EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON PRUNING RECOVERY IN TEA (*CAMELLIA* SP.)

Abstracts

Experiment was conducted at Parry Agro Industries Ltd., Valparai, Coimbatore district in two varieties of tea *viz*., Assam jat and ATK clone. Totally eighteen treatments with different combinations of 100, 75, 62.5 and 50 per cent of the recommended doses of fertilizers along with DCC and biofertilizers. The DCC at the rate of three and six tonnes ha^{-1} and biofertilizers *viz*., VAM, *Azospirillum* and Phosphobacteria each @ 40 kg ha^{-1} were given annually. Bud break and time taken for tipping were earliest in the plots receiving higher dose of DCC (6 t/ha^{-1}) along with biofertilizers (50 kg ha^{-1}) irrespective of levels of inorganic fertilizers (T_4, T_5, T_8, T_{12} and T_{16}) in both the varieties. Maximum number of buds and tipping weight, pruning index and starch content were higher in treatments consisting higher level of DCC (6 t/ha^{-1}) and biofertilizers (40 kg ha^{-1}) along with higher levels of inorganic fertilizers (100% and 75% of recommended dose).

Comment [h1]: Re write it …. Mention the treatments (also mention the name of treatments) which were observed best for all the characters in both varieties.

Key words: INM, DCC, Biofertilizers and Pruning recovery,

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Introduction

Tea bushes are pruned at periodical intervals to revitalize its vegetative vigour, revive gross morphology and physiology and maintain an operable form and size of the bush. The regeneration of bush following pruning is solely supported by the carbohydrates reserves available in stems and roots which would depend upon the nutrients applied, no of shoots retained etc. In the present study, nutrient management through the use of

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organic manures in the form of Digested Coirpith Compost (DCC) and biofertilizers like *Azospirillum brasilense*, Vesicular Arbuscular Mycorrhizae (VAM) and phosphobacteria has been taken up during one complete pruning cycle to assess their influence on the pruning recovery of tea bushes.

Comment [h3]: First of all write a brief note on tea and then start writing about role of pruning on tea. End the introductory part with the objective of your study. Like role of DCC, VAM and other biofertilizers on tea .. Why you have taken up these fertilizers for studies and what is main objective of your investigation.

Materials and Methods

The investigation was carried out in Parry Agro Industries Ltd., Valparai, Coimbatore district to study the effect of digested coirpith compost (DCC) and biofertilizers on pruning recovery in two varieties of tea *viz*., Assam jat and ATK clone. Totally eighteen treatments with different combinations of 100, 75, 62.5 and 50 per cent of the recommended doses of fertilizers along with DCC and biofertilizers (Table 1) were involved. The experiment was laid out in RBD with three replications. Each treatment unit consisted of 100 bushes. The DCC at the rate of three and six tonnes ha^{-1} and biofertilizers *viz.*, VAM, *Azospirillum* and Phosphobacteria each @ 40 kg ha^{-1} were given annually. The tea bushes in the experimental field were pruned during August 1997 and the treatments were imposed from October 1997 onwards. After completion of one pruning cycle, at the time of next pruning year of August 2001, observations on pruning recovery viz., pruning index, time taken for bud emergence, number of buds per bush, time taken for tipping, tipping weight and starch content were taken. Starch content was recorded during 15 days before pruning and 60 days after pruning as per the method described by Sadasivam and Manickam (1996) and expressed in per cent. Pencil thick root samples were collected from five randomly selected tea bushes, dried in a laboratory oven at 70°C and powdered using Wiley mill. Powdered (40 to 60 mesh) sample was used for the determination of starch.

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Comment [h5]: Write name of all the fertilizers used in present studies.

