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EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON NUTRIENT UPTAKE, SOIL AVAILABLE NUTRIENTS AND PRODUCTIVITY OF RAINFED FINGER MILLET

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Abstract: A field study was carried out at agroforestry research block, Acharya N.G Ranga Agricultural University campus, Rajendranagar, Hyderabad during July to October, 2013 to study the effect of INM on soil fertility and productivity on finger millet. Nine different treatments with three replications each were carried out in the plot in RBD design. INM practice including poultry manure and 75% recommended dose of nitrogen showed its best results with respect to grain yield (2681 kg ha^{-1}) as compared to other treatments. The nutrient content and uptake (NPK) by grain and straw were significantly higher with 100% RDF, 75% RD N + 25% N poultry manure on par with sole crop compared to other nutrient combinations and control. Organic carbon was also significantly influenced by sole crop on par with 100% RDF, 75% RD N + 25% N poultry manure and 75% RD N + 25% N vermicompost over control. Available nitrogen, phosphorus and potassium were found highest with 100% RDF and 75% RD N + 25% N poultry manure on par with sole crop.
Keywords: INM, poultry manure, available nitrogen, uptake, productivity, finger millet.

INTRODUCTION

Finger millet (*Eleusine coracana* L. *Gaertn*) is an important small millet crop grown in India and has the pride of place in having highest productivity among millets. It is also known as ragi, African millet and Bird's foot millet and an important staple food crop in part of eastern and central Africa and India. In fact, it is the main cereal crop of monsoon season in some hilly areas, where it is grown both for grain and fodder purpose. In India, it is cultivated in Karnataka, Tamil Nadu, Andhra Pradesh, Orissa, Jharkhand, Uttaranchal, Maharashtra, and Gujarat. The annual cultivated area under millets is around 29 million hectares, of which small millets alone accounts for about 3.5 million hectares. Among small millets, finger

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millet alone occupies 50 per cent area and contributes more than 2/3rdproduction (2.8 million tonnes). Wide adaptation, easy cultivation, free from major pests and diseases and drought tolerance have made this crop an indispensable component of dry farming system. Often in the lands where finger millet crop is raised, no other crop worth mentioning can give a reasonable harvest [1].

In arid and semi-arid regions of Southern Telangana in Andhra Pradesh when harsh and favourable climatic conditions coupled with poor soils make agricultural production system a gamble due to high risk of uncertainties. Under such circumstances, to meet the increasing demand for food, fodder, fuel, wood and timber etc., on sustainable basis without degradation of land resources, the only alternative is parallel advancement in the land productivity and agroforestry is the only system, which can save resources from further depletion and for better utilization. Agroforestry system is gaining importance now-a-days among resource poor farmers in semi-arid agro ecosystems of Southern Telangana region because it provides direct and indirect benefits and assured livelihood security to the farming community.

Among the modern agromanagement practices fertilizer application are imperative for boosting the growth and production of finger millet especially under rainfed conditions. Considerable work has been reported on these aspects but efforts are still required to improve these techniques for getting maximum yield. To improve productivity, integrated nutrient management is an important practice. Fertilizer application not only should influence the economic return of the investment through optimized yield and quality but also cause minimum level of environmental hazards. This calls for balanced use of fertilizers and adoption of integrated nutrient management practices. Integrated nutrient management aims at efficient and judicious use of the major sources of plant nutrients in an integrated approach so as to get maximum economic yield without any deleterious effect on physico-chemical and biological properties of the soil [2]. Hence, the present investigation was taken up to develop an INM technology using FYM for direct sown finger millet under rainfed condition.

MATERIAL AND METHODS

Site description

Field experiment was conducted with finger millet variety (PRS-2) at agroforestry research block, Acharya N.G Ranga Agricultural University campus, Rajendranagar, Hyderabad during *kharif*, 2013. The weekly mean maximum temperature during the crop growth period ranged from 27.8 to 33.5^{o}C with an average of 30.5^{o}C, while the weekly mean minimum temperature ranged from 17.7^{o}C to 25.0^{o}C with an average of 21.6^{o}C. The total rainfall received during the crop growth period was 437.1 mm distributed in 30 rainy days. The experimental soil was Alfisol with sandy loam texture with pH (7.57), EC (0.195 dSm^{-1}) and OC (0.75 %). The soil was medium in available nitrogen (259.2 kg ha^{-1}), phosphorus (40.85 kg ha^{-1}) and high in available potassium (352.1 kg ha^{-1}). The experiment was laid out in a Randomized Block Design and replicated thrice with 9 treatments comprised of T_1 FYM 10 t ha^{-1}, T_2 100% RDF (40:20:20 - N: P_2O_5: K_2O kg ha^{-1}), T_3 75% RD N + 25% N through FYM, T_4 75% RD N + 25% N Vermicompost, T_5 75% RD N + 25% N Poultry manure, T_6 75% RD N + *Azospirillum* @ 5 kg ha^{-1}, T_7 75% RD N + PSB @ 5 kg ha^{-1}, T_8 75% RD N + *Azospirillum* + PSB @ 5 kg ha^{-1} and T_9 Sole crop without trees.

