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Growth and yield of okra (*Abelmoschus esculentus L.*) as affected by organic bio formulation KKKP and inorganic fertilizers

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Abstract
The objective of this study is evaluation of new bio formulation (KKKP) cotreated with household fowl Poultry compost and Tamil Nadu inhabitant breed cattle manures on growth and yield of Okra (*Abelmoschus esculentus.L*) experienced in GIV Farms Petawaithalai Village, Karur district of Tamil Nadu, India. Application of NPK, PM and CM alone showed moderate growth and yield. In 2015-2016 experiments with three replicates in a randomized complete hunkintend. Treatment involves 350 Kg NPK ha^{-1}, 10 ton poultary manure ha^{-1}, 10 ton cow dung manure ha^{-1}, 10 L KKKP + 4 ton poultry manure ha^{-1}, 10 litre KKKP + 4 ton cow dung manure ha^{-1} and control without treatment. The combination of KKKP 10 L + 4 ton Poultary manure ha^{-1}, and Bio formulation KKKP 10L + 4 ton cow manures ha^{-1} treatments proved to be a good growth and yield promoters compared to the other treatments in both seasons. The 10L KKKP + 4t ha^{-1} poultry manure reported highest yield record compared to the 10 Litre KKKP + 4 ton Cow dung manure ha^{-1} treatment. In formulation of KKKP and are cheap as well as profit to the Manures, in farmers Economic point of view, as well as prevents soil pollution. The Bio formulation KKKP 10 L + 4 ton Poultry manure ha^{-1} assessment showed good effect on all parameters among okra cultivation.

Keywords: bio formulation KKKP, poultry manure, cow dung manure, NPK

Introduction
These are invegetable play Sasignificant part in our diet. Vegetables like Laddies finger, Brinjal, and Tomato are extensively utilize clip food by every one of classes' citizens in Southern branch of Tamilnadu. All time were Ladies finger for occupies, if a special place in our kitchen for its conventional recipies and scrumptious taste. Africa production from countries like Nigeria, Ghana, and Burkina Fasco, thought that derivation of Ladies finger beas of high [1]. Behindto 1700 is the French colonialist introduced by Okra to in new world.Usualadding together of ladies finger recipeswasgo on a diet has the capability to enhance up the brain reminiscence control according to the Ayurvedha of Tamil Nadu India. And as well its fond muciligious pleased are nutritious and help the intestine in bowl movement, as well as good abode remedy for Constipation. The tender fruits can be sliced and dehydrated save for additional recipes assembly in kitchen [2]. Present was more yearly yielding vegetable agricultural in Indian subcontinent of it Ladies finger rural is a roll-over prize for farmers absorbed on these types of vegetable in all term. Good manures of Ladies finger grow healthy with soil amended [3] stipulation the give up of Ladies finger have to enlarge on the low downproductive soil it be supposed to be amended with other nutrients, Inorganic fertilizer similar to NPK in to put on high-quality yield to produce a Farmers without Nigeria use adequate amount of insufficient in sequence on Manureing [4]. The identical farming process is follow in India. Yield of Fruit okra toenlargementappreciablyadd to on the request of N [5]. A inorganic compound fertilizers observed that Okra plant is 50 to 60 days in a good yielding stage in like NPK, It was also been normal life span of the practical field, Applications of Bioformulation like manures promote higher life of the plants and high-quality yield [6]. and the parameters were found to be increased in okra farming in a growth and yield. The study was expected to conclude the outcome of KKKP burningon poultry and cattle manures on okra farming compare with that of inorganic manures and solitary relevance of organic and inorganic manure.

Materials and Method
Study area
The meadow of study was conducted at GIV farms Petawaithalai Karur district in Tamil nadu, India. Work initiated during january 2015-2016 at the research site of PG and Research Department of Microbiology Srimad Andavan arts and science College, Trichy. Karur district lies between 11◦ 00'-12◦00' North latitude and 77◦ 28'-77◦50' East longitudes. The summer season are found to be dry normally. Average annual rainfall of Karur district is 615 mm it receives seasonal rainfall during the month of September to Mid November from North east monsoon winds.

Preparation of bio formulation KKKP
Domestic fowl waste inpoultry manures were collected from limited farm region and residentvariety cow manures are obtained from Srimad Andavan arts and Science College Ashram Trichy. Together with manures urine, ghee, coconut milk, fruit waste, fishemeal, jaggery were added and subjected to decay for regarding five weeks under air tight container. Nutrient examination of Cow dung and poultary manures is estimated by standard procedure.

