Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(1): 949-951
Received: 19-11-2018
Accepted: 21-12-2018

A Anjaneyulu
Department of Plantation and Processing, UBKV, Pundibari, Cooch Behar, West Bengal, India

H Bhattacharjee
Department of Plantation and Processing, UBKV, Pundibari, Cooch Behar, West Bengal, India

Correspondence
A Anjaneyulu
Department of Plantation and Processing, UBKV, Pundibari, Cooch Behar, West Bengal, India

Yield and quality of young tea (*Camellia sinensis* (L.) o. Kuntze) with application of organic and inorganic fertilizres in arecanut garden

A Anjaneyulu and H Bhattacharjee

Abstract
The investigation was conducted at Instructional plots of the Department of Plantation Crops and Processing, Faculty of Horticulture, UBKV, Pundibari, Cooch Behar, West Bengal, India, during March 2016 to May 2017, the investigation was to observe the yield and quality of young tea (*Camellia sinensis* (L.) o. Kuntze) with application of organic and inorganic fertilizer in arecanut garden. The experiment was laid out in Randomized Complete Block Design (RCBD) with five treatments T_1 (Control), T_2 (FYM@ 2.0kg+1/2 RDF), T_3 (VC@ 1.0kg+1/2RDF), T_4 (FYM@2.0kg+RDF), T_5 (VC@1.0kg+RDF), with four replications, yield parameters were recorded from 90 to 360 days after planting. Two leaf and a bud and tender terminal shoots with leaves were plucked, total number of two leaf and a buds were harvested per plot, fresh weight was taken soon after harvest and dried in oven then took dry weight using METLER balance. Caffeine content was estimated from two leaf and a bud. Results showed that yield parameters were significantly varied among the treatments, maximum yield was recorded in T_5 (VC+RDF), on number of two leaf and a buds (372.25), fresh weight of two leaf and a buds (100.49 g) and dry weight of two leaf and a buds (21.38 g), followed by T_4 (FYM+RDF) and T_3 (VC+1/2 RDF), whereas the minimum yield was recorded in T_1 (control). Caffeine content was not statistically significant difference among the treatments. Maximum caffeine content was recorded in T_3 (VC+1/2RDF) whereas minimum caffeine content was recorded in T_1 (control).

Keywords: Arecanut, caffeine, fresh and dry weight, tea and two leaf and a bud.

1. Introduction
Tea (*Camellia sinensis* (L.) o. Kuntze) is a perennial, small, evergreen shrub belonging to the family Theaceae, grown under a wide range of soil and climatic conditions. Cultivation of tea extends from 440 North to 340 South latitude, 1200 East to 600 West longitude and up to 2400 m above mean sea level. Tea in plain areas grows luxuriantly under shade, prefers acidic soil with a pH range of 4.5 to 5.5, ambient temperature range of 30^0 + 50 C with about 75% RH, and annual rainfall varying from 115.0 to 500.0 cm, well distributed though out the year. Tea is the most popular and the cheapest beverage consumed by the world population. It is grown in more than 60 countries in the world. Major producers are India, China, Sri Lanka, Kenya, Malawi, Vietnam and Bangladesh, contributing the maximum share to the global production.
Nutrient management in tea plantations is an important aspect and nutrients are supplied mainly through inorganic fertilizers. However, it is widely accepted that a balanced fertilizer application with an efficient use of other inputs is the key for sustainable production. Fertilizer is one of the major agro-inputs contributing to the cost of production and productivity in tea plantation. For proper maintenance of the health of tea bushes and to obtain high yield, a well-balanced fertilization is necessary throughout the year. Nitrogen, phosphorous and potassium are three major nutrients required for the cultivation and should be used in proper proportion. For maintaining the soil health integration of various factors like physical, chemical and biological properties of soil, climate, addition of organic matters, water, shade and weed management are vital for achieving maximum return from the investment and productivity of the soil. The most important elements present in organic fertilizers are nitrogen, phosphorus, potassium and more importantly the micro-nutrients, which influence vegetative and reproductive phase of plant growth. Organic manures having low nutrient content, solubility and nutrient release rate are typically lower than inorganic fertilizers and therefore inorganic fertilizers are more preferred than organic manures. Though the application of organic manures not only produced the highest and sustainable crop yield, but also improved the soil fertility and productivity of land. So, that combination of organic and inorganic sources of nutrients is helpful to obtain a good return without affecting the soil health. The objective of the study is yield and quality of young tea (*Camellia sinensis* (L.) o. Kuntze) with application of organic and inorganic fertilizres in arecanut garden.

