Original Research Article

Studies on the effect of foliar application of micronutrients for growth, yield, economic traitsand leaf nutrient content in cashew (*Anacardiumoccidantale* L.) var. VRI 3

ABSTRACT

The present field experiment on studies on the effect of foliar application of micronutrients for growth, yield, economic traits and leaf nutrient content of cashew var. VRI-3 was carried out at Horticultural College and Research Institute, Periyakulam and experiment was conducted at farmer's field at Kandamanur, Theni District during the year 2016 – 2017, 2017 – 2018 and 2018– 2019. The objective is to enhance the growth, flowering, nut yield, economic traits of cashew var. VRI 3. This experiment was laid out in a Randomized Block Design (RBD) with seven treatments and replicated thrice. Foliar application of micronutrients was done during three times in a year June – July, October – Novemberand January – February with ten years old randomly selected trees. The experimental resultsrevealed that the highest values of growth, flowering and yield traits were recorded in the treatment T_4 (NPK + micronutrient combination II (Recommended dose of fertilizer along with 0.75% $ZnSO_4$ + 0.75% $CuSO_4$ + 0.75% $FeSO_4$ + 0.2% $MnSO_4$ + 0.5% Boric acid) such as plant height, number of panicle per m^2, number of fruits per panicle, average apple weight, number of fruits per tree, average nut weight, 100 nut weight, yield per tree, estimated yield and B:C ratio for three years whereas the control (T_1) registered the lowest values for all the traits were observed. The same trend was noticed in leaf nutrient content also. T_4 exhibited the highest values of leaf nutrient content such as N,P,K and micronutrient contents *viz.*, Iron, Zinc, Manganese and Copper whereas the lowest values were recorded in control (T_1). The present study it was concluded that the T_4 registered the highest values for growth, yield and economic traits of cashew var. VRI-3.

Key words: Cashew,micronutrients, foliar application, growth, yield, economic traits.

1. INTRODUCTION

Cashew (*Anacardiumoccidentale* L.) belongs to the family Anacardiaceae and is native to Brazil.India is the largest area holder of cashew. Cultivation of cashew in India confines mainly to the peninsular areas. It is grown in Kerala, Karnataka, Goa and Maharashtra along the west coast and Tamil Nadu, Andhra Pradesh, Orissa and West Bengal along the east coast. India is the second largest producer of raw cashew in the world, next to

Vietnam. Andhra Pradesh has the largest area and Maharashtra ranks first in production and productivity of cashew in India. In Tamil Nadu, cashew mainly cultivated in Ariyalur, Cuddalore, Theni, Perambalur, Pudukottai, Sivagangai, Villupuram, Tirunelveli, Thanjavur, Kanyakumari, Tuticorin, Trichy, Nagapattinum, Dindigul and Kanchipuram districts with an area of 1,04,659 ha. In Theni District, it is cultivated in 4840 ha mainly in Aundipatti and Periyakulam regions. Cashew also cultivated in coastal regions of India mainly for reducing the runoff. In India cashew is generally grown as rainfed crop.Even though cashew is a hardy crop, it responds well to manure [1], [2]. Nutrient management is the basic cognitive process of managing the timing, source, amount and method of nutrient application with the aim of maximizing crop productivity while reducing nutrient losses that could bring up environmental problems. Manuring in cashew is not a regular practice in the existing orchards of India, even-though adequate application of fertilizers might be the required for cashew for growth and yield. In Tamil Nadu also little or no manure and fertilizer application were practiced by the most the farmers. Cashew responds well in fertilizer application. Manures and fertilizers promote growth of the plants and advance the onset of flowering in young trees. The ideal period for fertilizer application is immediately after the cessation of heavy rains and with available soil moisture which increase the nut weight and yield. Over the years, application of micronutrients and exogenous hormones has significantly improved flowering and fruiting in cashew [3]. Cultivation without manures and fertilizer application resulted in expression of deficiency symptoms for both major and micro nutrients especially N, K, Fe, Zn and B which is reduced the yield. Foliar sprays of N as urea combined with an insecticide at the emergence of the flush and again at panicle initiation will ensure better fruit set and control the major seasonal pests.The problem of declining nut yield has led to an investigation into the effectiveness of micronutrients as foliar application to improve the fruit set, and fruit retention in cashew. Micronutrient disorders were observed during the early stage as well as the full grown stage of cashew. Application of micronutrients as foliar spray was very effective in cashew than the soil application. With this background, present experiment on “Studies on the effect of foliar application of micronutrients for growth, yield and economic traits in cashew (*Anacardium* o*ccidentale* L.) var. VRI-3” was conducted at Department of Spices and Plantation Crops, Horticultural College and Research Institute, Periyakulam during 2016 – 2020.