KKKP Growth promotion on okra [6].
The test involves six treatments by means of sole of Bio formulation KKKP, Organic and inorganic fertilizers as well and present mixtures we reequipped from manures.

- 350 Kg NPK ha^{-1},

- 10 ton poultry manure ha^{-1},
- 10 ton cow dung manure ha^{-1},
- 10 liter KKKP + 4 ton poultry manure ha^{-1},
- 10 liter KKKP + 6 ton cow dung manure ha.$^{-1}$

The 10 liter of Bio formulation KKKP is subjected to miscellaneous with two take apart 100 liter water and sprayed on the 4 ton Poultry manure and 6 ton cow dung manure before application to the field.

Field study: prior tosow the okra seeds, two weeks earlier than the Bio formulation amend chick manures and cow muck manures are dispersed in to the small dig burrow meant for sowing okra seeds at the depth ranging from 15 cm. Randomized complete block design measuring 4m × 3m(12 m2) is laid out for the test. Row spacings of 50 cm and between rows of 60 cm is the sowing distance of okra seed. Total plant population of 810 with 35 plants per plots. It is recommendation sable to prefer good quality potent seeds for best germination, so beginning of germination be able to complete by choose 10 okra seeds in a petri plate provision it with 20 ml of water and germination rate be capable of be without difficulty assessed within 7 to 8 days, in field circumstance it is improved to wet the coconut coir pit and okra seeds can be sowed and packed for preliminary germination test. In this way anti cipation of germination failure know how to be avoided.

Result and discussion

Effect of KKKP and co effect of poultry and organic manure on okra plant were studied and Physiological parameters such as number of leaves, branches, Plant length, Plant height and give way constraint concerning fruit length, fruit diameter, fruit numbers per plant, and fresh fruit were calculated. Initially N, P, K, Ca, Mg and moist content was tested. It was found cow dung have 14.92 moist and 15.41for poultry. Concentration of N, P, K, Ca, mg of cow dung were 1.69≥1.06≥1.38≥1.99≥0.72 parentage of where as 4.29≥1.78≥0.90≥ 2.15 and 0.66 % for poultry (table 1). Poultry manure have rich in potash and phosphorus and is used as manure in agriculture [7].Treatment effect on some yield parameter of Okra were recorded and the data given in table 2. The results was predictby means of arithmetical analysis (ANOVA) and by means of (SAS, 1999). LSD at 5% was used to divide the means of tests. In together of year (2015 and 2016) of field measurement to study show that Bio formulation KKKP amended next to with organic manure showed a considerably (P=0.05). KKKP to the treatments greater than before number of leaves, integer of branches and plant height, plant girth compare to the NON Modification of Bio formulation. The deliberate parameters difference was observed among the amendment of organic manures and inorganic manures refusal important of this. The bio formulation KKKP 10 Litre + 6 ton native breed cow manure ha^{-1} in all cases show superior shade standards. The quantity of rainfall received and environmental changes strength were brought the variation in the growth and yield parameters in the break of two seasons in which dry period was existing among October 2015 to Feburary 2016 which received low rainfall, than 2016 season which secured higher level of rainfall that is between 2016 July to October month and thus showing higher level of parameters. A research conducted by Akanbi *et al* [8]. Showed that 9-18 tons/acre of poultry manure appropriate for good tomato production.