Soil physico-chemical properties

The experimental site was uniform in topography and red sandy loam in texture. The soil samples were collected randomly from 0 to 15 cm depth. The soil samples were shade dried, pounded and sieved through 2 mm sieve and analysed for its physico-chemical properties and available nutrients by using standard procedures [7] and the results are presented in Table 1. Soil was classified as sandy loam in texture, non-saline, slightly alkaline in soil reaction, high content of organic carbon, medium in available nitrogen and available phosphorus while high in available potassium.

Table 1. Soil physico-chemical properties of the experimental site

Particulars	Value	Method of analysis
A. Physical analysis		
Sand (%)	71.50	Bouyoucos Hydrometer method [14]
Silt (%)	16.20	
Clay (%)	12.30	
Textural class	Sandy loam	
B. Chemical analysis		
Soil reaction (pH) (1: 2.5 soil : water)	7.57	Glass Electrode pH meter model [7] Elico CM 180
Electrical conductivity ($dS\ m^{-1}$) (1: 2.5 soil : water)	0.195	Conductivity bridge method model [7] Elico LI 120
Organic carbon (%)	0.75	Walkley and Black's modified method [7]
Available nitrogen (kg N ha^{-1})	259.2	Alkaline permanganate method [18] Klelpus-Classic Dx
Available phosphorus (kg P_2O_5 ha^{-1})	40.85	Olsen method using colorimeter [12]systronics µC calorimeter 115
Available potassium (kg K_2O ha^{-1})	352.1	Neutral ammonium acetate method using Flame photometer [7] Elico-CL378

Statistical analysis

The data on the observations made was analyzed statistically by applying the technique of analysis of variance for randomized block design as suggested by [13]. The statistical significance was tested by F-test at 5 per cent level of probability and wherever the 'F' value was found significant, critical difference (CD) was worked out to test the significance.

RESULTS AND DISCUSSION

NPK content in Plant

Nitrogen content in finger milletvaried between 3.13-2.29, 1.33-1.15 and 0.82-0.66% with mean 2.67, 1.26 and 0.73% at 30, 60 DAS and harvest were presented in Table 2and depicted in Figure 1, 2 and 3. Significant increase in nitrogen content was recorded in sole crop (3.13, 1.33 and 0.82%) at 30, 60 DAS and harvest over control (2.29, 1.15 and 0.66%). Among different nitrogen sources at 30 DAS the highest nitrogen content resulted with 75% RD N + 25% N poultry manure (2.78%) followed by 100% RDF (2.74%) and 75% RD N + 25% N vermicompost (2.70%). Similar trends were obtained at 60 DAS and harvest.

Phosphorus content in finger milletranged from 0.274-0.200, 0.213-0.185 and 0.152-0.130% with mean of 0.251, 0.200 and 0.145% at 30, 60 DAS and harvest. Phosphorus content (0.274, 0.213 and 0.152%) at 30, 60 DAS and harvest was significantly increased in sole crop over control (0.200, 0.185 and 0.130%) followed by 75% RD N + 25% N poultry manure (0.271%), 100% RDF (0.265%), 75% RD N + 25% N vermicompost (0.260%). Similar trends were noticed at 60 DAS and harvest.

Potassium content in finger millet varied between 1.02-0.85, 1.90-1.74 and 2.68-2.05% with mean 0.95, 1.80 and 2.46%. The potassium content was influenced significantly at 30, 60 DAS and harvest of finger millet grown in sole crop (1.02, 1.90 and 2.68%) over control (0.85, 1.74 and 2.05%). The next best nutrient management practice was found with 75% RD N + 25% N poultry manure (1.00%) followed by 100% RDF (0.99%), 75% RD N + 25% N vermicompost (0.98%) and 75% RD N + *Azospirillum* + PSB (0.96%). Similar trends were observed at 60 DAS and harvest.

NPK contents in plant found higher with combined application of organic and inorganic fertilisers. This might be due to increased nutrient availability and higher meristematic activities of top and roots of the plant, therefore high absorption of these nutrients. These results were in conformity with findings of [10] and [16].

