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Research Article

Integrated Management of Sclerotium Wilt of Potato Caused by *Sclerotium rolfsii* Sacc.

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ABSTRACT

Sclerotium wilt/ rot of potato caused by Sclerotium rolfsii Sacc. is one of the major soil borne diseases of potato causing heavy losses every year. The present investigations on integrated management of sclerotium wilt/rot of potato were carried out during Kharif 2005-06 and 2006-07 both at Department of Plant Pathology, College of Agriculture, University of Agricultural Sciences, Dharwad and in farmer's fields of Dharwad and Belgaum districts of Karnataka.The results revealed that, pot culture experiments had showed a combination of carboxin and T. harzianum as tuber treatment along with organic amendments like FYM or vermicompost managed the disease to the extent of 88 per cent. The field experiment in farmer's fields confirmed the same results at two locations tested. Maximum suppression of the disease was observed when carboxin (2 g kg^{-1}) and T. harzianum (10 g kg^{-1}) were used for tuber treatment and supplemented with either FYM or vermicompost.

In Dharwad, carboxin + T.harzianum+ FYM (5.56%) treatment T_{13} recorded significantly least incidence than all other treatments. Carboxin (10.28%) was next best and was on par with carboxin + T.harzianum (13.05%) and carboxin+ T.harzianum + vermicompost (13.06%). The yield was significantly highest in carboxin+T.harzianum+FYM (13.26 t ha^{-1}) which was on par with carboxin+ T.harzianum+ vermicompost (12.38 t ha^{-1}). In Belgaum carboxin+T.harzianum+FYM (5.28%) was significantly superior to all the treatments followed by carboxin (9.72%), carboxin+T.harzianum(10.28%) and carboxin+T.harzianum+vermicompost (11.12%) which were on par. Yield per hectare was highest in carboxin+T.harzianum+FYM (15.51 t ha^{-1}) than all other treatments except carboxin+T.harzianum+vermicompost (14.43 t ha^{-1}) which was on par. The highest total returns and additional return over control were obtained in T_{13}carboxin+T.harzianum+FYM followed by carboxin+T.harzianum+vermicompost. But B:C ratio was highest in carboxin (10.20:1). The B: C ratio of IDM trials in farmer's fields showed above 3 for both the years in all the locations. Hence, this IDM technology can be adopted with great confidence by the farming community of the state. The transfer of technology is achieved beyond doubt with ample evidences in farmer's fields of Karnataka.

Keywords: *Carboxin, Sclerotium rolfsi, Potato, Trichoderma harzianum, Vermicompost.*

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INTRODUCTION

The potato (*Solanum tuberosum* L.) plant is a member of solanaceae or the nightshade family. Potato is one of the important and widely grown vegetables of the world, introduced in 17th century. The mineral production in case of potato is 3.70 times more than wheat and 11 times more than rice. Potato gives more carbohydrates, fiber and vitamins per unit area and time than the other major food crops. Potato is low energy food, 200g of boiled potatoes provide about 138 Kcal of energy (Shekhawat & Dahiya, 2000). It is rich in potassium and phosphorus (Shekhawat et al., 1992). Tubers contain at least 12 essential vitamins and is a good source of vitamin 'C' containing about 14-25 mg/10g of fresh weight of tubers (Thornaton & Sieczka, 1980).

Potato wilt caused by *Sclerotiumrolfsii*Sacc. is a well known polyphagous, ubiquitous and a non-target pathogen. It is one of the most destructive soil inhabiting pathogens so far reported. It has attained a serious status in Northern Karnataka particularly in the transitional belt. It is essential to develop a suitable Integrated Disease Management (IDM) with cultural practices, organic amendments and biological management practices. In order to reduce the environmental hazards, to avoid the development of resistant strains and reduce the cost of cultivation.

MATERIALS AND METHODS

The soil amendments, bioagents and chemicals which are found effective under *in vitro* studies were evaluated in both glasshouse and field conditions. Glasshouse studies were conducted at Department of Plant Pathology, College of Agriculture, Dharwad, with two varieties of potato *viz*., Kufri Chandramuki and Kufri Jyothi during 2005-06. The effective fungicides, bioagents and soil amendments of *in vitro* tests were included in integrated disease management options under pot culture condition to manage the sclerotium wilt of potato. Fungicides and bioagents were used as seed dressers alone and in combination along with soil amendments constituted the components of integrated disease management. The observations on per cent disease incidence were recorded at 45 DAP and analysed statistically and results are presented.