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Results and Discussion

In both ATK and Assam jat, significant differences were observed among the treatments for characters *viz*., time taken for bud break, number of buds per bush, time taken for tipping, tipping weight per plot and pruning index (Table 2). Among the treatments, bud break and time taken for tipping were earliest in the plots receiving higher dose of DCC (6 t/ha^{-1}) along with biofertilizers irrespective of levels of inorganic fertilizers (T_4, T_5, T_8, T_{12} and T_{16}) in both the varieties. Assam jat generally recorded relatively a longer time for bud break and time taken for tipping as compared to ATK. Number of buds and tipping weight, pruning index and starch content were higher in treatments consisting higher level of DCC and biofertilizers along with higher levels of inorganic fertilizers (100% and 75% of recommended dose).

The positive response of plants to DCC application along with biofertilizers may therefore be attributed to better uptake of nitrogen and water besides better storage of reserves in roots which in turn promoted the bud break and earlier growth and development of new shoots after pruning. If the tea bushes are left completely devoid of leaves at the time of pruning, they are unable to make use of the raw materials necessary for growth and are inevitably dependent on the reserves of elaborated food starch which they have accumulated for their recovery (Sharma, 1984). Hence in the present study, the starch reserves in the roots were just analyzed before and following pruning and the results showed that combined application of DCC and biofertilizers significantly registered maximum starch content during both 15 days before pruning and 60 days after pruning, confirming the key role of reserved starch material in the recovery of bushes after pruning in tea. Higher accumulation of starch in these bushes might be due to the

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better physiological status of the plant enhanced by the application of DCC and biofertilizers.

The maximum tipping weights and number of buds, earlier tipping and bud break were also recorded in treatments, which received DCC and biofertilizers that coincided with the highest initial carbohydrate levels influencing the recovery. The level of total carbohydrates in the root declined steeply after pruning. The declining trend continued up to 45 days after pruning. This decreasing trend in the root carbohydrate might be because of the upward translocation of carbohydrate for bud break and shoot growth and development. The slight increasing trend in the root carbohydrate levels observed during 45 days after pruning could be attributed to downward translocation of assimilates produced by newly expanding leaves (Sharma and Murty, 1989). Thus it is evident that recovery of the tea bushes completely depends upon the starch reserves in the roots which could be positively correlated with nutrients available to the plants.

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Comment [h13]: Name of treatment

Comment [h14]: Re-write results again with outcomes of your investigation. Out of 18 treatments which were best for both the varieties. Support your findings with more references.

REFERENCES

Sadasivam, S. and A. Manickam (1996). **Biochemical Methods**. New Age International (P) Limited Publishers, New Delhi and Tamil Nadu Agricultural University, Coimbatore. p. 256.

Sharma, V.S. (1984). Pruning of tea: Precepts and practices. **UPASI Tea Scient. Dept. Bull. 39 :** 63-67.

Sharma, V.S. and R.S.R. Murty (1989). Certain factors influencing recovery of tea from pruning in South India. **Tea, 10(1) :** 32-41.

Comment [h15]: Write reference after tables. Add more references.

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Table 1. Treatment details.

Comment [h17]: Mention these details in methodology part.

Treatments	Details
T_1	Recommended dose of inorganic fertilizers (Estate practice or control)
T_2	T_1 + Digested Coirpith Compost (DCC) alone @ 3 t/ha
T_3	T_1 + Digested Coirpith Compost (DCC) alone @ 6 t/ha
T_4	T_2 + Biofertilizers
T_5	T_3 + Biofertilizers
T_6	75% of T_1
T_7	75% of T_1 + DCC @ 3 t/ha + Biofertilizers
T_8	75% of T_1 + DCC @ 6 t/ha + Biofertilizers
T_9	75% of T_1 + Biofertilizers alone
T_{10}	62.5% of T_1
T_{11}	62.5% of T_1 + Biofertilizers
T_{12}	62.5% of T_1 + DCC @ 6 t/ha + Biofertilizers
T_{13}	62.5% of T_1 + Biofertilizers alone
T_{14}	50% of T_1
T_{15}	50% of T_1 + DCC @ 3 t/ha + Biofertilizers
T_{16}	50% of T_1 + DCC @ 6 t/ha + Biofertilizers
T_{17}	50% of T_1 + Biofertilizers alone
T_{18}	T_1 + Biofertilizers alone
Biofertilizers - VAM, *Azospirillum* and Phosphobacteria each @ 40 kg/ha	

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Table 2. Effect of digested coirpith compost and bio fertilizers on pruning recovery in tea varieties.