2. MATERIALS AND METHODS

The field experiment was conducted at farmer's field of Kandamanur village, Theni District, Tamil Nadu. A field survey was conducted in cashew growing areas of Aundipatti Taluk of Theni District and identified the micronutrients problems of cashew before imposing the trial and field was fixed at Kandamanur village. An experiment was taken up on 10 years old grafted cashew trees cv. VRI-3 with the spacing of 7 x 7 m. The healthy and high yielding trees were randomly selected and used for this study. The trees were applied with micronutrients as foliar spray at new flush stage (June – July), just before flowering (October - November) and nut development stages (January – February) as four to five litres spray solutions were sprayed in each tree. Trees under control were sprayed with water. The experiment was laid out with Randomized Block Design (RBD) with seven treatments and replicated thrice [4].Observations plant height (m), number fruits per panicle, number of panicle per m^2 area, average apple weight (g), apple + nut weight (g), 100 nut weight (g), average nut weight (g), yield per tree (kg $tree^{-1}$), estimated yield (t/ha) and B:C ratio were recorded and analysed statistically.The nitrogen (N) content in the leaf samples was analyzed by Kjeldahl method [5]. Phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), iron (Fe), manganese(Mn), zinc (Zn) and copper (Cu) were estimated by tri-acid mixture (9:4:1 HNO_3: $HClO_4$: H_2SO_4) as per the standard method [6].The treatment details are as follows

T_1	Control	:	No spray and not application of fertilizers
T_2	NPK alone	:	Recommended dose of fertilizers (RDF) (280:160:240g NPK/tree)
T_3	NPK + micronutrient combination - I	:	RDF + 0.5% $ZnSO_4$ + 0.5% $CuSO_4$+ 0.5 % $FeSO_4$ + 0.1 % $MnSO_4$ + 0.3 % Boric acid
T_4	NPK + micronutrient combination –II	:	RDF + 0.75% $ZnSO_4$ + 0.75% $CuSO_4$+ 0.75 % $FeSO_4$ + 0.2 % $MnSO_4$ + 0.5 % Boric acid
T_5	NPK + micronutrient combination –III	:	RDF + 0.5% $ZnSO_4$ + 0.5% $FeSO_4$ + 0.5 % urea
T_6	NPK + micronutrient combination –IV	:	RDF + 1.0% $ZnSO_4$ + 1.0% $FeSO_4$ + 1.0 % urea
T_7	NPK + micronutrient combination -V	:	RDF + 0.5% $ZnSO_4$ + 0.5% $FeSO_4$ + 0.25 % boric acid

3. RESULTS AND DISCUSSION

3.1 Vegetative Traits

The present investigation on studies on the effect of micronutrients in cashew of different combinations of micronutrients on growth and yield of cashew was conducted during the year 2016-17, 2017-18 and 2018-19. During the year 2016 – 2017, the experimental results revealed that all the vegetative, nuts and yield parameters varied

significantly. T_4 (NPK + micronutrient combination II (RDF + 0.75% $ZnSO_4$ + 0.75% $CuSO_4$ + 0.75% $FeSO_4$ + 0.2% $MnSO_4$ + 0.5% Boric acid) recorded the highest values in vegetative traits such as plant height (4.25 m), number of panicles per m^2 area (11.58) and number of fruits per panicle (18.56)followed by T_3(3.8 m; 9.64; 17.89) whereas the absolute control (T_1 - no foliar spray and application of fertilizers) noticed the lowest values for all the vegetative traits (3.25 m; 7.12; 12.16). The same trend was found in 2017 – 18 as well as 2018-19 also. During the year2017-18, experimental results revealed that T_4exhibited the highest values of all the traits plant height (4.43 m), number of fruits per panicle (19.26)and number of panicles per m^2 area (11.13) whereas the lowest values were found in control (3.47 m; 12.33; 5.67). In the year 2012-13, experimental results revealed that T_4registered the highest values of all the vegetative traits such as plant height (4.65 m), number of fruits per panicle (19.67) and number of panicles per m^2 area (11.67) whereas the lowest values were found in control (3.52 m; 12.75; 6.30). In the case of pooled mean, the same trend was noticed. T_4 registered the highest values for the all the vegetative traits whereas the control (T_1) exhibited the lowest values for all the vegetative traits. Zinc has an influence on the synthesis of carbohydrates and their translocation to storage organs as a result of which fruit set and development is improved [7]. He also stated that boron also very essential for flower production in cashew. Foliar spray of zinc sulphate was effective in increasing the number of fruits per plant in guava [8]. Boron is needed both at the reproductive stage for pollination and at maturity stage, to avoid fruitdrop and also for mobilization of calcium for better shelf life. Since it is highly immobile in the plant, it is continuously needed. But, reproductive parts need more B than do vegetative parts [9]. Foliar application of micronutrients which enhanced growth traits such as number of fruits per panicle in cashew [10], [11], [12].