Field studies in farmer's fields at Dharwad was with Kufri Chandramukhi variety and at Belgaum with Kufri Jyothi variety during both years, *viz.* 2005-06 and 2006-07. The details of the treatments are given here under.

Trt. No.	**Treatment details**	**Concentration**
T_1	Carboxin	0.2 %
T_2	Carbendazim + Mancozeb	0.2 %
T_3	Phenyl mercury nitrate	0.2 %
T_4	Mancozeb	0.2 %
T_5	Captan	0.2 %
T_6	*Trichoderma harzianum (T.h.)*	10g per kg of tubers
T_7	*T. viride (T.v.)*	10g per kg of tubers
T_8	*Psudemonas fluorescens(P.f')*	10g per kg of tubers
T_9	Combination of *T. h + P. f.*	10g per kg of tubers
T_{10}	Farmyard manure	25 t /ha
T_{11}	Vermicompost	2.5 t/ha
T_{12}	T_1 + T_6 (Carboxin+*T.h.)*	-
T_{13}	T_1 + T_6 + T_{10} (Carboxin+*T.h.*+ FYM*)*	-
T_{14}	T_1 + T_6 + T_{11} (Carboxin+*T.h.*+Vermicompost*)*	-
T_{15}	Control	-

For the pot culture study sterilized soil was uniformly mixed with four percent inoculum of *S. rolfsii* which was grown in sand corn meal medium and filled in 40 x 35cm size pot. The soil was previously mixed with FYM and vermicompost and tubers were treated with fungicides, bio–agents and Corboxin followed by *T. harzianum*. For each treatment ten tubers were taken and three replications were maintained for each treatment. Observations were recorded after 45 days of planting.

The field trial was conducted at farmers field in Dharwad and Belgaum during two consecutive years 2005-06 and 2006-07. The experiment was laid out in Randomized Block Design (RBD) with three replications and fifteen treatments along with untreated check. The tubers of Kufri chandramukhi variety were sown in field by following spacing of 60×60 cm and with plot size of 3.0×3.6 m. The recommended package of practice was followed for the trial. Observations were recorded after 75days of planting.

Estimation of Benefit: Cost (B:C) ratio

The economic analysis of the experiment was done by taking into consideration of market prices prevailing during 2005-06 and 2006-07 for the produce and cost of treatment. The additional returns and B:C ratio over control were calculated for each treatment.

RESULT AND DISCUSSION

The results indicated that, there was significant difference among the treatments with respect to per cent disease incidence. In glass house experiment the disease incidence was 100 per cent in both the varieties in untreated control. In Kufri Chandramukhi variety, significantly least disease incidence was noticed in T_{14} consisting of Carboxin + *T.harzianum*+ vermicompost (13.33%) which was on par with T_{13} (16.67%) and T_{12} (20.00%). Application of Carboxin alone recorded 26.67 per cent incidence which was next best treatment. The bioagent *Pseudomonas fluorescens* (86.67%), carbendazim + mancozeb (Companion) (86.67%), emisan (73.33%), mancozeb (86.67%) were ineffective as they recorded higher per cent incidence (Table 1).

Same trend was observed in case of Kufri Jyoti variety, but disease incidence was less compared to Kufri Chandramukhi, wherein lowest per cent (10.00) disease incidence was noticed in T_{13} (carboxin + *T. harzianum* + FYM) and T_{14} (Carboxin + *T. harzianum* + vermicompost) which was on par with T_{12} (16.67%). Disease incidence was to the extent of 80.00 per cent in T_8 (*P. flourescens*) and T_2 (Carbendazim + Mancozeb), which was on par with T_3 (70.00%), T_4 (76.77%) and T_5 (63.33%).

Integrated disease management in field condition at Dharwad

During *kharif*2005-06 results revealed that, least per cent disease incidence was noticed in T_{13} (6.11%) with a yield of 11.64 t ha^{-1}. Whereas, T_4 recorded highest incidence (37.78%) and lowest yield of 8.43 t/ha (Table 2).