NPK content in grain

Nitrogen contentin grain of finger milletvaried from 1.32 to 1.15% with mean 1.25% (Figure 4). Significant increase in nitrogen content (1.32%) in grain of sole crop over control (1.15%). Among different integrated nutrient sources, the highest nitrogen content with 75% RD N + 25% N poultry manure (1.31%) followed by 100% RDF, 75% RD N + 25% N vermicompost and 75% RD N + *Azospirillum* + PSB.

Phosphorus content in finger milletranged from 0.265-0.238% with mean value of 0.252%. Within nutrient management practices, phosphorus content (0.265%) showed significant increase in sole crop followed by 75% RD N + 25% N poultry manure (0.264%), 100% RDF (0.257%), 75% RD N + 25% N vermicompost (0.255%) and 75% RD N + *Azospirillum* + PSB (0.253%) over control (0.238%).

Potassium content in finger milletvaried from 0.47-0.42% with mean 0.46%. The potassium content was influenced significantly in sole crop (0.47%) over control (0.42%). The next best nutrient management practice was found with 75% RD N + 25% N poultry manure (0.47%), 100% RDF (0.47%), 75% RD N + 25% N vermicompost (0.46%) and 75% RD N + *Azospirillum* + PSB (0.46%).

Among the manurial treatments, the superiority of poultry over vermicompost and FYM is well established in increasing nutrient content and uptake, may be due to its higher nutrient composition and easy mineralization with low C:N ratio. Among biofertilizers the significant improvement in content and removal of nutrients as a consequence of inorganic fertilizer with biofertilizer was improvement in nutrient availability pattern of soil which might have reflected on biological yield and resulted ultimately in nutrient content and uptake of micro and macronutrients. Similar findings were reported by [2] and [5].

NPK uptake by grain

NPK uptake of finger milletranged from 35.47-18.17, 7.10-3.77 and 12.68-6.71 kg ha^{-1} with mean 26.81, 5.39 and 9.77 kg ha^{-1} was presented in Table 3. Significant increase in NPK uptake (35.47, 7.10 and 12.68 kg ha^{-1}) by grain of finger millet grown in sole crop over control (18.17, 3.77 and 6.71 kg ha^{-1}). Among different nutrient sources, highest NPK uptake with 75% RD N + 25% N poultry manure (31.58, 6.35 and 11.31 kg ha^{-1}) followed by 100% RDF >75% RD N + 25% N vermicompost >*Azospirillum* + PSB >*Azospirillum*> PSB > FYM.

NPK uptake by straw

NPK uptakeof finger milletranged from 27.55 to 41.47, 4.69-7.71 and 74.10-135.83 kg ha^{-1} with mean 31.21, 6.20 and 106.33 kg ha^{-1} was presented in Table 3. Significant increase in NPK uptake (41.47, 7.71 and 135.83 kg ha^{-1}) at harvest of finger millet in sole crop over control (27.55, 4.69 and 74.10 kg ha^{-1}). The highest nitrogen uptake with sole crop (41.47 kg ha^{-1}) followed by 75% RD N + 25% N poultry manure (32.82 kg ha^{-1}) and 75% RD N + 25% N vermicompost (33.12 kg ha^{-1}). The highest PK uptake with 75% RD N + 25% N poultry manure (7.10 and 125.33 kg ha^{-1}) followed by 100% RDF (6.98 and 121.87 kg ha^{-1}) and 75% RD N + 25% N vermicompost (6.52 and 106.33 kg ha^{-1}).

Total uptake by plant

Total NPK uptake of finger milletvaried from 76.94-45.72, 12.44-6.95 and 148.5-80.8 kg ha^{-1} with a mean of 58.02, 9.60 and 116.1 kg ha^{-1}. Total NPK uptakeby grain and straw (76.94, 12.44 and 148.5 kg ha^{-1}) of finger millet in sole crop was significantly increased over control (45.72, 6.95 and 80.8 kg ha^{-1}). Among different sources in agri-silvi culture system, highest total Nitrogen uptake with 100% RDF (65.81 kg ha^{-1}) followed by 75% RD N + 25% N poultry manure (64.39 kg ha^{-1}) and 75% RD N + 25% N vermicompost (Table 3).

The highest total PK uptake with 75% RD N + 25% N poultry manure (11.30 and 136.6 kg ha^{-1}) followed by 100% RDF >75% RD N + 25% N vermicompost > 75% RD N + *Azospirillum* + PSB > 75% RD N + *Azospirillum*> 75% RD N + PSB > 75% RD N + 25% N FYM.