Regarding nut characters, the experimental results are presented in Table 2. The year 2016 -17 results revealed that T_4 recorded the highest values for the traits such as apple weight (59.66 g), apple + nut weight (67.06 g), 100 nuts weight (671.66), average nut weight (7.40 g) and number of nuts per kg (151.33) whereas the control registered the lowest values for all the nut characters (52.16 g;60.10 g; 628.3 g;6.25 g;161.83).During theyear 2017 – 18, T_4 registered the highest values of the nut characters such as average apple weight (76.17 g), average apple + nut weight (83.62 g), average nut weight (7.45 g), 100 nut weight (674.33 g) and number of nuts per kg (151.33) while the lowest value was observed in control (T_1) of the traits like apple + nut weight (59.99g), average apple weight (53.13 g), average nut weight (6.21g), 100 nut weight (593.67) and number of nuts per kg (162.33). In the case of 2018 -19, the same trend was noticed.T_4 exhibited the highest values of the traits *viz.*,apple + nut weight

(80.10 g), average apple weight (75.53 g), average nut weight (7.38 g), 100 nut weight (668.00 g) and number of nuts per kg (149.33) whereas the control (T_1) found the lowest values in the traits like apple + nut weight (62.0g), average apple weight (54.90 g), average nut weight (6.20g), 100 nut weight (603.0 g) and number of nuts per kg (161.33). According to the pooled mean analysis, results revealed that T_4 recorded the highest values for nut characters such as average apple weight (75.12 g), apple + nut weight (81.593 g), average nut weight (7.41 g), 100 nut weight(671.33) and number of nuts per kg (149.74)which was significantly superior over other treatments. Heavier fruits under zinc treatment might be due to the high level of auxin in the various parts of the fruit maintained by zinc application. Foliar application of zinc sulphate (0.5 %) + borax (0.1 %) found to be significantly higher values of nut weight and apple weight under Karnataka conditions [11]. Foliar application of micronutrients has increased nut weight over control [13]. Foliar application of borax had increasedfruit weight in mango cv. Himsagar. [14]. Soil application of micronutrients such as Zn, Iron and Boran had enhanced fruit weight in cashew [15].

3.2 Yield and Economic Traits

According to the yield and economic traits, during 2016 – 17 experimental results revealed that T_4 recorded the highest values of yield per tree (15.66 kg/tree), estimated yield (2.44 t/ha) and B:C ratio (2.74) whereas the lowest yield traits were found in control (T_1) (12.08 kg/tree; 1.88 t/ha; 1.75). In the year 2017-18, experimental results revealed that T_4 recorded the highest value of all the traits such as yield per tree (16.30 kg), estimated yield per ha (3.32 t/ha) and B:C ratio (2.75). The lowest value was observed in control (T_1) of the traits *viz.*,yield per tree (12.93 kg), estimated yield (2.64 t/ha) and B:C ratio (1.75).During the year 2018– 19,the same trend was noticed. T_4 registered the highest values of the traits like yield per tree (5.23 kg/tree), estimated yield (1.07 t/ha) and B:C ratio (2.76) whereas control (T_1) recorded the lowest values for the traits such as yield per tree (3.92 kg/tree), estimated yield (0.80 t/ha) and B:C ratio (1.74).According to the pooled mean analysis, T_4exhibited the highest values in yield per tree (12.40 kg/tree), estimated yield (2.193 t/ha) and B:C ratio of 2.74.The control (T_1) registered the lowest values of the traits *viz.*,yield per tree (9.64 kg/tree), yield (1.517 t/ha) and B:C ratio (1.75).The improvement in yield due to micro-elements may be ascribed to better photosynthesis, less fruit drop, improved fruit size and fruit weight [16]. Foliar application of zinc sulphate (0.5 %) + borax (0.1 %) found to be significantly higher values in yield traits under Karnataka conditions [11].Foliar application of Fe (4.0%) + Mn (3%) + Cu (1%) + Zn (6%) + Mo (0.05%) + B (2%) is beneficial to

