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Studies on performance of transplanted Finger Millet in Surahonne based Agroforestry System Under Varied Nutrient Level Practices

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Abstract: Field experiment was conducted during *kharif*-2018 at Bio fuel park Madenur, University of Agricultural Sciences, Bangalore. The experiment comprised of seven treatments with three replications laid out in randomized block design. The experimental soil was red sandy loam with neutral in reaction (pH 6.8) and the electrical conductivity was normal (0.26 d Sm^{-1} at 25 °C). The available nitrogen present in the soil was medium (337 kg ha^{-1}) , the available phosphorus was high 34 kg ha^{-1} and medium potassium 290 kg ha^{-1}. The results revealed that significantly higher finger millet grain and straw yield (2792 and 5164 kg ha^{-1}, respectively) was recorded with (T_7) application of 75% N equivalent through neem cake+ 25% through RDF + 2% 19:19:19 water soluble foliar spray. The higher yield of finger millet was attributed due to higher number of tillers (5.30 $plant^{-1}$), total dry matter (35.52 g $plant^{-1}$), ear length (6.98 cm) and 1000 grain weight (3.68 g). It was on par with (T_2) application of 75% N equivalent through pongamia cake + 25% through RDF + 2% water soluble 19:19:19 foliar spray (2606 and 5052 kg ha^{-1}, respectively) and recommended package of practice(T_1) (100:50:50) N, P_2O_5, K_2O kg ha^{-1} + FYM @ 10 t ha^{-1} (2504 and 4973 kg ha^{-1}, respectively). Lower grain and straw yield (1888 and 3549 kg ha^{-1}, respectively) of finger millet was recorded with (T_4) application of 25% N Equivalent through pongamia cake+ 75% through RDF + 2% water soluble 19:19:19.

Keywords: Agro forestry, Finger millet, Macronutrients

INTRODUCTION

India is considered as pivot for the minor millet crops. Finger millet (*Eleusine coracana* L.) is commonly known as ragi in India and ranks third to its importance among millet in country, in area and production after sorghum and pearl millet. The area under finger millet crop is round 2 million hectares which is 7.5 per cent of the total millets area but its contribution (2.5 to 2.6 million tons) to total millet production is around 13 per cent. Karnataka is the leading producer of finger millet by occupying an area of 1.02 million hectares with the production of 1.87 million tons accounting 58 per cent of its global production (Anonymous., 2017)

Agroforestry is not a new concept, nor is it a new technology. For centuries, agroforestry has been practiced around the world and is most commonly associated with tropical and sub-tropical regions. Agroforestry is an intensive land-management system that optimizes the benefits from the biological interactions created when trees or shrubs are deliberately combined with crops or livestock. It is an emerging concept and technology that bridges agriculture production and natural resource conservation with environmental enhancement and human needs. During the juvenile period of the young plantations. As moderate to wide spacing (4.5 m) in between the trees is followed, there is lot of scope for growing intercrops. Most of the farmers keep the land fallow which favors weeds and harbors pests and diseases. This

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makes intercultural operations difficult. Fallow condition of the land favors the loss of valuable top soil by water erosion during monsoon by runoff and loss of soil moisture by evaporation during dry periods. Hence, it is advisable to grow intercrops such as wheat, sorghum, bajra and finger millet with minimum field preparation. The advantages of growing intercrops are mainly, large fall of litter during crop growth period which helps in buildup of organic matter and carbon after decomposition in the soil and biological nitrogen fixation in nitrogen fixation trees.