During *kharif* 2006-07 least incidence of the disease was noticed in T_{13} (5%) by giving a yield of 14.89 t ha^{-1} Control (35.01%) recorded highest incidence of the disease with yield of 8.80 t ha^{-1}. However, Mancozeb (33.33%) and *Pseudomonas fluorescens* (30.53%) were on par with control by recording yield of 9.20 t ha^{-1} and 8.89 t ha^{-1} respectively(Table 2).

Integrated disease management in field condition at Belgaum

During*kharif*2006-07 data revealed that, T_{13} (5.56%) recorded significantly least per cent disease incidence than all the treatments T_2 (27.23%), T_4, (33.89%) and T_8 (31.10%) were on par with control (34.66%).With respect to yield per hectare, T_{13} (14.85 t ha^{-1}), T_{14} (13.80 t ha^{-1}) were on par and recorded significantly highest yield than all the treatments. Control (8.49 t ha^{-1}) recorded significantly lowest yield than all other treatments except T_2 (8.57 t ha^{-1}), T_3 (8.83 t ha^{-1}), T_4 (8.77 t ha^{-1}), T_5 (9.35 t ha^{-1}) and T_8 (9.38 t ha^{-1}) which were on par (Table 3).

During *Kharif*2006-07, disease incidence was significantly least in T_{13} (5.00%) than all other treatments. Control

(30.54%) recorded maximum disease incidence and was on par with T_2 (29.43%), T_4 (29.46%) T_5 (23.87%) and T_8 (29.43%).The yield per hectare was significantly superior in T_{13} (16.17 t ha^{-1}) which was on par with T_{14} (15.06 t ha^{-1}), T_1 (14.26 t ha^{-1}) and T_{12} (14.20 t ha^{-1}). Control recorded least yield of 10.77 t ha^{-1} which was on par with remaining treatments (Table 3).

Pooled analysis

The pooled analysis of experiment on integrated disease management for the year *Kharif* season 2005-06 and 2006-07 has been presented for Dharwad and Belgaum locations in table 4 and 5. The data revealed that, in Dharwad, treatment T_{13} (5.56%) recorded significantly least incidence than all other treatments. The treatment T_1 (10.28%) was next best and was on par with T_{12} (13.05%) and T_{14} (13.06%). Treatments T_6 (15.83%), T_9 (17.05%) and T_{10}(19.73%) were on par and next in order. Control (36.39%) recorded the highest incidence of the disease and was on par with T_4 (34.99%) and T_8 (31.93%).

Significantly highest yield was recorded in T_{13} (13.26 t ha^{-1}) which was on par with T_{14} (12.38 t ha^{-1}). The treatments T_1 and T_{12} (both 11.73 t ha^{-1}) were next best. Control (8.46 t ha^{-1}) recorded least yield and was on par with T_4 (8.81 t ha^{-1}), T_3 (8.50 t ha^{-1}), T_2 (9.06 t ha^{-1}), T_5 (9.11 t ha^{-1}) and T_8 (8.78 t ha^{-1}).

The pooled analysis of Belgaum also revealed similar trend as that of Dharwad. The treatment T_{13} (5.28%) was significantly superior to all the treatments followed by T_1 (9.72%), T_{12} (10.28%) and T_{14} (11.12%) which were on par. Control treatment (32.53%) recorded highest disease incidence which was on par with T_4 (34.67%) and T_8 (30.27%).

Yield per hectare was significantly superior in T_{13} (15.51 t ha^{-1}) than all other treatments except T_{14} (14.43 t ha^{-1}) which was on par. Control (9.63 t ha^{-1}) recorded least yield and was on par with T_3 (9.63 t ha^{-1}), T_8 (9.74 t ha^{-1}), T_4 (9.88 t ha^{-1}), T_7 (10.60 t ha^{-1}), T_5 (10.15 t ha^{-1}) and T_6 (10.80 t ha^{-1}).

Estimation of Benefit: Cost ratio

The economics of benefit: cost ratio was worked out separately for the experiment on integrated disease management (IDM) at Dharwad and Belgaum districts and results are presented in table 4 and 5.

The table 4 (IDM for Dharwad) revealed that, highest total returns were obtained in T_{13} (Rs. 99,450 ha^{-1}) followed by T_{14} (Rs. 92,850 ha^{-1}). Similarly additional return over control was also more in T_{13} (Rs. 36,000 ha^{-1}) and T_4 (Rs.29,400 ha^{-1}). But when B:C ratio was calculated T_1 recorded highest B:C of 10.20:1. The treatment T_{13} (3.03:1), T_{14} (2.76:1) and T_{12} (5.17: 1) which were superior with respect to yield and recorded less B:C ratio, because of increased cost of treatment.