increased nut yield in cashew var. BPP-8 under Andhra Pradesh conditions [13]. Foliar spraying of micronutrients had 30.5% higher yield over control [17].

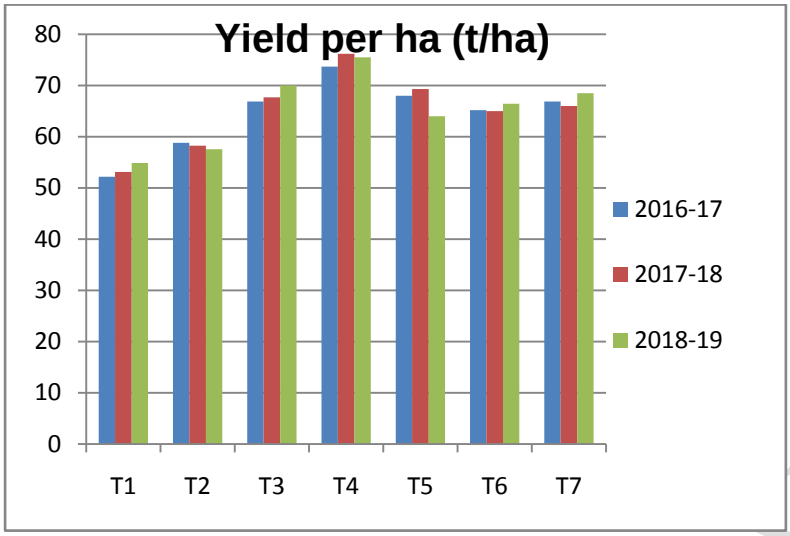

Fig 1 :Bar graph showing yield traits against different treatments

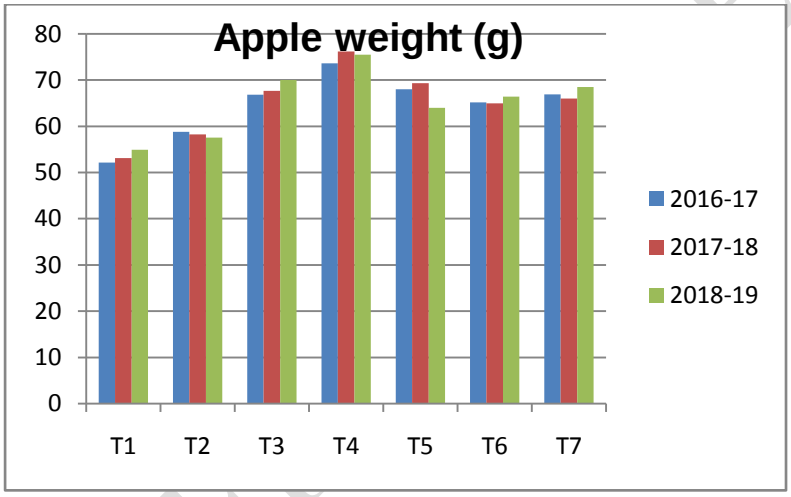

Fig 2 :Bar graph showing apple yield against different treatments

3.3 Leaf Nutrient Content

The leaf nutrient content of N, P and K is influenced by different treatments (Table 4). The leaf nutrient content either increased or remained stable during the experiment period in all the NPK along with micronutrient treatments. However, the maximum leaf nitrogen content (0.86 %) was recorded in T_4 (NPK + micronutrient combination II (RDF + 0.75% $ZnSO_4$ + 0.75% $CuSO_4$ + 0.75% $FeSO_4$ + 0.2% $MnSO_4$ + 0.5% Boric acid) whereas the lowest leaf nutrient content were registered in T_1 (control) of 0.40 %. In the case of phosphorus content, T_4exhibited the highest value of 0.29 % and the lowest phosphorus content was found in control (T_1) of 0.11 %. Regarding potassium content, the same trend was noticed. T_4 observed the highest content of 0.19 % followed by T_3 (0.18 %) whereas the

