PERFORMANCE OF DIFFERENT VARIETIES OF BRINJAL GROWN THROUGH ORGANIC FARMING IN CHHOTANAGPUR PLATEAU

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ABSTRACT

The adverse impact of chemical fertilizers and pesticides in agriculture is insight with deterioration of soil quality, food and so on due to which acidification and depletion of the soil causes problem in production systems. Chhotanagpur plateau is well-known for its quality vegetable production but because of indiscriminate uses of agro-chemicals in different crops causes deterioration of quality. The present investigation has piloted with the objective of helping the farming communities through low cost involving organic package of practices and its need for modern era in producing comparatively safer food. The experiment was designed after split plot technique by adopting four treatments, *viz.*, T_1: *Enriched Sanjeevani* (3%); T_2: BD-501 (1%); T_3: *Sanjeevani* (10%); and T_4: Absolute Control, and seven varieties, namely V_1: HABR-21, V_2: Swarna Abhilamb, V_3: Swarna Shree, V_4: Swarna Shobha, V_5: Swarna Pratibha, V_6: Swarna Mani, and V_7: Swarna Shyamli with their three replications for each treatment. Crop varieties were grown and different growth, yield and quality attributes were studied and duly recorded from time to time. The results were found to be significant for most of the studied parameters. The maximum values on plant height (75.00 cm) as noted in T_1 [*Enriched Sanjeevani* (3%)], earliness in flowering (55.86 days) in T_2[BD-501 (1%)], fruits plant^{-1} (5.61) in T_1followed by T_3 (5.58), TSS (3.95^{0}Brix) in T_1, ascorbic acid (32.64 mg 100 g^{-1}) in T_3, and reducing sugar (4.79%) in T_3 were recorded. As a consequence, the highest yield (61.90 ± 2.44 t ha^{-1}) estimated in T_3 but in case of vaiety, highest yield (55.58 ± 2.32 t ha^{-1}) recorded in V_7(Swarna Shyamli). Interaction effect revealed T_3V_2 as the best combination with the highest yield (72.76 ± 4.65 t ha^{-1}). Economics study further revealed that*Sanjeevani* 10% (T_3)is the most profitable when combined with V_2 (Swarna Abhilamb) with the highest benefit: cost ratio (3.77).The findings of the present investigation proposescomparatively safer brinjal production though itscultivation by using low cost organic liquid manure '*Sanjeevani'* in the south Chhotanagpur plateau of the eastern India.

Keywords: Brinjal, *Solanum melongena*, BD-501, *Sanjeevani*, Growth, Yield, Quality, B: C ratio

INTRODUCTION

Brinjal (*Solanum melongena*L.) is one of the important vegetable crop grown all over India throughout the year. It comes under a member of the solanaceae family and is closely related to tomato and potato which has also a great importance to our Indian marketing systems. The major brinjal producing states of India are Orissa, Bihar, Karnataka, West Bengal, UP and Maharashtra. Brinjal has several medicinal properties and it is good for diabetic patients as well. It is also used as pickle making and dehydration industries (Singh *et al.*, 1992) and is an excellent remedy for those suffering from liver problems. Brinjal is also a source of vitamins A, C and minerals. It contents good amount of many essential 'B' complex groups of vitamins also. In Jharkhand, brinjal is extensively cultivated in Ranchi, Giridh, Loherdaga, Hazaribagh, Ramgarh, Godda districts and it covers approximately 13.9% of the area under vegetable cultivation. Brinjal is used by itself or mixed with other vegetables and consumed almost every day. It is named as "poor man's vegetable" because of its low cost of production, ease of culture and availability throughout the year. Light well-drained sandy-loam soils with a pH range of 6.0 to 7.5 are preferred by this crop. China is the largest producer of brinjal and contributes about 68.7 per cent of the world's production while India occupies second position with a share of 23.3 per cent. In India, brinjal occupies fourth position in area and sixth position in production among the vegetable crops and contributes 8 % of the total production. There is a lot of scope for increasing the productivity of brinjal in our country. Further, the crop is being sprayed with 20-25 times with pesticides and use of chemical pesticides leave pesticides residues in fruits causing greater health concern.In India, since majority of the farmers belong to small and marginal category and a large number of people live below the poverty line, purchase of costly in-organic inputs also become difficult for the resource poor farmers of our country. So, for those farmers the cheapest and easy to produce organic formulations like *Sanjeevani* may be recommended that can easily be produced by utilizing locally available bio-resources. Also the requirement of such organic liquid nutrient solution is comparatively low (about 200 litre ha^{-1}) as compared to bulky organic manures (20-25 t ha^{-1}). In this particular context, organic farming in Jharkhand has a great scope considering socio economic perspective of the small, marginal and tribal farmers. Due mainly to shortage of irrigation water, rainfed farming is generally practiced in Jharkhand and thereby high production by using hybrid seed along a huge fertilizers is a major bottleneck. However, low cost organic intervention by using different easily available resources of organic inputs can apply to cop-up the situation. Different organic manures like FYM along with dense organic manure resulted in the highest fruit yieldand higher vitamin C in brinjal (Singh, 2006).