Nutrients uptake (N, P & K) is vital in enhancing yield and nutrient content. Considerable increase in either nutrient content or in yield may increase the uptake. Nutrients uptake (N, P & K) coincide with higher nutrient contents and yields. Uptake of any nutrient is the function of its content and dry matter production by the crop. Higher nutrient content in the produce and higher biomass production of finger millet might be the pertinent reason for higher uptake of nutrients. These findings were in close agreement with the results reported by [11], [17] and [19].

With regard to biofertilizer combinations tested inoculation of mixed biofertilizers *i.e.* Azospirillum + PSB along with 75% RD N was significantly better than non-inoculation and individual application of FYM 10 t ha^{-1} both in nutrient content and uptake. This significant improvement in content and removal of nutrients as a consequence of inorganic fertilizer with biofertilizer was important in improving nutrient availability pattern of soil which might have reflected on biological yield and resulted ultimately in nutrient content and uptake of nutrients. Similar findings were reported by [2] and [5].

Organic carbon

Data on soil organic carbon at harvest of finger millet is presented in Table 4. The soil organic carbon content ranged from 0.92-0.74% with mean 0.11%. The results revealed that the organic carbon content was significantly altered by different sources of nitrogen. There was a significant increase in organic carbon (0.92%) of sole crop over control (0.74%). Among different sources in agri-silvi culture system, the organic carbon content registered higher with 75% RD N + 25% N poultry manure (0.88%) on par with 100% RDF (0.87%) and 75% RD N + 25% N vermicompost (0.86%).

Slight built up of organic carbon was found by conjoint use of organic and inorganic nutrient combinations over control. This might be due to enhanced root growth and production of more crop residues leading to the accumulation of more organic residues in soil. Organic carbon in the soil acts as energy substrate for proliferating microorganisms enhancing nutrient availability. These results were in conformity with the findings of [9]. The lowest OC content was recorded in control (0.74%), where only FYM @ 10 t ha^{-1} were applied before sowing and continued upto harvest stage. Hence, the root growth, spread and decomposition was low which led to less addition of organic matter to soil.

Available nitrogen

The highest available nitrogen content 317.0 kg ha^{-1} was observed with sole crop on par with 75% RD N + 25% N poultry manure (291.8 kg ha^{-1}) and 100% RDF (283.9 kg ha^{-1}), was significantly higher than 75% RD N + 25% N vermicompost and 75% RD N + *Azospirillum* + PSB (Table 4).

The higher available N was observed with integrated use of poultry manure with 75% N inorganic source. This might be attributed due to higher amount of N and OC content present in poultry manure which might have hastened the process of mineralization during crop growth period. Another reason for higher availability of N may be due to the addition of mineral fertilizer N along with organic sources which have contributed to the reduction of C:N ratio and thus increased the rate of decomposition resulting in faster availability of nutrients from manures. Similar findings were reported by [16].

Available phosphorus

The highest available phosphorous of 39.04 kg ha^{-1} in soil was observed with 75% RD N + 25% N poultry manureon par with 100% RDF (38.72 kg ha^{-1}) and sole crop (37.76 kg ha^{-1}), 75% RD N + 25% N vermicompost (35.15 kg ha^{-1}) significantly higher than 75% RD N + *Azospirillum* + PSB (Table 4).

The higher available phosphorus might be due to the release of organic acids during microbial decomposition of organic matter which helped in the solubility of native phosphates thus increasing available phosphorus. The applied organic matter may have led to formation of coating on the sesquioxide clay minerals, because of which the phosphate fixing capacity of soil is reduced in manure treated plots. Similar results were observed by [6] and [21].

Available potassium

Available potassium status was significantly influenced by integrated application of organic and inorganic sources (Table 4). The highest available potassium with sole crop (366.1 kg ha^{-1}) followed by 75% RD N + 25% N poultry manure (355.4 kg ha^{-1}) and 100% RDF (354.8 kg ha^{-1}).

The beneficial effect of organics on available potassium may be ascribed to the reduction of K fixation and release of potassium due to the interaction of organic matter with clay minerals besides the direct potassium addition to the potassium pool of the soil. Similar beneficial effect of organics on available K was reported in case of poultry manure by [20].