2. Materials and Methods

An experiment was conducted with five treatments T_1 (Control), T_2 (FYM@2.0kg+1/2RDF), T_3 (VC@1.0kg+1/2RDF), T_4 (FYM@2.0kg+RDF), T_5 (VC@1.0kg+RDF), planting material used for the experiment of tea was biclonal seed stock of TS-462, taken from the Departmental nursery and inter planted in arecanut garden with spacing of 110 cm X 60 cm (single hedge), maintaining a distance of 60 cm from the base of the arecanut palm, work was done at the instruction cum research plots of the Department of Plantation Crops and Processing, Faculty of Horticulture, Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal, India, work was done during June 2016 to May 2017. The experiment was laid out in Randomized Complete Block Design (RCBD) with five treatments (T_1 to T_5) and four replications (R_1 to R_4), Spacing of areca nut was followed 2.70 m X 2.70 m, age of areca nut palms 11years old when tea was inter planted in arecanut garden, arecanut variety used for the study was Mohit nagar. Source of nutrients for the experiment was organic matter as farm yard manure (FYM@2.0 kg/plot) and vermicompost (VC @1kg/plot); nitrogen as urea, phosphorus as single super phosphare (SSP) and potash as muriate of potash (MOP) and recommended dose of fertilizers for tea [Young tea mixture (NPK:10: 5: 10) @ 200 kg/ha/year], as per recommendation of Tea Research Association (TRA), in case of arecanut recommended dose of fertilizers i.e., NPK @ 100:40:140 g/palm/year was given. Two leaf and a bud and tender terminal shoots with leaves were plucked, total number of two leaf and a buds were harvested per plot, fresh weight was taken soon after harvest and dried in oven then taken dry weight using METLER balance. Caffeine content was estimated from two leaf and a bud and followed method was **(**Fuiseungchin *et al*., 2010) [2]. Observations were recorded like number of two leaf and a bud, Fresh weight of two leaf and a buds (g), Dry weight of two leaf and a buds (g) and Caffeine content (%).

3. Results and Discussion

Number of two leaf and a bud

Number of two leaf and a buds were showed that significantly varied among the treatments, number of two leaf and a buds studied from 90 to 360 days after planting and presented in Table.1. and Figure.1. From this study number of two leaf and buds were constantly increased from 300 to 360 days after planting in compared with other days. Number of two leaf and a buds (372.25) were recorded maximum in T_5 (VC+RDF) followed by (302.75) in T_4 (FYM+RDF) and (285.25) in T_3 (VC+1/2 RDF) whereas the minimum number of (245.25) two leaf and a buds were recorded in T_1 (control) on 360 days after planting. The maximum number of two leaf and a bud was recorded during the active growth period of plants but minimum number of two leaf and a bud was recorded during the winter months compared to sunny days. Similar observations were also recorded by Qamar-uz-zaman *et al*., (2011) [4] that fresh leaves yield increased significantly with application of nitrogenous fertilizer on the growth and yield of tea crop. Production of tea usually apply urea, and organic manures for P, K and Mg nutrition. In fact, tea plants need large amounts of N, P, K and Mg for growth. The deficiency of these nutrients could adversely affect the yield and quality observed by Li and Pan (2004) [3], Yu *et al*., (1997) [6] and Zheng (1999) [8]. Yuan (2000) [7] absorbed that the nutrient deficiency in soils and poor fertilization are two factors limiting the yield and quality of tea, Swaminathan (1992) [5] also stressed that importance of integrated nutrient management in tea to increase its soil health and thus the productivity of tea.

Fresh weight and dry weight of two leaf and a bud per plot (g)

Fresh and dry weight of two leaf and a buds (per plot) were studied from 90to 360 days after planting and presented in Table.2. Fresh and dry weight of two leaf and a bud was recorded that significant difference among the treatments. Minimum fresh and dry weight of two leaf and a bud was recorded on 210 days after planting, in case maximum fresh and dry weight of two leaf and a buds were recorded from 300 to 360 days after planting. Maximum fresh and dry weight of two leaf and a bud (100.49 g), (21.38 g) was produced in T_5 (VC+RDF) whereas the minimum fresh and dry weight of two leaf and a bud (66.66 g), (14.74 g) was observed in T_1 (control) after T_5(VC+RDF) fresh and dry weight of two leaf and a bud (82.17 g), (17.45 g) was recorded in T_4 (FYM+RDF) and (77.49 g), (17.10 g) in T_3(VC+1/2RDF) on 360 days after planting. Debere *et al*. (2014) also observed that fresh and dry weight of two leaf and a bud in tea was significant difference with inorganic nitrogenous fertilizers with organic phosphorus, whereas control treatment gave lowest values both fresh and dry weight.