With respect to the economics of Belgaum, (table 5) treatment T_{13} (Rs. 1,13,625 ha^{-1}) and T_{14} (Rs. 1,08,225 ha^{-1}) recorded highest total returns. The additional return over control was also highest in T_{13} (Rs. 11900 ha^{-1}) and T_{14} (Rs. 10,650 ha^{-1}) as in Dharwad location. However the B:C ratio was more in T_1 (11.22: 1).

Carboxin was reported as very effective fungicide against *S. rolfsii* (Maiti & Choudhury, 1975; Patil & Rane, 1982; Kulkarni et al., 1986; El Wakil & Ghonim, 2000 & Prabhu, 2003). Similarly, Carboxin was also effective under *in vitro* studies. However, mancozeb which was found effective in the laboratory screening was ineffective in pot culture, may be because of its non-systemic nature. Though, FYM and vermicompost are known to suppress *S. rolfsii*, they could add little effect when used with carboxin and *T. harzianum*. This may be due to lack of sufficient time to the organic amendments to get incorporated in the soil and produce volatiles to suppress *S. rolfsii* .

Thus the effective treatment like *T. harzianum* is well known as effective biological control agent for the *S. rolfsii*. Use of FYM in this treatment has provided a food base for the multiplication of *T. harzianum* (Garret, 1965). The effect of organic amendments on the pathogenic fungi may be attributed to release of NH_3 that is directly toxic to sclerotia. After decomposition, these amendments having high C: N ratio result in an increase in microbial population and activity of the antagonistic microbes. Hence, there is considerable amount of CO_2 liberation by these soil saprophytes which might have suppressed the pathogenic activity of the pathogen (Punja, 1985). The net increase in population of beneficial fungi may be due to the presence of high content of protein (11-12 per cent) and protein rich materials which are responsible for the increase in population as reported by Ghaffar et al. (1967). The crop rotation with sorghum perhaps starved the *S. rolfsii* and thus decreased the population. This might also be due to the mechanism of production of root exudates by sorghum crop, which are detrimental for germination and growth of *Sclerotium rolfsii.* Sorghum has been recommended as one of the crops suggested for the management of Sclerotium wilt of potato (Anahosur, 2001). The dual advantage in using sorghum as crop rotation is that, it is a fodder crop mostly preferred by farmers of Northern Karnataka.

Table 1: Integrated management of Sclerotium wilt of potato under glass house condition

Treat. No.	Treatment	Per cent disease incidence	
		KufriChandramukhi	KufriJyothi
T_1	Carboxin (Vitavax)** (@0.2%)	26.67 (31.00)*	23.33 (28.78)
T_2	Carbendazim+Mancozeb (companion) (@0.2%)	86.67 (68.86)	80.00 (63.44)
T_3	Phenyl mercury nitrate (Emisan-G) (@0.2%)	73.33 (59.00)	70.00 (56.79)
T_4	Mancozeb (Indofil M 45) (@0.2%)	86.67 (68.86)	76.67 (61.22)
T_5	Captan (Captof) (@0.2%)	66.67 (54.78)	63.33 (52.78)
T_6	*Trichodermaharzianum*	53.33 (46.92)	40.00 (39.23)
T_7	***Trichodermaviride*(@10g/kg)**	53.33 (46.92)	50.00 (45.00)
T_8	**Pseudomonas fluorescens*(@10g/kg)***	86.67 (68.86)	80.00 (63.43)
T_9	*T. harzianum* + *P. fluorescens*(@10g/kg)	53.33 (46.92)	50.00 (45.00)
T_{10}	Farm Yard Manure (@ 25t/ha)	50.00 (45.00)	40.00 (39.23)
T_{11}	Vermicompost (@2.5t/ha)	50.00 (45.00)	40.00 (39.23)
T_{12}	$T_1 + T_6$	20.00 (26.57)	16.67 (23.86)
T_{13}	$T_1 + T_6 + T_{10}$	16.67 (23.86)	10.00 (15.00)
T_{14}	$T_1 + T_6 + T_{11}$	13.33 (17.71)	10.00 (15.00)
T_{15}	Control	100.00 (90.00)	100.00 (90.00)
	S.Em±	3.08	3.39
	CD at 1%	12.04	13.24