lowest content was obtained in control (T_1) of 0.14 %. Among the treatments, the highest yield was obtained in $T_4$and leaf nutrient content (N, P and K) were recorded comparatively high in the same treatment. This shows that utilization of applied manures to the maximum extend observed by the plant.Addition of manures add sufficient amount of organic matter to the soil and solubilise plant nutrients and improve physical conditions of the soil by accelerating porosity, aeration and water holding capacity [18].

Considerable difference was noted in the micronutrient concentration in the leaf of cashew. The highest concentration of micronutrient content in cashew leaves recorded the highest T_4such as in Fe (33.483ppm), Zn (15.953 ppm), Mn (12.203 ppm) Cu (12.657 ppm) followed by T_3 (32.317 ppm; 15.317 ppm; 11.653ppm; 12.340 ppm) whereas the lowest micronutrient contents in cashew leaves were observed in control T_1 (25.617 ppm; 12.313 ppm; 9.297 ppm; 10.537 ppm).Variations were found in different micronutrient concentration of cashew leaves under Karnataka conditions [19].

4. CONCLUSION

The present experiment it was concluded that T_4 foliar application of micronutrients along with recommended dose of fertilizers (RDF + 0.75% $ZnSO_4$ + 0.75% $CuSO_4$+ 0.75 % $FeSO_4$ + 0.2 % $MnSO_4$ + 0.5 % Boric acid)recorded the highest values of growth, yield and economic traits of cashew for three years. Foliar application of micronutrients along with recommended dose of fertilizers will increased yield of 33 per cent over control. Hence this treatment will be recommended to farmers' field adoption during the ensuing year to reduce the micronutrient disorders and enhance the yield.

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Table 1. Growth, flowering and fruit characters of cashew var. VRI-3 for three consecutive years (2017 – 2019)

Treatments	Plant height (m)				No. of fruits per panicle				No. of panicles per m^2			
	2016-17	2017-18	2018-19	Pooled Mean	2016-17	2017-18	2018-19	Pooled Mean	2016-17	2017-18	2018-19	Pooled Mean
T_1	3.25	3.47	3.52	3.313	12.16	12.33	12.75	12.413	7.12	5.67	6.30	6.487
T_2	3.40	3.63	3.79	3.520	15.12	15.32	14.33	14.923	7.39	6.37	8.33	7.363
T_3	3.80	3.98	4.22	3.987	17.89	17.98	18.67	18.180	9.64	9.00	10.33	9.657
T_4	4.25	4.43	4.65	4.403	18.56	19.26	19.67	19.163	11.58	11.33	11.67	11.527
T_5	3.60	3.87	4.13	3.852	16.54	15.96	15.67	16.057	10.12	9.67	8.33	9.373
T_6	3.55	3.78	4.00	3.764	17.15	17.54	16.00	16.897	8.55	7.67	8.67	8.297
T_7	3.50	3.77	3.90	3.705	16.19	16.92	17.33	16.813	8.15	6.67	7.57	7.463
Mean	3.621	3.847	4.030	3.792	16.230	16.473	16.346	16.349	8.936	8.054	8.743	8.595
	SED	**CD (0.05%)**			**SED**	**CD (0.05%)**			**SED**	**CD (0.05%)**		
Treatment	0.018	0.035			0.776	1.559			0.460	0.926		
Season	0.013	0.024			0.508	1.021			0.302	0.606		
Season x Treatment	0.032	0.069			1.344	2.701			0.797	1.604		

Table 2. Yield traits of cashew var. VRI-3 for three consecutive years (2017 – 2019)