MATERIALS AND METHODOLOGY

An experiment was conducted at organic experimental farm of the university during autumn-winter season 2016-17 and 2017-18 by employing seven varieties of the crop. The experiment was conducted at geographic location at 23.23^0N latitude and 85.23^0E longitude under temperature regimes of 30^0-36^0C (maximum) and 13^0-25^0C (minimum). The soil texture of the experimental plot was porous sandy loam type

with available organic carbon, N, P_2O_5 and K_2O were 4.57 (%), 263.42 (kg.ha^{-1}), 19.38 (%) (*10^{-3}) and 52.89 (%) (*10^{-3}), respectively. The soil reaction of the experimental site was acidic (pH: 6.32).The seven varieties selected for the experimentwere:V_1: HABR-21, V_2: Swarna Abhilamb, V_3: Swarna Shree, V_4: Swarna Shobha, V_5: Swarna Pratibha, V_6: Swarna Mani, and V_7: Swarna Shyamli. The experiment was designed after split plot technique considering four treatments *viz.*, T_1: *Enriched Sanjeevani* (3%); T_2: BD-501 (1%); T_3: *Sanjeevani* (10%); and T_4: Absolute Control with their three replications. Thereby, seven varieties were grown in 84 experimental plots each of 3.0 m x 2.0 m sizes by keeping 60 cm row-row distance and 50 cm plant-plant distance. As basal dose 1 kg vermicompost and 1 kg wood ash per square metre running area was applied in all experimental plots.Different organic liquid manures were applied (as per the specified treatment) five times at 15 days interval starting after 15 days of transplanting. Neem leaf extract @ 10% was sprayed once a weekagainst insect-pests as prophylactic measures but for diseases whey water mixed with turmeric powder @ 10g per litre during peak vegetative and reproductive stages was applied @10% concentration at 15 days interval for three times in all experimental plots except in control. Different growth and yield attributes like plant height, branches per plant, days to 50% flowering, polar & equatorial diameter of fruits, number of fruits per plant and projected yield were taken into account. Similarly, proximate quality parameters like TSS, titrable acidity, reducing sugar and ascorbic acid content of edible portion of the crop were estimated by adopting standard methods. The data finally obtained were subjected to statistical analysisto calculate the critical difference by using analysis of variance for split plot design.

RESULTS AND DISCUSSION

Growth and yield attributes

Different growth attributes were highly influenced by organic treatment conditions as well as under different varietal situations. As a consequence, statistically significant differences were documented in almost all treatments, varietal or even treatment-varietal interaction conditions (Table-1). In case of treatment, T_3 emerged with the highest yield (61.90± 2.44 t ha$_{-1}$) but V_7 recorded the more yield (55.58± 2.32t ha$_{-1}$), whereas, T_3V_2 interaction documented with higher yield (72.76± 4.65t ha$_{-1}$) [Table-1].The higher yields associated with T_3 may probably be *Sanjeevani* with more available nutrient supplied liquid manure than its respective counterparts.These findings are in accordance with the findings of Singh (2006); Bindhumati (2008); Harish (2009); Chaturvedi *et al.* (2016).