Surahonne (*Calophyllum inophyllum* L.) is a slow-growing and low-branching tree. It usually reaches 8 to 20 m in height. Its wood is hard, strong and has been used in boat building. The fatty acid methyl esters derived from *Calophyllum inophyllum* oil meets the major biodiesel requirements in the United States and European Union. The average oil yield is 11.7 kg oil tree^{-1} or 4680 kg oil ha^{-1}. Organic manures act not only as a source of nutrients and organic matter, but also increase size, biodiversity and microbial activity in soil (Albiach *et al*., 2000). Use of organic manures to fulfil the nutrient requirement of crop would be unavoidable practices in the years to come for sustainable agriculture. Since, organic manures commonly improve the soil physical, chemical and biological properties along with preserving the moisture holding capacity of soil and resulting in improved crop productivity along with maintaining the quality of crop produce. Neem and pongamia cake is used as concentrated organic manure for improving the soil fertility and thus promoting plant growth. Neem and pongamia cake is gaining popularity because it is environmental friendly and also the compounds found in it help to increase the nitrogen and phosphorous content in soil. Neem and pongamia cake is used to manufacture high quality organic manure, which does not have any ill effects on plants, soil and other living organisms. It has many benefits like bio-degradability and eco- friendly, nourishes the soil and plants by providing all the macro and micronutrients. Helps in eliminating bacteria responsible for denitrification, thus to reduce the usage of fertilizers and reduce the cost of cultivation. It has anti-feed properties that help to reduce the number and growth of insects and pests (Subbalakshmi *et al*., 2012).Foliar nutrition is intended to avoid the problems like immobilization and fixation of nutrients. Hence, foliar nutrition is being accepted as an essential method of fertilization in modern agriculture especially under moisture limited situation. This technique provides for utilization of nutrients more efficiently for correcting deficiencies rapidly. Therefore, considering the above facts, the present investigation Studies on performance of transplanted Finger Millet in Surahonne based Agroforestry System Under Varied Nutrient Level Practices was conducted.

MATERIAL AND METHODS

The study entitled the "Studies on performance of transplanted finger millet in surahonne based agroforestry system under varied nutrient level practices in Southern Transition Zone of Karnataka" was conducted during *kharif* 2018. The experiment was conducted at Biofuel Park Madenur, College of Agriculture, Hassan, University of Agricultural Sciences, Bengaluru. The experimental site is geographically located in the Southern Transitional Zone (Zone - 7) of Karnataka and located between 12^{o} 13' and 13^{o} 33' N Latitude and 75^{o} 33' and 76^{o} 38' E longitude at an altitude of 827 m above mean sea level (MSL). The experimental soil was red sandy loam with neutral in reaction (pH 6.8) and the electrical conductivity was normal (0.26 d Sm^{-1} at 25 °C). The available nitrogen present in the soil was Medium (337 kg ha^{-1}) and the available phosphorus was high (34 kg ha^{-1}) and potassium (290 kg ha^{-1}). Experiment was laid out in Randomized Block Design (RBD) with three replications.

The Treatment details are as follows

T_1: Recommended package of practice (100:50:50) N, P_2O_5, K_2O kg ha^{-1} + FYM @ 10 t ha^{-1}

T_2: 75% N Equivalent through pongamia cake + 25% through RDF + 2% water soluble19:19:19

T_3: 50% N Equivalent through pongamia cake + 50% through RDF + 2% water soluble 19:19:19

T_4: 25% N Equivalent through pongamia cake + 75% through RDF + 2% water soluble 19:19:19

T_5: 75% N Equivalent through neem cake + 25% through RDF + 2% water soluble 19:19:19

T_6: 50% N Equivalent through neem cake + 50% through RDF + 2% water soluble 19:19:19

T_7: 25% N Equivalent through neem cake + 75% through RDF + 2% water soluble 19:19:19

Note: Macronutrient foliar spray at 45 and 65 DAT

Specification	
Variety	GPU-28
Season	*kharif* – 2018
Spacing for finger millet	30 cm x 10 cm
Recommended fertilizer dose	100:50:50 kg NPK ha^{-1}
Gross plot	3.0 m x 5.0 m = 15 m^{-2}
Net plot size	2.4 m x 4.6 m = 11.04 m^2
Main tree	Surahonne (*Colophyllum inophyllum* L.,)
Age of trees	4 years
Spacing of trees	5.0 m× **5**.0 m
Date of transplanting	11th July 2018
Age of trees	5 years

RESULTS AND DISCUSSION

GROWTH PARAMETERS

Plant height (cm)

Plant height as influenced by varied nutrient levels practices under surahonne based agro-forestry system are presented in table 1.

Among all the treatments, application of 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray (T_5) has recorded significantly higher plant height at harvest (97.03 cm). and was on par with (T_2) application 75% N Equivalent through pongamia cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray (95.45 cm) and recommended package of practice (T_1) (100:50:50) N, P_2O_5, K_2O kg ha^{-1} + FYM @ 10 t ha^{-1} (94.40 cm).

Significantly lower plant height was recorded at harvest with application of 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray (T_4) 86.20 cm.

Furtherer, gradual release and initial nutrient availability through inorganic sources will meet the nutrient requirement of crop in growth and development. Availability of nutrients throughout the crop growth period by oil seed cakes and foliar macronutrient spray will be met the expanded accessibility of supplements in the soil through mineralization of natural sources could have activated cell prolongation and the gradual release and maintained a high level of availability of nutrients throughout the crop growth period by oil seed cakes bringing about high development rate of shoots and plant stature of finger millet.