Treatments	Time taken for bud break (days)		Number of buds per bush		Time taken for tipping (days)		Tipping weight per plot (days)		Pruning Index (kg/cm^2)	
	ATK	Assam	ATK	Assam	ATK	Assam	ATK	Assam	ATK	As
T_1	26	28	265	275	86	92	0.222	0.239	3.34	1.67
T_2	25	26	274	286	82	87	0.304	0.269	3.72	1.98
T_3	25	26	285	298	81	85	0.307	0.33	3.89	1.99
T_4	23	24	310	314	77	82	0.278	0.305	4.00	2.15
T_5	22	23	325	345	77	78	0.275	0.337	4.08	2.29
T_6	27	28	272	270	84	92	0.255	0.291	3.34	1.55
T_7	24	25	295	285	78	82	0.295	0.346	3.76	2.13
T_8	23	25	328	320	77	78	0.340	0.357	4.23	2.15
T_9	24	26	298	296	79	82	0.287	0.269	3.42	1.87
T_{10}	26	27	248	268	84	90	0.286	0.274	2.94	1.55
T_{11}	24	25	284	281	79	84	0.245	0.266	3.73	1.94
T_{12}	24	24	292	290	77	80	0.312	0.345	3.84	2.13
T_{13}	25	24	276	286	82	86	0.273	0.298	3.25	1.85
T_{14}	27	27	268	267	87	94	0.286	0.281	2.94	1.54
T_{15}	25	25	284	274	80	84	0.293	0.315	3.34	1.76
T_{16}	24	24	286	286	79	81	0.294	0.343	3.62	1.92
T_{17}	25	25	270	276	82	87	0.284	0.259	2.82	1.75
T_{18}	25	26	285	295	84	88	0.298	0.369	3.61	1.89
S.Ed	0.515	0.569	5.460	5.760	1.578	1.750	0.051	0.052	0.163	0.097
CD (P=0.05)	1.41	1.156	11.140	11.700	3.200	3.550	0.103	0.105	0.3313	0.198

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Table 3. Effect of digested coirpith compost and biofertilizers on the starch content (%) of dried roots in tea varieties

Treatment	ATK			Assam jat		
	15DBP	60DAP	% Decrease	15DBP	60DAP	% Decrease
T_1	20.46	16.16	21.02	19.21	16.02	16.61
T_2	22.22	17.24	22.41	21.09	17.20	18.44
T_3	22.24	17.28	22.30	21.21	17.22	18.81
T_4	22.48	17.38	22.69	21.36	17.32	18.91
T_5	22.85	17.47	23.54	21.67	17.45	19.47
T_6	20.37	16.08	21.06	19.07	16.02	15.99
T_7	22.52	17.35	22.96	21.48	16.85	21.55
T_8	22.88	17.42	23.86	21.85	17.13	21.60
T_9	22.28	17.25	22.58	21.31	17.25	19.05
T_{10}	20.34	16.12	20.75	18.88	16.04	15.04
T_{11}	22.34	17.32	22.47	20.65	17.30	16.22
T_{12}	22.44	17.38	22.55	20.98	17.40	17.06
T_{13}	22.16	17.24	22.20	20.32	17.22	15.26
T_{14}	20.28	16.10	20.61	19.01	16.01	15.78
T_{15}	21.82	17.24	20.99	20.68	17.29	16.39
T_{16}	22.06	17.28	21.67	20.84	17.38	16.60
T_{17}	22.04	17.17	22.10	20.28	17.24	14.99
T_{18}	22.30	17.25	22.65	21.33	17.28	18.99
S.Ed	0.387	0.312	--	0.395	0.289	--
CD (P=0.05)	0.786	0.633	--	0.806	0.588	--

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DBP – Days Before Pruning **DAP – Days After Pruning**

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