Quality contributing traits

Different quality contributing traits were also influenced by the treatment, varieties and their interactions as well (Table-2). As a consequence, higher TSS (3.95^{0}Brix) estimated in samples collected from T_1 but higher ascorbic acid (32.64 mg 100 g^{-1}) recorded in T_3 (Table-2). Among varieties, higher TSS (4.33^{0}Brix) and ascorbic acid (38.08 mg 100g^{-1}) were recorded in V_2 but the interaction study revealed that T_2V_2as the higher TSS (4.70^{0}Brix) content and T_3V_4as the highest ascorbic acid content (60.77 mg 100g^{-1})

combinations [Table-2]. The findings on ascorbic acid content as recorded in the present study corroborated well with the previous findings of Kandoliva *et al*. (2015).

Economics of brinjal cultivationunder organic growing conditions

The organically grown crops warrant more impulsion over the marketing system. Thereby, a priority was given here to consider the economics aspect of organically grown brinjal varieties (Table-3). Findings publicized that all treatments have greater impact on B:C ratio than the absolute control (Table-4).It was also revealed that the T_3 of V_2 with the highest B:C ratio (3.77) followed by the T_1 of V_2 (3.55), T_1 of V_7(3.51), T_3 of V_7 (3.41) as against the lowest B:C (1.09) ratio as recorded in T_4 of V_1. The higher level of B:C ratio in the present investigation is mainly due to lower cost of cultivation in organic system and it is supportedby Kerutagi *et al.* (2000); Singh *et al.* (2016).

CONCLUSION

It may be concluded that *Sanjeevani*(10%) is the best for production of brinjal organically followed by *Enriched Sanjeevani*(3%). It was also revealed that almost all varieties included in the present investigation are moderate to highly responsive to organic cultivation in the south Chhotanagpur plateau regions of Jharkhand. However, varieties like Swarna Abhilamb(V_2) and Swarna Shyamli (V_7)were highly responsive with the application of T_3[*Sanjeevani* (10%)]and T_1 [Enriched *Sanjeevani* (3%)]. Swarna Abhilambwith the application of *Sanjeevani* (10%) and Enriched *Sanjeevani* (3%) recorded 3.77 and 3.55 B:C ratio, respectively, while, *Sanjeevani* (10%) with Swarna Shyamli recorded B:C ratio of 3.51.

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Table-1: Mean performance of growth and yield attributes of different brinjal varieties under organic growing conditions

	Plant height (cm)	Branches plant^{-1}	Days to 50% Flowering	Polar diameter of fruit (cm)	Equatorial diameter of fruit (cm)	No. of fruits per plant^{-1}	Projected yield (t ha$^{-1)}$
Treatment (T)							
T_1	75.00^{a}	7.95^{a}	61.00^{b}	25.76^{b}	16.86^{b}	5.61 ^{a}	60.10 ^{ab}
T_2	72.38^{ab}	6.76^{abc}	55.86^{bc}	29.11^{a}	19.12^{a}	5.49 ^{ab}	58.69 ^{cb}
T_3	70.52^{ab}	7.00^{ab}	72.00^{a}	30.24^{a}	18.96^{a}	5.58 ^{ab}	61.90 ^{a}
T_4	52.57^{c}	5.10^{c}	60.38^{bc}	27.11^{b}	17.46^{b}	2.26 ^{c}	26.76 ^{c}
SEm (±)	3.12	0.69	2.50	0.65	0.42	0.15	2.44
$CD_{P\leq 0.05}$	8.57	1.89	6.86	1.79	1.16	0.43	6.73
Variety (V)							
V_1	71.67 ^{abcd}	4.92 ^{d}	65.00^{abc}	37.64^{a}	17.52 ^{bc}	4.47 ^{bcde}	49.33 ^{bcde}
V_2	72.17 ^{abcc}	7.08a ^{bc}	66.58^{ab}	25.31^{b}	11.09 ^{e}	4.66 ^{bcde}	55.19 ^{ab}
V_3	72.50 ^{ab}	7.92 ^{a}	68.17^{a}	20.03 ^{d}	11.93 ^{d}	4.76 ^{bcd}	52.67 ^{abcd}
V_4	57.83 ^{e}	6.75 ^{abc}	62.58^{bcd}	20.58 ^{d}	16.67 ^{c}	4.90 ^{b}	54.34 ^{abc}
V_5	67.25 ^{acd}	7.17 ^{abc}	59.83^{de}	38.82 ^{a}	18.45 ^{b}	3.88 ^{f}	46.04 ^{f}
V_6	75.00 ^{a}	7.83 ^{ab}	60.58^{cde}	23.58 ^{c}	23.10^{a}	4.84 ^{bc}	49.91 ^{abcde}
V_7	56.92 ^{f}	5.25 ^{d}	53.42^{f}	30.43 ^{ab}	27.93 ^{a}	5.63 ^{a}	55.5 8 ^{a}
SEm (±)	3.38	0.50	1.89	0.75	0.55	0.22	2.32
$CD_{P\leq 0.05}$	8.03	1.18	4.48	1.77	1.30	0.52	5.52
Interaction (T*V)							
T_1V_1	91.33	7.00	63.00	34.35	13.35	5.11	60.50
T_1V_2	75.00	7.00	64.00	23.25	10.75	5.57	65.99
T_1V_3	79.67	9.33	59.00	18.00	10.50	6.18	58.43
T_1V_4	66.67	6.67	62.00	23.40	20.40	5.26	62.35
							Table-1…Contd…
T_1V_5	69.00	8.67	61.00	36.70	17.50	4.24	50.23