Grain and Straw yield

Grain and straw yield significantly affected by the judicious use of inorganic fertilizer with organic manures, Poultry manure, Vermicompost, FYM and biofertilizers i.e., Azospirillum and PSB (Table 4). The highest grain yield (2681 kg ha^{-1}) was recorded with sole crop on par with 75% RD N (2405 kg ha^{-1}) + 25% N through poultry manure (2394 kg ha^{-1}) and 100% RDF significantly superior over 75% RD N + 25% N through vermicompost and 75% RD N + *Azospirillum* + PSB. The percentage increase in grain yield with sole crop, 75% RD N + 25% N poultry manure and 100% RDF over control was 65.39%, 48.37% and 47.69% respectively. Among the nutrient management practices followed, biofertilizers combination treatments also performed better than control where only FYM @ 10 t ha^{-1} was applied. Among them 75% RD N + *Azospirillum* + PSB (2126 kg ha^{-1}) was significantly superior to control (1621 kg ha^{-1}). In terms of percentage, the increase of 34.30, 24.89 and 23.44% with 75% RD N + *Azospirillum* + PSB, 75% RD N + *Azospirillum* and 75% RD N + PSB respectively.

Finger millet as sole crop (5063 kg ha^{-1}) resulted on par yields with 100% RDF (4745 kg ha^{-1}) and 75% RD N + 25% N through poultry manure (4733 kg ha^{-1}) significantly superior over 75% RD N + 25% N through vermicompost (4377 kg ha^{-1}) and 75% RD N + *Azospirillum* + PSB (4241 kg ha^{-1}). The percentage increase in grain yield with sole crop, 75% RD N + 25% N through poultry manure and 100% RDF over control was 48.82%, 39.12% and 39.12% respectively.

The conjunctive use of organic and inorganic sources has beneficial effect on physiological process of plant metabolism and growth, there by leading to higher grain yield. The easy availability of nitrogen due to mineralization of organics there by influence the shoot and root growth favouring absorption of other nutrients. Similar results were obtained by [4] and [22]. Reduced yield in finger millet compared to sole crop may be due to competition for light, moisture and nutrients with suppressing effect on crops, reduced solar radiation on crop canopy. Similar results were reported by [8] and [15].

CONCLUSIONS

From the study, it was inferred that integrated use of 75% RD N + 25% N through poultry manure and 100% RDF is the best nutrient management practice that can be adopted for agri-silvi system on par with sole crop, which was significantly superior over 75% RD N + 25% N through FYM, 75% RD N + 25% N through Vermicompost, 75% RD N + *Azospirillum* @ 5 kg ha^{-1},75% RD N + PSB, 75% RD N + *Azospirillum* + PSB and control in red sandy loam soils under rainfed finger millet for improving the soil fertility status and to obtain better yields.

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Table 2. Nitrogen, phosphorous and potassium contents of finger millet as influenced by nutrient management in *Melia azedarach* based agri-silvi system

	N content (%)			P content (%)			K content (%)		
Treatments	**30 DAS**	**60 DAS**	**Harvest**	**30 DAS**	**60 DAS**	**Harvest**	**30 DAS**	**60 DAS**	**Harvest**
T_1 FYM @ 10 t ha^{-1}	2.29	1.15	0.66	0.200	0.185	0.130	0.85	1.74	2.05
T_2 100% RDF	2.74	1.29	0.76	0.265	0.207	0.150	0.99	1.81	2.62
T_3 75%N + 25% N FYM	2.48	1.22	0.69	0.233	0.192	0.141	0.89	1.76	2.35
T_4 75% RD N + 25% N Vermicompost	2.70	1.28	0.75	0.260	0.202	0.148	0.98	1.81	2.54
T_5 75% RD N + 25% N Poultry manure	2.78	1.32	0.77	0.271	0.211	0.151	1.00	1.85	2.64
T_6 75% RD N + *Azospirillum*	2.64	1.26	0.72	0.254	0.195	0.143	0.95	1.79	2.36
T_7 75% RD N + PSB	2.56	1.25	0.71	0.247	0.194	0.142	0.94	1.78	2.35
T_8 75% RD N + *Azospirillum* + PSB	2.67	1.27	0.72	0.256	0.200	0.146	0.96	1.80	2.51
T_9 Sole crop without trees	3.13	1.33	0.82	0.274	0.213	0.152	1.02	1.90	2.68
Mean	2.67	1.26	0.73	0.251	0.200	0.145	0.95	1.80	2.46
S.Em.±	0.06	0.01	0.03	0.004	0.003	0.002	0.03	0.02	0.03
CD *(P=0.05)*	0.19	0.05	0.09	0.013	0.009	0.007	0.07	0.05	0.09

Table 3. Nutrient uptake (kg ha^{-1}) by finger millet as influenced by nutrient management in *Melia azedarach* based agri-silvi system