Numbers of Tillers

Application of 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray(T_5) was recorded significantly higher number of tillers per plant at harvest (5.30) and it was on par with application 75% N Equivalent through pongamia cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray(T_2) (5.19) and recommended package of practice (100:50:50) N, P_2O_5, K_2O kg ha^{-1} + FYM @ 10 t ha^{-1} (2.43, 3.81, 4.61 and 5.00, respectively). Significantly less number of tillers per plant was recorded at harvest with application of 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray (T_4) (3.45) compared to other treatments. Maximum numbers of tillers per plant in treatment T_5 and T_2 might be due to timely and continuous availability of nitrogen at all stages of the crop growth helped in profuse tillering and this consequently led to more number of the ear head. The similar findings have also been reported by Baskar et., al (2019).

Leaf area (cm^2 $plant^{-1}$)

Application of 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray (T_5) has recorded significantly higher leaf area at harvest (903) and it was on par with application 75% N Equivalent through pongamia cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray (T_4) (876) and recommended package of practice (100:50:50) N, P_2O_5, K_2O ha^{-1} + FYM @ 10 t ha^{-1} (870). Significantly lower leaf area per plant was recorded at harvest with application of 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19

water soluble foliar spray (T_1) (816). The leaf area increased up to 90 DAT then it's declined. High leaf area at 90 DAT might be due to more light interception and enhanced photosynthetic rate (NAR), which ultimately resulted in higher dry matter production, straw yield, test weight, grain weight earhead^{-1} and grain yield. These results are in conformity with the findings of Patil *et al.* (2003) in sweet sorghum.

Lower leaf area recorded in treatment 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray due to closer spacing of the treatment with Surahonne tree species and the higher leaf area were recorded in treatment 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar because of more space and less competition, higher leaf area was observed, these findings have also been reported by Anusha (2017).

Total dry matter production (g plant^{-1})

Application of 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray (T_5) has recorded significantly higher total dry matter accumulation at harvest (35.52) and it was on par with application of 75% N Equivalent through pongamia cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray (T_2) (33.45) and recommended package of practice (100:50:50) N, P_2O_5, K_2O kg ha^{-1} + FYM @ 10 t ha^{-1}(T_1) (32.90).

Significantly lower dry matter accumulation was recorded at harvest with application of 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray (T_4) (23.43).

The photosynthetic efficiency of the plant is an indicator of dry matter production. Huge increment in plant dry matter production at various phases of development is because of increment in nitrogen levels and its impact on higher content of chlorophyll and formation of the other nitrogen compounds like amino acids, proteins and protoplasm result in increase of plant height, number of tillers and number of ears. The nutrient uptake helped in higher dry matter production. These results were in conformity with the findings of Kumar *et al.* (2014).

Lower dry matter was recorded in treatment 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray due to closer spacing of the treatment with Surahonne tree species and the higher dry matter was recorded in treatment 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar because of more space and less competition, higher dry matter was observed, similar findings have also been reported by Anusha (2017).

YIELD AND YIELD COMPONENTS

Ear length (cm)

The data on ear length of finger millet as influenced by varied nutrient level practices under Surahonne based agro-forestry system are presented in table 2.

Significantly higher finger length was recorded with application of 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray (T_5) (9.43) and was on par with application 75% N Equivalent through pongamia cake+ 25% through RDF + 2% 19:19:19 water soluble foliar spray(T_2) (9.27) and recommended package of practice (T_1) (100:50:50) N, P_2O_5, K_2O kg ha^{-1} + FYM @ 10 t ha^{-1} (9.08).Significantly lower ear length was recorded with application of 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray (T_4).

Number of fingers earhead^{-1}

Among the different treatments, number of fingers per earhead did not differ significantly due to varietal characteristics of finger millet and also soil application of varied levels of concentrated oil seed cakes with inorganic sources and macronutrient foliar spray supplied the required nutrients thought the crop period in under Surahonne based agro-forestry system.