Table 2: Integrated management of Sclerotium wilt of potato in farmer's fields in Dharwad

Treat. No.	Treatment	2005-06		2006-07	
		Per cent disease incidence	Yield (t/ha)	Per cent disease incidence	Yield(t/ha)
T_1	Carboxin (Vitavax)** (@0.2%)	11.11 (19.39)*	10.96	9.44 (17.58)	12.50
T_2	Carbendazim+Mancozeb (companion) (@0.2%)	28.89 (32.42)	8.73	26.13 (30.68)	9.38
T_3	Phenyl mercury nitrate (Emisan-G) (@0.2%)	23.87 (29.19)	8.46	23.90 (29.23)	9.14
T_4	Mancozeb (Indofil M 45) (@0.2%)	36.66 (37.24)	8.43	33.33 (35.26)	9.20
T_5	Captan (Captof) (@0.2%)	28.33 (32.15)	8.46	26.10 (30.71)	9.51
T_6	*Trichodermaharzianum*	16.67 (24.08)	9.85	15.00 (22.77)	10.65
T_7	***Trichodermaviride* (@10g/kg)**	24.47 (29.63)	9.66	22.77 (28.44)	10.19
T_8	***Pseudomonas fluorescens*(@10g/kg)**	33.32 (35.24)	8.67	30.53 (33.53)	8.89
T_9	*T. harzianum* + *P. fluorescens*(@10g/kg)	25.00 (29.97)	9.81	23.33 (28.84)	10.83
T_{10}	Farm Yard Manure (@ 25t/ha)	20.57 (26.92)	10.20	18.90 (25.71)	11.11
T_{11}	Vermicompost (@2.5t/ha)	27.20 (31.40)	9.63	24.47 (29.63)	10.25
T_{12}	$T_1 + T_6$	12.77 (20.87)	10.93	13.33 (21.39)	12.53
T_{13}	$T_1 + T_6 + T_{10}$	6.11 (14.29)	11.64	5.00 (12.80)	14.89
T_{14}	$T_1 + T_6 + T_{11}$	14.43 (22.18)	11.45	11.69 (19.70)	13.30
T_{15}	Control	37.78 (37.92)	8.12	35.01 (36.26)	8.80
	S.Em±	1.37	0.46	1.39	0.41
	CD at 5%	3.98	1.34	4.03	1.17

* Figures in parenthesis are arc sin transformed values

** Names in the parenthesis indicate trade name

Table 3: Integrated management of sclerotium wilt of potato in farmer's fields of Belgaum district

Treat. No.	Treatment	2005-06		2006-07	
		Per cent disease incidence	Yield(t/ha)	Per cent disease incidence	Yield(t/ha)
T_1	Carboxin (Vitavax)** (@0.2%)	9.44 (17.88)*	12.19	9.99 (18.31)	14.26
T_2	Carbendazim+Mancozeb (companion) (@0.2%)	27.23 (31.39)	8.57	24.43 (29.59)	10.93
T_3	Phenyl mercury nitrate (Emisan-G) (@0.2%)	20.57 (26.85)	8.83	18.90 (25.74)	10.43
T_4	Mancozeb (Indofil M 45) (@0.2%)	33.89 (35.58)	8.77	29.46 (32.75)	10.99
T_5	Captan (Captof) (@0.2%)	26.63 (30.99)	9.35	23.87 (29.13)	10.96
T_6	*Trichodermaharzianum*	14.43 (22.30)	10.18	12.80 (20.93)	11.42
T_7	***Trichodermaviride*(@10g/kg)**	22.77 (28.44)	10.00	21.70 (27.76)	11.20
T_8	***Pseudomonas fluorescens*(@10g/kg)**	31.10 (33.88)	9.38	29.43 (32.85)	10.09
T_9	*T. harzianum* + *P. fluorescens*(@10g/kg)	22.77 (28.43)	10.93	17.23 (24.49)	11.60
T_{10}	Farm Yard Manure (@ 25t/ha)	21.13 (27.29)	11.02	18.87 (25.66)	12.38
T_{11}	Vermicompost (@2.5t/ha)	22.20 (28.51)	10.52	19.43 (26.14)	11.64
T_{12}	$T_1 + T_6$	11.10 (19.42)	11.64	9.46 (17.80)	14.20
T_{13}	$T_1 + T_6 + T_{10}$	5.56 (13.60)	14.85	5.00 (12.92)	16.17
T_{14}	$T_1 + T_6 + T_{11}$	11.68 (19.78)	13.80	10.55 (18.78)	15.06
T_{15}	Control	34.46 (35.89)	8.49	30.54 (33.44)	10.77
	S.Em±	1.58	0.45	1.54	0.88
	CD at 5%	4.57	1.31	4.47	2.56