Treatments	Grain			Straw			Total		
	N	P	K	N	P	K	N	P	K
T_1 FYM @ 10 t ha^{-1}	18.17	3.77	6.71	27.55	4.69	74.10	45.72	6.95	80.8
T_2 100% RDF	30.56	6.14	11.25	35.25	6.98	121.87	65.81	10.92	133.1
T_3 75% RD N + 25% N FYM	21.96	4.48	8.04	25.71	5.27	88.12	47.68	8.22	96.2
T_4 75% RD N + 25% N Vermicompost	28.25	5.56	10.27	33.12	6.52	110.97	61.37	9.91	121.2
T_5 75% RD N + 25% N Poultry manure	31.58	6.35	11.31	32.82	7.10	125.33	64.39	11.30	136.6
T_6 75% RD N + *Azospirillum*	24.64	4.91	8.95	28.42	5.71	100.04	53.10	8.70	109.0
T_7 75% RD N + PSB	23.85	4.84	8.79	28.93	5.65	94.35	52.77	8.83	103.1
T_8 75% RD N + *Azospirillum* + PSB	26.79	5.39	9.92	27.61	6.17	106.39	54.40	9.53	116.3
T_9 Sole crop without trees	35.47	7.10	12.68	41.47	7.71	135.83	76.94	12.44	148.5
Mean	26.81	5.39	9.77	31.21	6.20	106.33	58.02	9.60	116.1
S.Em.±	1.38	0.29	0.44	2.52	0.27	5.62	3.07	0.56	5.85
CD *(P=0.05)*	4.17	0.89	1.34	7.63	0.80	16.99	9.29	1.68	17.68

Table 4.Grain, straw yield and soil parameters of finger millet as influenced by nutrient management in *Melia azedarach* based agrisilvi system

Treatments	Grain yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Organic carbon (%)	Available (kg ha^{-1})		
				N	P_2O_5	K_2O
T_1 FYM @ 10 t ha^{-1}	1583	3402	0.74	213.3	27.94	322.6
T_2 100% RDF	2393	4745	0.87	283.9	38.72	354.8
T_3 75%N + 25% N FYM	1828	3745	0.75	225.8	29.96	344.2
T_4 75% RD N + 25% N Vermicompost	2216	4377	0.86	263.4	35.15	352.1
T_5 75% RD N + 25% N Poultry manure	2405	4733	0.88	291.8	39.04	355.3
T_6 75% RD N + *Azospirillum*	1977	4014	0.83	247.4	32.35	344.7
T_7 75% RD N + PSB	1954	4006	0.80	234.8	32.28	342.1
T_8 75% RD N + *Azospirillum* + PSB	2126	4241	0.83	259.2	34.53	349.1
T_9 Sole crop without trees	2681	5063	0.92	317.0	37.76	366.1
Mean	2129	4258	0.83	259.6	34.19	346.8
S.Em.±	102	205	0.04	13.54	1.98	7.74
CD *(P=0.05)*	310	619	0.11	40.93	5.98	23.45
Initial	-	-	0.75	259.2	40.85	352.1