Yield per plant (g plant^{-1})

Significantly higher yield per plant was recorded with application of 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray(T_5) (14.73) and was on par with application 75% N Equivalent

through pongamia cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray(T_2)(13.87) and recommended package of practice (T_1) (100:50:50) N, P_2O_5, K_2O kg ha^{-1} + FYM @ 10 t ha^{-1} (12.31). Significantly less yield per plant was recorded with application of 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray(T_4) (9.44). Due to wider spacing from Surahonne trees, number of tillers were more and yield per plant also more due to less interception in application with 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray. Due to less distance between tree species with treatment plot the tillers number reduced and yield per plant also recorded minimum in application with 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray.

Test weight (g)

Application of 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray (T_5) has recorded significantly higher test weight (3.68) and it was on par with application 75% N Equivalent through pongamia cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray (T_2) (3.44) and recommended package of practice (T_1) (100:50:50) N, P_2O_5, K_2Okg ha^{-1} + FYM @ 10 t ha^{-1} (3.36). Significantly low test weight values was recorded with application of 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray (T_4) (2.43). The conjunctive application of varied level of concentrated of oil seed cakes with inorganic sources and macronutrient foliar spray increased the yield attributes of finger millet *viz*., ear length, number of fingers earhead^{-1}, finger length and test weight. Especially a marked increase of yield attributes were found with the application of 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray.

NPK are essential nutrients required for the promotion of the meristematic and physiological activities. These activities promote higher photosynthetic activities leading to the production of enough assimilates for subsequent translocation to various sink and there by leading to production of higher sink components like ear length, number of fingers earhead^{-1}, finger length and test weight. These results are also in conformity with the findings of Pratap *et al.* (2008), Jagathjothi *et al.* (2010) and Giribabu *et al.* (2010).

YIELD PARAMETERS

Grain yield (kg ha^{-1})

The data on grain yield (kg ha^{-1}) of finger millet as influenced by varied nutrient level practices under Surahonne based agro-forestry system are presented in table 3

Significantly higher grain yield was recorded with application of 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray (T_5) (2792.3) and was on par with application 75% N Equivalent through pongamia cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray(T_4) (2606.3) and recommended package of practice (T_1) (100:50:50) N, P_2O_5, K_2O kg ha^{-1} + FYM @ 10 t ha^{-1} (2504.3). Significantly lower grain yield was recorded with application of 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray (T_4) (1888.3). Due to wider spacing of Surahonne trees all yield parameters of finger millets were more due to less interception so in application with 75% N Equivalent throughneem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray recorded highest grain yield and straw yield due to less distance between tree species with treatment plot the grain yield reduced in application with 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray recorded lowest grain yield and straw yield. The conjunctive use of varied levels of concentrated oil seed cakes with inorganic sources and macronutrient foliar spray 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 organic sources there by influence the shoot and root growth favoring absorption of other nutrients. Similar results were obtained by Yakadri and Reddy (2009). The nutrients also enhance the

carbohydrates supply to seeds, increasing yield components like Ear length, number of fingers earhead^{-1}, finger length, and test weight which have direct influence on grain yield. Similar results were reported by Duryodhana *et al*. (2004), Varalakshmi *et al.* (2005), Umesh *et al.* (2006), Basavaraju and Purushotham (2009). Reduced yield in finger millet compared to may be ascribed to competition for light, moisture and nutrients with suppressing effect on crops, reduced solar radiation on crop canopy. Similar results were reported by Prasad *et al*. (2011) Baskar *et al. (2019)* and Kumar *et al*. (2013).

Straw yield (kg ha^{-1})

Significantly higher straw yield was recorded with application of 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray (T_5) (5164) and it was on par with the application 75% N Equivalent through pongamia cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray(T_2) (5052) and recommended package of practice (T_1) (100:50:50) N, P_2O_5, K_2O kg ha^{-1} + FYM @ 10 t ha^{-1} (4973.0).

Significantly lower grain yield was recorded with application of 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray (T_4) (3549). Significant increase in straw yield with varied level of concentrated oil seed cakes with inorganic sources and macro nutrient foliar spray was attributed to build up of humus, organic carbon which improves the soil properties and increased availability of nutrients with addition of organic sources. These results are in line with the findings of Rajamani *et al.* (2009), Khan *et al.* (2011), Reddy (2011) and Rajesh (2012). Higher straw yield under conjoint organic and inorganic sources were due to higher plant height, LAI, dry matter accumulation, more nutrient availability and uptake. These results are in conformity with the results of Basavaraju and Purushotham (2009), Giribabu *et al.* (2010) and Jagathjothi *et al.* (2010).

Harvest Index

Among the different treatments, harvest index did not differ significantly due to soil application of varied levels of concentrated oil seed cakes with inorganic sources and macronutrient foliar spray under Surahonne based agro-forestry system.