T_1V_6	88.67	10.67	64.00	20.95	21.10	6.14	57.96
T_1V_7	54.67	6.33	54.00	23.65	24.40	6.76	65.25
T_2V_1	92.33	4.67	54.00	43.85	22.25	4.99	59.19
T_2V_2	64.67	8.00	54.00	25.00	9.40	4.88	57.85
T_2V_3	80.67	8.67	55.00	17.80	15.10	5.15	61.02
T_2V_4	64.33	10.00	64.00	16.00	16.00	6.63	63.73
T_2V_5	64.33	5.67	60.00	42.10	20.40	4.40	52.19
T_2V_6	87.00	5.67	55.00	24.75	21.00	6.05	56.85
T_2V_7	53.33	4.67	49.00	34.25	29.70	6.31	60.00
T_3V_1	70.00	4.67	80.00	35.10	17.55	6.23	59.03
T_3V_2	80.67	8.00	83.00	29.10	13.75	6.14	72.76
T_3V_3	72.67	8.00	93.00	25.65	10.70	5.07	60.06
T_3V_4	45.00	5.00	64.00	23.05	13.95	5.28	62.53
T_3V_5	74.33	8.67	61.00	37.90	18.35	4.96	58.78
T_3V_6	79.00	8.67	64.00	26.30	28.00	4.59	54.44
T_3V_7	72.00	6.00	59.00	34.60	30.40	6.80	65.73
T_4V_1	33.00	3.33	63.00	37.27	16.93	1.57	18.59
T_4V_2	68.33	5.33	65.33	23.90	10.47	2.04	24.15
T_4V_3	57.00	5.67	65.67	18.67	11.40	2.63	31.19
T_4V_4	55.33	5.33	60.33	19.87	16.33	2.43	28.74
T_4V_5	61.33	5.67	57.33	38.57	17.57	1.94	22.96
T_4V_6	45.33	6.33	59.33	22.30	22.30	2.56	30.37
T_4V_7	47.67	4.00	51.67	29.23	27.20	2.64	31.33
SEm(±)	6.76	0.99	3.78	1.50	1.10	0.44	4.65
$CD_{P\leq 0.05}$	16.05	2.37	8.96	3.55	2.60	1.05	11.05

Note: V_1 (HABR-21), V_2 (Swarna Abhilamb), V_3 (Swarna Shree), V_4 (Swarna Shobha), V_5 (Swarna Pratibha), V_6 (Swarna Mani), V_7 (Swarna Shyamli) and T_1: *Enriched Sanjeevani*(3%), T_2: BD-501 (1%), T_3:*Sanjeevani* (10%); T_4: Absolute Control.