Caffeine content

Caffeine content in two leaf and a buds were presented in Table.3 Caffeine content was not significant difference among the treatments. Maximum caffeine content was recorded in T_3 (VC+1/2RDF) whereas minimum caffeine content was recorded in T_1 (control). Similar observations were also recorded by Fuiseungchin *et al*., (2010) [2] there was no significant difference in all treatments on caffeine content in tea leaves was observed in organic and conventional farming systems of tea plantations.

4. Conclusion

On the basis of the findings of this study, it was concluded that yield parameters were significantly varied among the treatments, maximum was recorded by T_5 (VC+RDF) vermicompost with Recommended dose of fertilizers, parameters like number of two leaf and bud (372.25),fresh weight of two leaf and a buds (100.49 g) and dry weight of two leaf and a buds (21.38 g), whereas the minimum yield parameters were recorded in T_1 (control).With respect of quality, Caffeine content in two leaf and a bud was not significant difference among the treatments.

Table 1: Number of two leaf and bud on days after planting (per plot)

Treatments	Number of Two leaf and bud							
	90DAP (August'16)	120DAP (Sept'16)	150DAP (Oct'16)	180 DAP (Nov'16)	210DAP (Dec'16)	300DAP (March'17)	330DAP (April'17)	360DAP (May'17)
T_1-Control	6.75	90.50	121.75	105.00	29.00	140.75	217.00	245.25
T_2-FYM+1/2 RDF	10.50	101.75	132.75	117.25	32.00	153.50	229.00	284.50
T_3-VC+1/2 RDF	12.00	120.50	148.25	121.00	37.75	167.25	237.25	285.25
T_4-FYM+RDF	12.50	125.75	172.75	139.50	42.75	174.25	260.25	302.75
T_5-VC+RDF	15.75	155.75	191.50	160.50	46.25	206.25	302.25	372.25
SEm(±)	1.48	7.25	6.32	7.28	2.10	7.86	10.51	8.53
C.D at (0.05)	4.56	22.33	19.48	22.43	6.48	24.21	32.38	26.29

DAP: Days after planting, RDF: Recommended dose of fertilizers, (FYM: Farm yard manure, VC: Vermicompost)

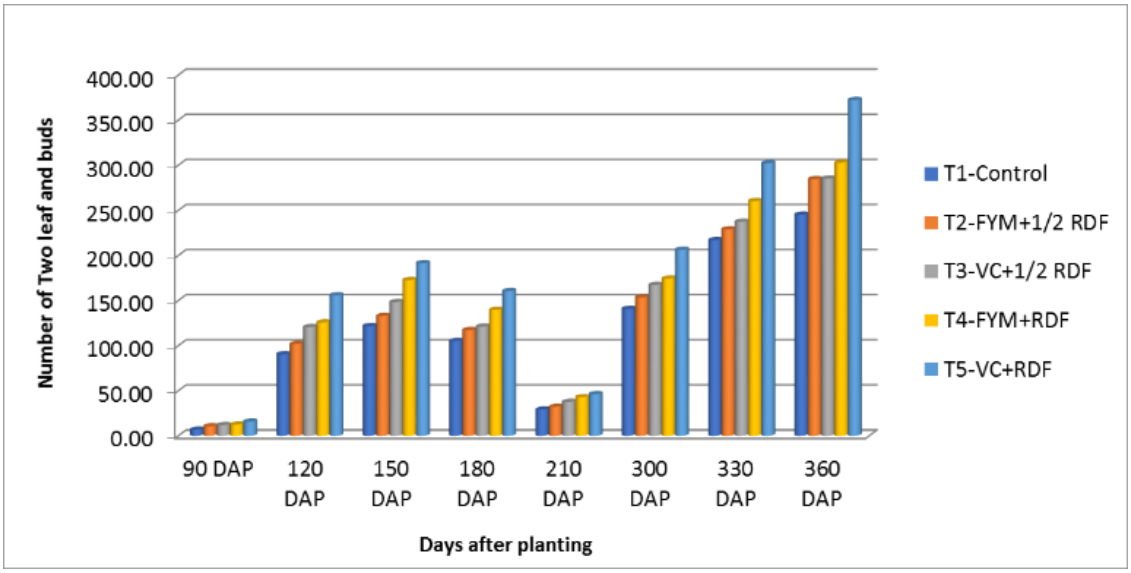

Fig 1: Number of two leaf and bud on days after planting (per plot)