Proportionate increase in both grain and straw yields with nitrogen sources, thus resulting non-significant effect. Similar results were obtained in foxtail millet and pearl millet by Basavarajappa *et al.* (2002) and Rajesh (2012) respectively.

TOTAL NUTRIENT UPTAKE

The data on total nutrient uptake by the finger millet crop as influenced by varied nutrient level practices under Surahonne based agro-forestry system are presented in Table 4.

At harvest, significantly higher macro nutrient uptake was recorded with application of 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray (81.4 kg N ha^{-1}, 18.53 kg P_2O_5 ha^{-1} and 47.8 kg K_2O kg ha^{-1}) and which was on par with application 75% N Equivalent through pongamia cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray (79.18 kg N ha^{-1}, 17.78 kg P_2O_5 ha^{-1} and 46.12 kg K_2O kg ha^{-1}) and Recommended package (100:50:50) N, P_2O_5, K_2O kg ha^{-1} +FYM @ 10 t ha^{-1} (76.33 kg N ha^{-1}, 16.55 kg P_2O_5 ha^{-1} and 44.89 kg K_2O ha^{-1}).Significantly lower macro nutrient uptake was recorded with application of 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray (63.86 kg N ha^{-1}, 13.01 kg P_2O_5 ha^{-1} and 38.84 kg K_2O ha^{-1}).

Improved yield and growth attributes might be interpreted as the manifestation of higher nutrient uptake by the plants. Nitrogen being a structural component of proteins involved in various biological functions. Whereas, phosphorous involved in better development of root systems and enhance the efficiency of nutrient and water uptake by roots. Potassium imparts resistance to major biotic and abiotic stress.

Application of 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray and was on par with the application of 75% N Equivalent through pongemia cake + 25% through RDF

+ 2% 19:19:19 water soluble foliar spray and Recommended package of practice (100:50:50) N, P_2O_5, K_2O ha^{-1} + FYM @ 10 t ha^{-1}. This was mainly due to higher growth parameters, yield parameters and small extent increase in nutrient status of the grain and straw recorded with application 75% N Equivalent through neem cake + 25% through RDF + 2% 19:19:19 water soluble foliar spray.

The lower uptake of nitrogen, phosphorus and potassium in finger millet recorded with the application of 25% N Equivalent through pongamia cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray and 25% N Equivalent through neem cake + 75% through RDF + 2% 19:19:19 water soluble foliar spray.

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 Sujatha *et al*. (2008) and Singh *et al.* (2011).

CONCLUSION

From the study it can be concluded that application of 75% N equivalent through neem cake+ 25% through RDF + 2% 19:19:19 water soluble foliar spray recorded significantly higher finger millet grain and straw yield.

Table 1: Growth parameters of transplanted finger millet as influenced by varied nutrient level practices under Surahonne based agro-forestry system at harvest

Treatments	*Plant height (cm)*	*No. of Tillers*	*Leaf area (cm^2 $plant^{-1}$)*	*TDM g $plant^{-1}$*
T_1	94.40	5.00	870	32.90
T_2	95.45	5.19	876	33.45
T_3	91.67	4.08	633	28.91
T_4	86.20	3.45	816	23.43
T_5	97.03	5.30	903	35.52
T_6	92.47	4.38	666	30.5
T_7	91.17	3.93	627	25.43
S.Em±	0.94	0.16	15.43	0.62
CD (p=0.05)	2.89	0.51	47.55	1.93

T_1: Recommended package of practice (100:50:50) N, P_2O_5, K_2O kg ha^{-1} + FYM @ 10 t ha^{-1}

T_2: 75% N Equivalent through pongamia cake + 25% through RDF + 2% water soluble19:19:19

T_3: 50% N Equivalent through pongamia cake + 50% through RDF + 2% water soluble 19:19:19

T_4: 25% N Equivalent through pongamia cake + 75% through RDF + 2% water soluble 19:19:19

T_5: 75% N Equivalent through neem cake + 25% through RDF + 2% water soluble 19:19:19

T_6: 50% N Equivalent through neem cake + 50% through RDF + 2% water soluble 19:19:19

T_7: 25% N Equivalent through neem cake + 75% through RDF + 2% water soluble 19:19:19

Note: Macronutrient foliar spray at 45 and 65 DAT

Table 2: Yield parameters of transplanted finger millet as influenced by varied nutrient level practices under Surahonne based agro-forestry system at harvest