Table-2: Mean performance of quality contributing traits of different brinjal varieties under organic growing conditions

	TSS (^{0} Brix)	Titrable Acidity (%)	Reducing Sugar (%)	Ascorbic Acid (mg 100g^{-1})
Treatment (T)				
T_1	3.95 ^{a}	0.22 ^{a}	4.74 ^{a}	21.98 ^{b}
T_2	3.86 ^{ab}	0.17 ^{bc}	4.30 ^{b}	20.88 ^{bc}
T_3	3.87 ^{ab}	0.18 ^{ab}	4.79 ^{a}	32.64 ^{a}
T_4	3.63 ^{c}	0.16b ^{c}	4.41 ^{b}	19.78 ^{bc}
SEm (±)	0.06	0.01	0.06	0.98
$CD_{P\leq 0.05}$	0.17	0.04	0.18	2.70
Variety				
V_1	3.85 ^{b}	0.22 ^{a}	3.83 ^{c}	19.23 ^{c}
V_2	4.33 ^{a}	0.24 ^{a}	5.17 ^{abc}	38.08 ^{a}
V_3	3.46 ^{d}	0.15 ^{b}	5.55 ^{a}	23.08 ^{bc}
V_4	3.72 ^{c}	0.17 ^{b}	4.87 ^{bcd}	26.73 ^{b}
V_5	3.27 ^{e}	0.17 ^{b}	4.69 ^{d}	23.08 ^{bc}
V_6	4.25 ^{a}	0.18 ^{b}	5.25 ^{ab}	17.31 ^{d}
V_7	3.92 ^{b}	0.15 ^{b}	2.56 ^{f}	19.23 ^{c}
SEm (±)	0.10	0.01	0.16	3.80
$CD_{P\leq 0.05}$	0.23	0.03	0.38	5.45
Interaction (T*V)				
T_1V_1	4.55	0.32	4.79	23.08
T_1V_2	4.10	0.24	4.13	30.77
T_1V_3	3.50	0.12	5.51	23.08
T_1V_4	3.50	0.18	4.65	15.38
T_1V_5	3.65	0.18	4.55	23.08
T_1V_6	4.65	0.35	7.28	15.38
				Table-2…Contd…
T_1V_7	3.70	0.16	2.27	23.08
T_2V_1	3.60	0.13	2.80	15.38
T_2V_2	4.70	0.29	4.71	30.77

T_2V_3	3.40	0.25	5.28	26.92
T_2V_4	3.75	0.14	4.26	15.38
T_2V_5	3.70	0.16	5.27	23.08
T_2V_6	4.00	0.10	4.55	15.38
T_2V_7	3.85	0.16	3.23	19.23
T_3V_1	3.70	0.22	4.05	23.08
T_3V_2	4.50	0.22	6.80	60.00
T_3V_3	3.60	0.13	6.07	23.08
T_3V_4	4.00	0.19	5.81	60.77
T_3V_5	2.70	0.19	4.51	23.08
T_3V_6	4.20	0.13	4.06	23.08
T_3V_7	4.40	0.16	2.22	15.38
T_4V_1	3.57	0.21	3.66	15.38
T_4V_2	4.00	0.22	5.03	30.76
T_4V_3	3.33	0.12	5.34	19.23
T_4V_4	3.63	0.16	4.76	15.38
T_4V_5	3.03	0.16	4.42	23.08
T_4V_6	4.13	0.13	5.12	15.38
T_4V_7	3.73	0.13	2.50	19.23
SEm(±)	0.20	0.03	0.32	3.20
$CD_{P\leq 0.05}$	0.47	0.07	0.76	7.60

Note: V_1 (HABR-21), V_2 (Swarna Abhilamb), V_3 (Swarna Shree), V_4 (Swarna Shobha), V_5 (Swarna Pratibha), V_6 (Swarna Mani), V_7 (Swarna Shyamli) and T_1: *Enriched Sanjeevani*(3%), T_2: BD-501 (1%), T_3:*Sanjeevani* (10%); T_4: Absolute Control

Table-3: Total cost of cultivation of different brinjal varieties in one hectare of land under different organic growing conditions

Sl. No.	Cost Components with Cost (Rs.)	Organic Growing Conditions			
		T_1: *Enriched Sanjeevani* (3%)	T_2: BD-501 (1%)	T_3:*Sanjeevani* (10%)	T_4: Absolute Control
1.	Land preparation	9500	9500	9500	9500
2.	Nursery and transplanting	9000	9000	9000	9000
3.	Cost of mulching	10000	10000	10000	8000
4.	Weeding and hoeing	2500	2500	2500	3500
5.	Irrigation	9500	9500	9500	8000
6.	Vermicompost+ basal dose of manure	6000	6000	6000	6000
7.	BD-501/*Enriched Sanjeevani*/*Sanjeevani*	1500	3500	5000	…..
8.	Plant protection	3000	3000	3000	……
9.	Labour cost	22000	22000	22000	22000
10.	Harvesting (Picking) and post harvest handling	10000	10000	10000	9000
11.	Miscellaneous (land rent, implements, marketing cost, interest, lay out, *etc*.)	10000	10000	10000	10000
TOTAL COST OF CULTIVATION (Rs.)		**93000**	**95000**	**96500**	**85000**