Treatments	Apple weight (g)				Apple + Nut weight (g)			
	2016-17	**2017-18**	**2018-19**	**Pooled Mean**	**2016-17**	**2017-18**	**2018-19**	**Pooled Mean**
T_1	52.16	53.13	54.90	53.397	60.10	59.99	62.00	60.697
T_2	58.83	58.27	57.57	58.223	62.26	63.91	65.67	63.947
T_3	66.86	67.67	70.00	68.177	69.14	74.90	73.53	72.523
T_4	73.66	76.17	75.53	75.120	81.06	83.62	80.10	81.593
T_5	68.00	69.33	64.03	67.120	73.96	76.47	71.50	73.977
T_6	65.16	65.00	66.43	65.530	70.92	72.51	70.00	71.143
T_7	66.89	66.00	68.53	67.140	69.15	71.97	68.33	69.817
Mean	64.51	65.08	65.28	64.96	69.51	71.91	70.16	70.53
	SED	**CD (0.05%)**			**SED**	**CD (0.05%)**		
Treatment	1.467	2.824			1.071	2.153		
Season	1.053	1.956			0.702	1.409		
Season x Treatment	2.532	5.169			1.855	3.729		

Table 3. Nut yield of cashew under different treatments for three consecutive years (2017 to 2019)

Treatments	Average nut weight (g)				Number of nuts per kg				100 nut weight (g)			
	2016-17	2017-18	2018-19	Pooled Mean	2016-17	2017-18	2018-19	Pooled Mean	2016-17	2017-18	2018-19	Pooled Mean
T_1	6.25	6.21	6.20	6.220	161.83	162.33	161.33	161.830	628.30	593.67	603.00	608.323
T_2	6.43	6.51	6.29	6.410	159.17	158.67	159.67	159.170	636.66	623.00	617.67	625.777
T_3	7.28	7.23	7.19	7.233	153.83	156.00	151.67	153.835	661.66	648.67	652.33	654.220
T_4	7.40	7.45	7.38	7.410	151.33	148.56	149.33	149.740	671.66	674.33	668.00	671.330
T_5	6.96	7.00	6.61	6.857	155.50	153.33	157.67	155.500	645.0	647.67	646.67	646.447
T_6	6.76	6.94	6.77	6.823	156.16	156.00	156.33	156.165	651.66	641.00	637.67	643.443
T_7	6.62	6.64	6.87	6.710	156.67	158.67	154.67	156.670	648.33	631.67	630.15	636.717
Mean	6.81	6.85	6.76	6.81	156.36	156.22	155.81	156.13	649.04	637.14	636.50	640.89
	SED	**CD (0.05%)**				**SED**	**CD (0.05%)**		**SED**	**CD (0.05%)**		
Treatment	0.038	0.078				1.115	2.242		2.776	5.580		
Season	0.025	0.051				0.730	1.468		1.817	3.653		
Season x Treatment	0.067	0.135				1.932	3.884		4.808	9665		

Table 4. Yield and economic traits of cashew var. VRI -3 under different treatments for three consecutive years (2017 to 2019)

Treatments	Yield per tree (kg)				Yield per ha(t/ha)				B:C ratio			
	2016-17	2017-18	2018-19	Pooled Mean	2016-17	2017-18	2018-19	Pooled Mean	2016-17	2017-18	2018-19	Pooled Mean
T_1	12.08	12.93	13.21	12.740	1.88	2.54	2.64	2.353	1.75	1.75	1.74	1.75
T_2	13.40	13.55	13.81	13.587	2.11	2.73	2.76	2.533	2.01	2.11	2.12	2.00
T_3	15.58	15.77	15.94	15.763	2.43	3.21	3.32	2.987	2.64	2.68	2.69	2.64
T_4	15.66	15.89	16.38	16.113	2.44	3.30	3.34	3.027	2.74	2.75	2.76	2.74
T_5	15.30	15.37	15.80	15.490	2.29	3.12	3.03	2.813	2.54	2.58	2.60	2.54
T_6	14.26	14.83	14.90	14.663	2.22	2.82	2.93	2.657	2.58	2.60	2.61	2.58
T_7	13.98	14.20	14.63	14.270	2.18	2.77	2.84	2.597	2.48	2.52	2.54	2.48
Mean	14.323	14.707	14.953	14.661	2.221	2.927	2.980	2.710	2.39	2.43	2.44	2.39
	SED	**CD (0.05%)**			**SED**	**CD (0.05%)**						
Treatment	0.168	0.338			0.0594	0.128						
Season	0.110	0.222			0.068	0.0.148						
Season x Treatment	0.292	0.586			0.107	0.215						

Table 5. Nitrogen, phosphorus and potassium content (%) of cashew leaf for three years (2017 – 2019)