Table 2: Fresh and dry weight of two leaf and buds on days after planting per plot (g)

Fresh and dry weight of two leaf and buds per plot																
Treatments	**90DAP (Augst'16)**		**120DAP (Sept'16)**		**150DAP (Oct'16)**		**180DAP (Nov'16)**		**210DAP (Dec'16)**		**300DAP (March'17)**		**330DAP (April'17)**		**360DAP (May'17)**	
	F. wt	**D. wt**	**F. w t**	**D. wt**	**F. wt**	**D. wt**	**F. wt**	**D. wt**	**F. wt**	**D. wt**	**F. wt**	**D. wt**	**F. wt**	**D. wt**	**F. wt**	**D. wt**
T_1-Control	1.95	0.52	24.35	7.51	32.39	7.97	27.96	7.64	7.96	2.96	38.46	9.48	58.64	13.69	66.66	14.74
T_2-FYM+1/2 RDF	2.88	1.05	27.22	8.39	35.31	8.56	31.11	8.33	8.93	3.54	41.66	10.29	62.28	14.11	76.16	16.33
T_3-VC+1/2 RDF	3.36	1.26	32.20	8.86	39.24	9.22	33.02	8.02	10.28	4.23	45.16	10.78	64.52	14.72	77.49	17.10
T_4-FYM+RDF	3.72	1.38	33.43	9.26	45.92	10.00	38.47	9.81	11.05	4.37	47.62	11.25	70.71	15.42	82.17	17.45
T_5-VC+RDF	4.28	1.67	42.30	11.10	51.11	12.05	43.01	10.91	12.64	4.40	56.14	13.08	81.63	17.02	100.49	21.38
SEm(±)	0.45	0.20	1.93	0.51	1.68	0.40	1.98	0.44	0.47	0.28	2.22	0.45	2.88	0.44	2.32	0.59
C.D at (0.05)	1.39	0.61	5.95	1.58	5.17	1.24	6.11	1.34	1.43	0.87	6.84	1.38	8.88	1.36	7.14	1.82

(DAP: Days after planting, RDF: Recommended dose of fertilizers, (FYM: Farm yard manure, VC: Vermicompost)

Table 3: Caffeine content

Treatments	Caffeine (%)
T_1-Control	3.55
T_2-FYM+1/2 RDF	3.65
T_3-VC+1/2 RDF	3.83
T_4-FYM+RDF	3.57
T_5-VC+RDF	3.60
SEm(±)	0.09
C.D at (0.05)	NS

RDF: Recommended dose of fertilizers,
(FYM: Farm yard manure, VC: Vermicompost)

5. References

1. Debere N, Fikre L, Kaba U, Gezahegn B. Influence of combined application of inorganic nitrogen and organic phosphorus fertilizers on growth of young tea plants (*Camellia sinensis* L.). Journal of Agronomy. 2014; 26(5):1-8.
2. Fuiseungchin, Teckyung H, Khimphin C, Mohamaduboyie J, Nyetkui W. Organic versus conventional farming of tea plantation. Borneo Science. 2010; 26:19-26.
3. Li CJ, Pan GS. Fertilization and nutrition analysis on tea plant. Tea. 2004; 17(6):17-21.
4. Qamar-uz Z, Sair S, Fayaz A, Hamid FS. Effect of nitrogenous fertilizers on the growth and yield of Tea (*Camellia sinensis*) pruned in curved VS flat shape. J Agric. Res. 2011; 49(4):477-482.
5. Swaminathan P. Integrated nutrient management in tea, UPASI scientific conference, Coonoor, India. 14 Sep. Bulletin No. 1992; 45:13-28.
6. Yu ZJ, Yang XC, Wei CL. The effects of N, P and K compound fertilizer on growth and yield of treetops of spring tea in tea garden. Tea. 1997; 23(4):16-18.
7. Yuan L, Wang SS, Huang JG. Tea-grown soils and tea quality in Sichuan and Chongqing, China. Pedosphere. 2000; 10(1):45-52.
8. Zheng NF. The Utilitarian Techniques on Tea Plantation. Nanjing University Press. Nanjing. 1999; 5-10.