Table 4. Effect of integrated management of Sclerotium wilt of potato on yield and B:C ratio (Dharwad)

Treat. No.	Treatment	Yield (t/ha)	Total returns (Rs.)	Additional return over control	Costof treatment	B:C ratio
T_1	Carboxin (Vitavax)** (@0.2%)	11.73	87975	24525	2400	10.20:1
T_2	Carbendazim+Mancozeb (companion) (@0.2%)	9.06	67950	04500	0920	4.81:1
T_3	Phenyl mercury nitrate (Emisan-G) (@0.2%)	8.50	63750	00300	0960	0.31:1
T_4	Mancozeb (Indofil M 45) (@0.2%)	8.81	66075	02625	0440	5.97:1
T_5	Captan (Captof) (@0.2%)	9.11	68325	04875	0700	6.96:1
T_6	*Trichodermaharzianum*	10.25	76875	13425	2000	6.71:1
T_7	**Trichodermaviride*(@10g/kg)***	9.92	74400	10950	2000	5.48:1
T_8	**Pseudomonas fluorescens*(@10g/kg)***	8.78	65850	02400	1800	1.33:1
T_9	*T. harzianum* + *P. fluorescens*(@10g/kg)	10.32	77400	13950	1900	7.34:1
T_{10}	Farm Yard Manure (@ 25t/ha)	10.66	80475	17025	7500	2.27:1
T_{11}	Vermicompost (@2.5t/ha)	9.94	74550	11100	6250	1.77:1
T_{12}	$T_1 + T_6$	11.73	87975	24525	4400	5.57:1
T_{13}	$T_1 + T_6 + T_{10}$	13.26	99450	3600	11900	3.03:1
T_{14}	$T_1 + T_6 + T_{11}$	12.38	92850	29400	10650	2.76:1
T_{15}	Control	8.46	63450	-	-	-

* Names in the parenthesis indicate trade name

Table 5. Effect of integrated management of Sclerotium wilt of potato on yield and B:C ratio(Belgaum)

Treat. No.	Treatment	Yield/ha (tons)	Total returns (Rs.)	Additional return over control	Cost of treatment	B:C ratio
T_1	Carboxin (Vitavax)** (@0.2%)	13.22	99150	26925	2400	11.22:1
T_2	Carbendazim+Mancozeb (companion) (@0.2%)	10.25	76875	4650	0920	5.05:1
T_3	Phenyl mercury nitrate (Emisan-G) (@0.2%)	9.63	72225	00000	0960	00:00
T_4	Mancozeb (Indofil M 45) (@0.2%)	9.88	74100	01875	0440	4.26:1
T_5	Captan (Captof) (@0.2%)	10.15	76125	03900	0700	5.57:1
T_6	*Trichodermaharzianum*	10.80	81000	08775	2000	4.39:1
T_7	***Trichoderma viride* (@10g/kg)**	10.60	79500	07275	2000	3.64:1
T_8	***Pseudomonas fluorescens*(@10g/kg)**	9.74	73050	00825	1800	0.46:1
T_9	*T. harzianum* + *P. fluorescens*(@10g/kg)	11.27	84525	12300	1900	6.47:1
T_{10}	Farm Yard Manure (@ 25t/ha)	11.72	87900	15675	7500	2.09:1
T_{11}	Vermicompost (@2.5t/ha)	11.08	83100	10875	6250	1.74:1
T_{12}	$T_1 + T_6$	12.92	96900	24675	4400	5.61:1
T_{13}	$T_1 + T_6 + T_{10}$	15.51	113625	41400	11900	3.48:1
T_{14}	$T_1 + T_6 + T_{11}$	14.43	108225	36000	10650	3.38:1
T_{15}	Control	9.63	72225	-	-	-

* Names in the parenthesis indicate trade name

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