Treatments	Nitrogen (%)				Phosphorus (%)				Potassium (%)			
	2017	2018	2019	Pooled mean	2017	2018	2019	Pooled mean	2017	2018	2019	Pooled mean
T_1	1.44	1.46	1.49	1.463	0.071	0.074	0.079	0.075	0.330	0.337	0.340	0.336
T_2	1.47	1.50	1.56	1.510	0.078	0.079	0.079	0.079	0.368	0.370	0.373	0.370
T_3	1.52	1.57	1.62	1.570	0.091	0.092	0.093	0.092	0.382	0.385	0.401	0.389
T_4	1.56	1.59	1.64	1.597	0.097	0.098	0.098	0.098	0.391	0.401	0.408	0.400
T_5	1.50	1.52	1.59	1.537	0.087	0.089	0.090	0.089	0.380	0.381	0.384	0.382
T_6	1.48	1.52	1.58	1.527	0.081	0.084	0.087	0.084	0.378	0.380	0.381	0.380
T_7	1.50	1.53	1.57	1.533	0.084	0.086	0.089	0.086	0.374	0.376	0.379	0.376
Mean	1.496	1.527	1.579	1.534	0.084	0.086	0.088	0.086	0.372	0.376	0.381	0.376
SEd	0.038	0.017	0.018		0.078	0.183	0.184		0.018	0.014	0.015	
CD (0.05)	0.074	0.039	0.039		0.129	0.041	0.040		0.035	0.027	0.028	
	SEd	CD (0.05)			SEd	CD (0.05)			SEd	CD (0.05)		
Treatment	0.031	0.0691			0.0018	0.0027			0.0062	0.0134		
Season	0.0238	0.0520			0.0019	0.0030			0.0089	0.0193		
Treatment x Season	0.0634	0.128			0.0039	0.0059			0.0092	0.0201		

Table 6. Different micronutrients concentrations of cashew leaf for three years (2017 – 2019)

Treatments	Fe content (ppm)				Zn content (ppm)				Mn content (ppm)				Cu content (ppm)			
	2017	**2018**	**2019**	**Pooled mean**	**2017**	**2018**	**2019**	**Pooled mean**	**2017**	**2018**	**2019**	**Pooled mean**	**2017**	**2018**	**2019**	**Pooled mean**
T_1	25.34	25.61	25.90	25.617	12.11	12.36	12.48	12.313	9.07	9.28	9.54	9.297	10.25	10.64	10.72	10.537
T_2	26.54	27.10	27.80	27.147	12.79	13.54	13.9	13.410	9.58	9.65	10.15	9.793	10.80	10.95	11.10	10.950
T_3	32.10	32.40	32.45	32.317	15.17	15.31	15.47	15.317	11.57	11.61	11.78	11.653	12.10	12.40	12.52	12.340
T_4	33.14	33.58	33.73	33.483	15.42	15.86	16.58	15.953	12.08	12.18	12.35	12.203	12.35	12.64	12.98	12.657
T_5	31.25	31.41	31.58	31.413	14.52	14.84	15.27	14.877	10.85	10.97	11.21	11.010	11.87	11.96	12.10	11.977
T_6	27.40	29.41	31.25	29.353	14.13	14.22	14.82	14.390	10.11	10.23	10.54	10.293	11.40	11.54	11.67	11.537
T_7	28.22	28.10	28.31	28.203	13.9	14.25	14.74	14.297	9.87	10.14	10.25	10.087	11.02	11.25	11.38	11.217
Mean	29.141	29.659	30.146	29.648	14.006	14.340	14.751	14.365	10.447	10.580	10.831	10.619	11.399	11.626	11.781	11.602
SEd	0.018	0.025	0.052		0.013	0.021	0.032		0.02	0.019	0.016		0.013	0.015	0.021	
CD (0.05)	0.040	0.056	0.113		0.028	0.038	0.070		0.44	0.40	0.034		0.029	0.031	0.045	
	SEd	CD (0.05)			SEd	CD (0.05)			SEd	CD (0.05)			SEd	CD (0.05)		
Treatment	0.027	0.054			0.704	1.408			0.0042	0.0084			0.647	1.220		
Season	0.013	0.025			0.490	0.968			0.0021	0.0041			0.412	0.818		
Treatment x Season	0.045	0.089			1.321	2.548			0.0072	0.0140			1.265	2.420		