Table-4: Economics of cultivation of different brinjal varieties in one hectare of land under different organic growing conditions

Items	Interaction between Treatment and Variety						
	T_1V_1	T_1V_2	T_1V_3	T_1V_4	T_1V_5	T_1V_6	T_1V_7
Total cost of cultivation (Rs.)	93000.00	93000.00	93000.00	93000.00	93000.00	93000.00	93000.00
Production (t ha^{-1})	60.50	65.99	58.43	62.43	50.23	57.96	65.25
Selling price(Rs. kg^{-1})*	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Total income(Rs. ha^{-1})	302500.00	329950.00	292150.00	311750.00	251150.00	289800.00	326250.00
Net profit(Rs. ha^{-1})	209500.00	236950.00	199150.00	218750.00	158150.00	196800.00	233250.00
B:C Ratio	**3.25**	**3.55**	**3.14**	**3.35**	**2.70**	**3.12**	**3.51**
Items	**Interaction between Treatment and Variety**						
	T_2V_1	T_2V_2	T_2V_3	T_2V_4	T_2V_5	T_2V_6	T_2V_7
Total cost of cultivation (Rs.)	95000.00	95000.00	95000.00	95000.00	95000.00	95000.00	95000.00
Production (t ha^{-1})	59.19	57.85	61.02	63.73	52.19	56.85	60.00
Selling price(Rs. kg^{-1})*	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Total income(Rs. ha^{-1})	295950.00	289250.00	305100.00	318650.00	260950.00	284250.00	300000.00
Net profit(Rs. ha^{-1})	200950.00	194250.00	210100.00	223650.00	165950.00	189250.00	205000.00
B:C Ratio	**3.12**	**3.04**	**3.21**	**3.35**	**2.75**	**2.99**	**3.16**
Items	**Interaction between Treatment and Variety**						
	T_3V_1	T_3V_2	T_3V_3	T_3V_4	T_3V_5	T_3V_6	T_3V_7
Total cost of cultivation (Rs.)	96500.00	96500.00	96500.00	96500.00	96500.00	96500.00	96500.00
Production (t ha^{-1})	59.03	72.76	60.06	62.53	58.78	54.44	65.73
Selling price(Rs. kg^{-1})*	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Total income(Rs. ha^{-1})	295150.00	363800.00	300300.00	312650.00	293900.00	272200.00	328650.00
Net profit(Rs. ha^{-1})	198650.00	267300.00	203800.00	216150.00	197400.00	175700.00	232150.00
B:C Ratio	**3.06**	**3.77**	**3.11**	**3.24**	**3.05**	**2.82**	**3.41**
Items	**Interaction between Treatment and Variety**						
	T_4V_1	T_4V_2	T_4V_3	T_4V_4	T_4V_5	T_4V_6	T_4V_7
Total cost of cultivation (Rs.)	85000.00	85000.00	85000.00	85000.00	85000.00	85000.00	85000.00
Production (t ha^{-1})	18.59	24.15	31.19	28.74	22.96	30.37	31.33
Selling price(Rs. kg^{-1})*	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Total income(Rs. ha^{-1})	92950.00	120750.00	155950.00	143700.00	114800.00	151850.00	156650.00
Net profit(Rs. ha^{-1})	7950.00	35750.00	70950.00	58700.00	29800.00	66850.00	71650.00
B:C Ratio	**1.09**	**1.42**	**1.83**	**1.69**	**1.35**	**1.79**	**1.84**

Note: *-Farm gate price was taken into account; V_1 (HABR-21), V_2 (Swarna Abhilamb), V_3 (Swarna Shree), V_4 (Swarna Shobha), V_5 (Swarna Pratibha), V_6 (Swarna Mani), V_7 (Swarna Shyamli) and T_1: *Enriched Sanjeevani* (3%), T_2: BD-501 (1%), T_3:*Sanjeevani* (10%); T_4: Absolute Control