

** Highly significant at 0.01 level
* Significant at 0.05 level

Conclusions

The antagonistic fungus *T. harzianum* was effective at controlling vegetable soybean basal stem rot caused by *R. solani*, and also caused the soybean yield components to increase.

References

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