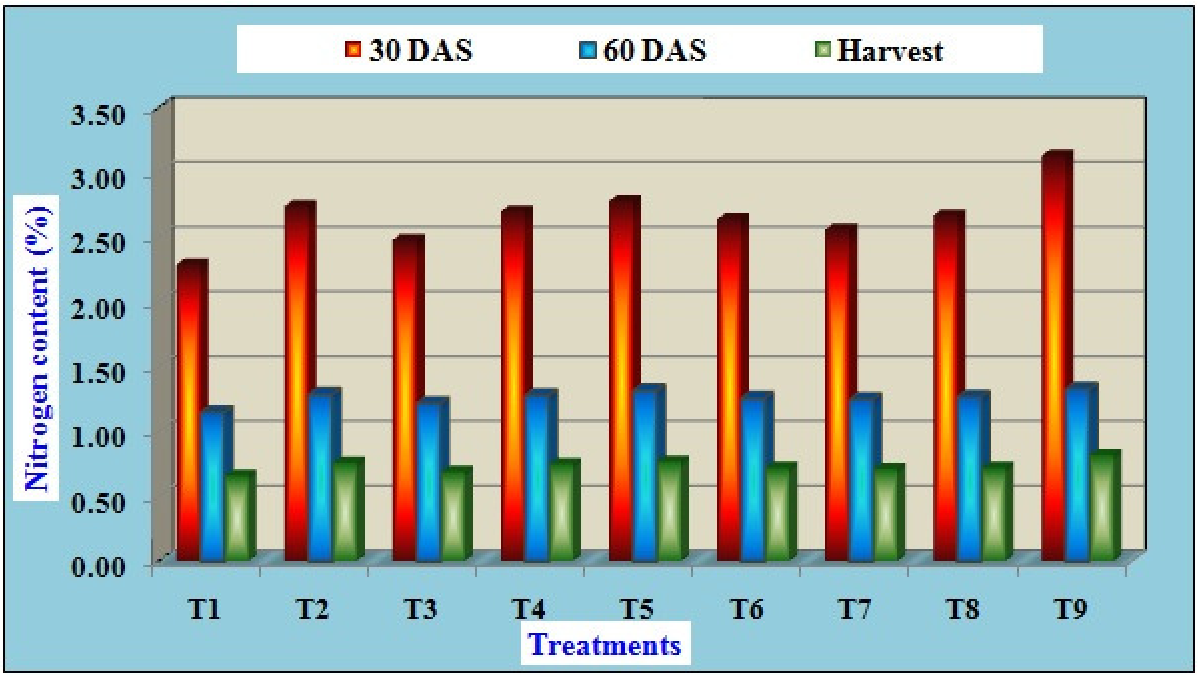

Figure 1. Nitrogen content at different growth stages of finger millet as influenced by nutrient management in *Melia azedarach* based agri-silvi system

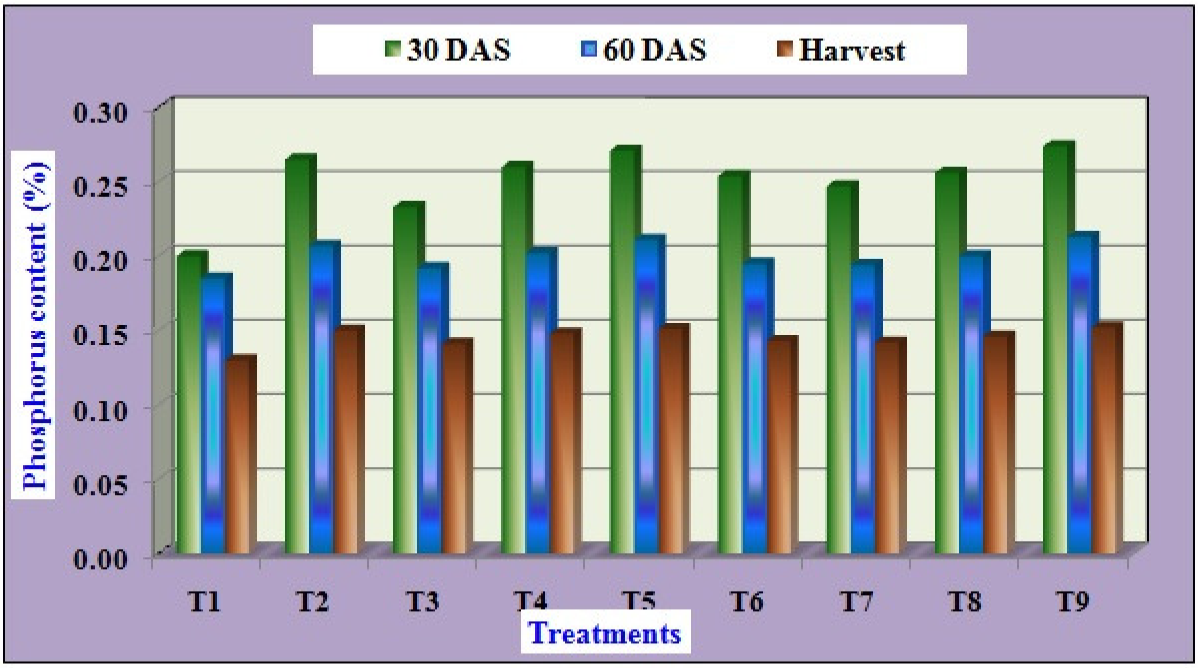

Figure 2. Phosphorus content at different growth stages of finger millet as influenced by nutrient management in *Melia azedarach* based agri-silvi system