Treatments	*Ear length (cm)*	*No. of fingers per ear head*	*Yield per plant (g plant^{-1})*	*Test weight (g)*
T_1	9.08	6.93	12.31	3.36
T_2	9.27	7.08	13.87	3.44
T_3	7.81	6.72	10.49	3.07
T_4	6.98	5.97	9.44	2.43
T_5	9.43	7.36	14.73	3.68
T_6	7.53	6.17	11.30	3.12
T_7	7.07	6.21	9.78	2.98
S.Em±	0.40	0.14	0.85	0.12
CD (p=0.05)	1.23	NS	2.65	0.34

T_1: Recommended package of practice (100:50:50) N, P_2O_5, K_2O kg ha^{-1} + FYM @ 10 t ha^{-1}

T_2: 75% N Equivalent through pongamia cake + 25% through RDF + 2% water soluble19:19:19

T_3: 50% N Equivalent through pongamia cake + 50% through RDF + 2% water soluble 19:19:19

T_4: 25% N Equivalent through pongamia cake + 75% through RDF + 2% water soluble 19:19:19

T_5: 75% N Equivalent through neem cake + 25% through RDF + 2% water soluble 19:19:19

T_6: 50% N Equivalent through neem cake + 50% through RDF + 2% water soluble 19:19:19

T_7: 25% N Equivalent through neem cake + 75% through RDF + 2% water soluble 19:19:19

Note: Macronutrient foliar spray at 45 and 65 DAT

Table 3: Grain yield, Straw yield and Harvest index of finger millet as influence by varied nutrient level practices under Surahonne based agro-forestry system

Treatments	*Grain yield (kg ha^{-1})*	*Straw yield (kg ha^{-1})*	*Harvest Index*
T_1	2504	4973	0.33
T_2	2606	5052	0.34
T_3	2167	4047	0.34
T_4	1888	3549	0.34
T_5	2792	5164	0.35
T_6	2291	4312	0.34
T_7	2067	3895	0.34
S.Em±	89.7	132.9	NS
CD (p=0.05)	276.3	409.4	

T_1: Recommended package of practice (100:50:50) N, P_2O_5, K_2O kg ha^{-1} + FYM @ 10 t ha^{-1}

T_2: 75% N Equivalent through pongamia cake + 25% through RDF + 2% water soluble19:19:19

T_3: 50% N Equivalent through pongamia cake + 50% through RDF + 2% water soluble 19:19:19

T_4: 25% N Equivalent through pongamia cake + 75% through RDF + 2% water soluble 19:19:19

T_5: 75% N Equivalent through neem cake + 25% through RDF + 2% water soluble 19:19:19

T_6: 50% N Equivalent through neem cake + 50% through RDF + 2% water soluble 19:19:19

T_7: 25% N Equivalent through neem cake + 75% through RDF + 2% water soluble 19:19:19

Note: Macronutrient foliar spray at 45 and 65 DAT

Table 4: Total nutrient uptake of finger millet at harvest as influenced by varied nutrient level practices under Surahonne based agro-forestry system.

Treatments	*Nitrogen (kg ha^{-1})*	*Phosphorus (kg ha^{-1})*	*Potassium (kg ha^{-1})*
T_1	76.33	16.55	44.89
T_2	79.18	17.78	46.12
T_3	70.73	14.79	40.88
T_4	63.86	13.01	38.84
T_5	81.4	18.53	47.8
T_6	74.01	15.57	43.22
T_7	66.98	13.97	40.27
S.Em±	2.35	0.51	1.38
CD (p=0.05)	7.24	1.58	4.26

T_1: Recommended package of practice (100:50:50) N, P_2O_5, K_2O kg ha^{-1} + FYM @ 10 t ha^{-1}

T_2: 75% N Equivalent through pongamia cake + 25% through RDF + 2% water soluble19:19:19

T_3: 50% N Equivalent through pongamia cake + 50% through RDF + 2% water soluble 19:19:19

T_4: 25% N Equivalent through pongamia cake + 75% through RDF + 2% water soluble 19:19:19

T_5: 75% N Equivalent through neem cake + 25% through RDF + 2% water soluble 19:19:19

T_6: 50% N Equivalent through neem cake + 50% through RDF + 2% water soluble 19:19:19

T_7: 25% N Equivalent through neem cake + 75% through RDF + 2% water soluble 19:19:19

Note: Macronutrient foliar spray at 45 and 65 DAT

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