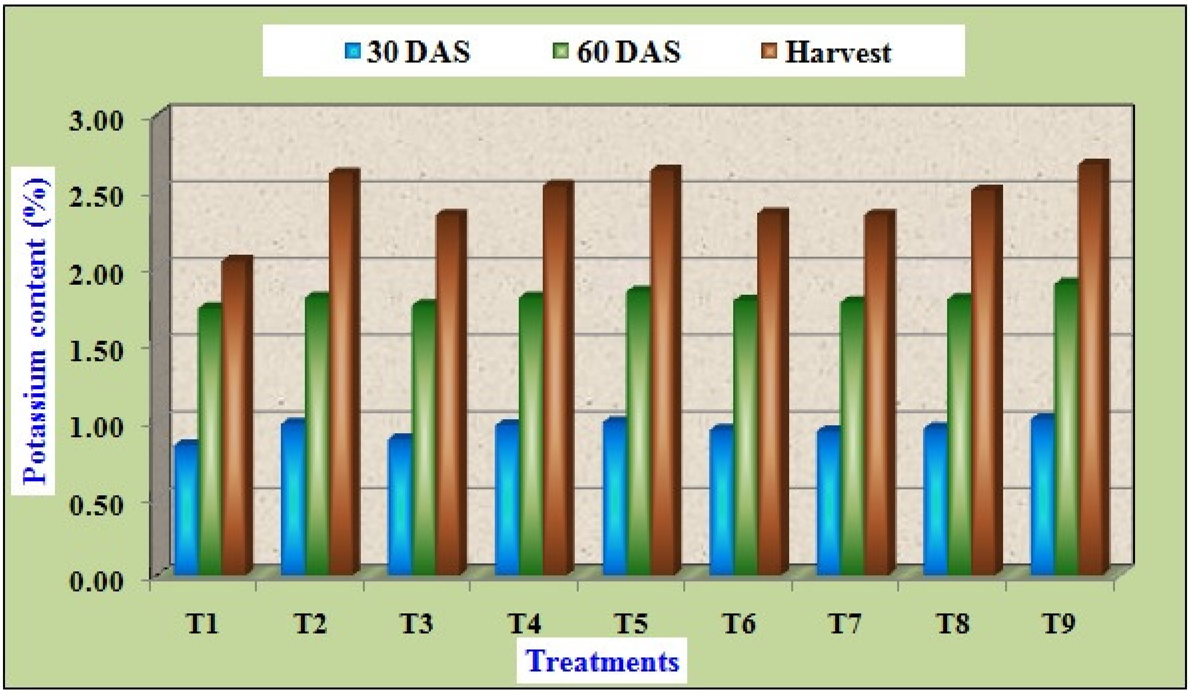

Figure 3. Potassium content at different growth stages of finger millet as influenced by nutrient management in *Melia azedarach* based agri-silvi system

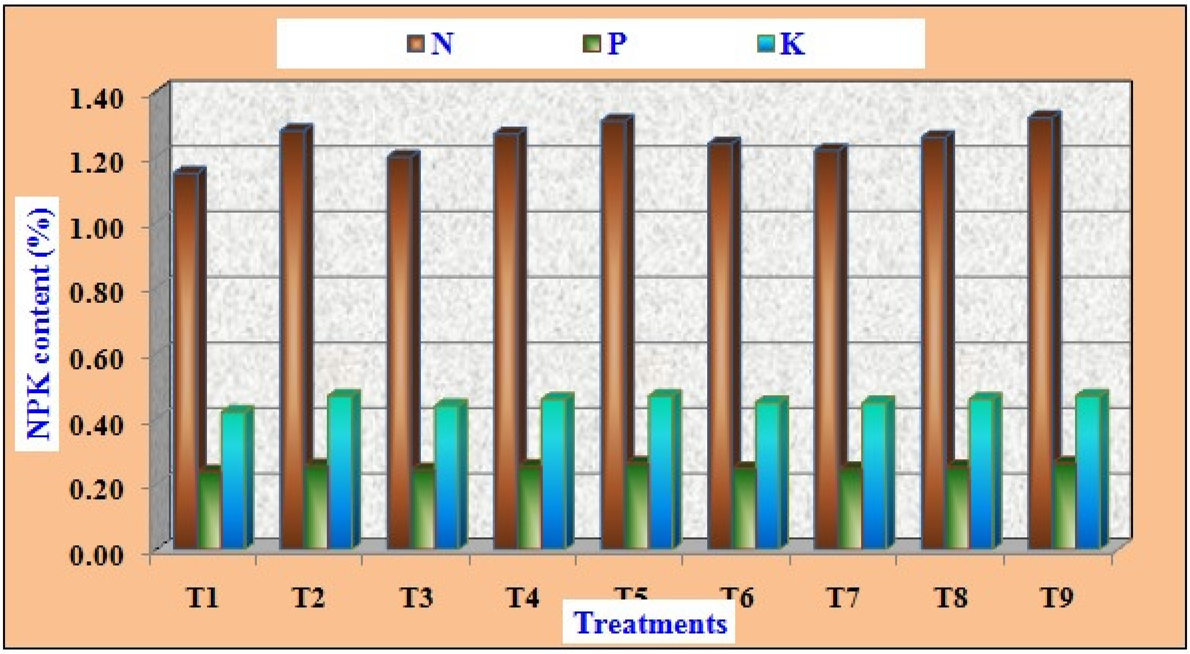

Figure 4. NPK content in grain of finger millet as influenced by nutrient management in *Melia azedarach* based agri-silvi system