In the field study it is also observed that life of the Okra plant is increased, on amendment of Bio formulation KKKP along with organic manures like poultry and cow dung manure. In the organic farm practice like using KKKP amendment with organic manure its life increases up to 100 to 145 days yielding. Application of inorganic manures beyond the recommended level causes Okra plant to grow faster with fast yielding rate with low life span also chlorophyll gets increases on the leaf. Studies also revealed the combined effects of organic and inorganic manure produced highest level of growth parameters comparing it with the sole applications of either inputs [9, 10]. Some of the complementary effect can be attributed on combination of inorganic and organic fertilizers. Bio formulation KKKP 10 Liter + 6 ton resident breed cow manure ha^{-1} record uppermost stage of yield parameter of proved the combined to Okra. Considerably more than the Manage which was (P=0.05). The treatment of 10Liter KKKP + 4 ton poultry manure ha^{-1} a second maximum records of the defer para metersat The same significant assessment of (P=0.05) is practical on compare the KKKP 10 Liter + 6 ton resident breed cow manure ha^{-1} handling. Express shoot growth, energy storage, Plant development and respiration was increased to motivation these are Nitrogen, Phosphorus, and potassium contented present in the KKKP unswervingly are involve. It rely on who exact that modify organic fertilizers with the soil as a plant nutrient provide evidence to increase Plant height and many more leaves in shallots, similar thing is observed in Okra [11]. Amendment of wood ash, Cocoa husk, spent grain, rice bran and saw dusta long with manures similar to Poultary, Pig and Goat manures enhance the okra yield by the learn conduct [12-13]. Improve physical position of the soil and development of harvest yield can be achieve by combine request of Organic and mineral fertilizers indicate [14]. The best okra yield compared with other treatment were experimental on the application of NPK and Organo mineral fertilizers at the rate of 75 kg NPK and 3 t.ha-1 organo mineral fertilizers [15]. KKP + poultry manure treated okra showed significant number of branches, leaves, height, fruit number followed by cowdung combination agreed with the earlier report [16]. Schlegel [17] reported the use of chicken or poultry manure in soil amendment resulted in taller plants and higher number of leaves per plant. In the Table-3, the financial profit of the treatment in the Okra invention was obtainable on compare the cost of manufacture with the be alive in command of the amended soil treatments showed elevated cost of production. Owing to the high quantity of manure used sole organic manure in addition secures the high cost. The top economic benefits of the production were observed in combined treatment comparing it with the rest of the treatment. The 10 litre KKKP + 4t Poultary manure has been record the uppermost (4075 and 3302 GH₵ ha^{-1} for 2015 season and 2016 time of year correspondingly) net benefit. The give way stage is higher in 2016 compared with 2015 term. In 2015 it is dry as a bone period reception low rainfall even while the price of Okra is one and not whole instance high. Hence in season of 2015 has the high net benefit than the 2016 term.

Conclusion

In study exposed that joint function of Bio formulation KKKP next to with Poultry and Cow compost manures have been proved good advancement in the Okra Growth and

yield components, than the sole relevance of inorganic manures like NPK and Organic manures like Poultry and cow dung manure. KKKP collective action with Organic manure hada good inexpensive benefit to the farmers as well as in defensive the soil, Plant wellbeing, Environment and insect killer exceptional complimentary vegetable and food commodities.

The combating treatment of 10 litre KKKP + 4t Poultry manure as a superior result in the various region of test Consideration.

Table 1: Nutrient Analysis reports of Cow dung and Poultary manure.

Manure	Nutrient concentration (%)					Moist Content
	N	P	K	Ca	Mg	
Cow dung	1.69	1.06	1.38	1.99	0.72	14.92
Poultry	4.29	1.78	0.90	2.15	0.66	15.41
KKKP						

Table 2: Treatment effect on some yield parameter of Okra

Treatment ha-1	No. of fruit per plant		Fruit length (CM)		Fruit diameter (CM)		Fresh fruit yield (Kg ha-1)	
	2015	2016	2015	2016	2015	2016	2015	2016
NPK	35	84	5.4	7.4	2.3	2.6	2430	4057
PM	35	85	5.3	7.2	2.4	2.5	2439	4002
CM	31	79	4.9	7.1	2.2	2.5	2130	3763
10 litre KKKP + 4t Poultry manure	40	89	5.7	7.6	2.5	2.6	2650	4527
10 litre KKKP + 4t cow dung manure	36	88	5.1	7.6	2.4	2.6	2288	4277
Control	22	62	4.1	6.7	2.0	2.4	1723	2680
LSP (0.05)	4.1	16.9	0.3	0.5	0.1	0.1	463.4	882.0
CU (%)	8.3	13.8	8.3	4.1	1.8	3.0	13.5	15.1

350 Kg NPK ha^{-1} = NPK; 10t Poultry manure ha^{-1} = PM; 10t Cow dung manure ha^{-1} = CM; 10 Liter KKKP + 4t Poultry manure ha^{-1} = 10 Litre KKKP+ 4t PM ha^{-1}; 10 Liter KKKP + 4t Cow dung manure ha^{-1} = 10 Litre KKKP+ 4t CM ha^{-1}; No Treatment of manure = Control.

Table 3: Economic benefits of organic and inorganic manures on the yield of Okra

Treatment ha-1	Fresh Fruit yield (Kg ha^{-1})		Value of yield (GH ₵ ha^{-1})		Production Cost (RS/ ha^{-1})		Net benefits (GH ₵ ha^{-1})	
	2015	2016	2015	2016	2015	2016	2015	2016
NPK	2288	4057	4576	4057	1200	1200	3351	2857
PM	2439	4002	4878	4002	1250	1250	3628	2752
CM	2130	3763	4260	3763	1250	1250	3010	2513
10 litre KKKP + 4t Poultry manure	2650	4527	5300	4527	1225	1225	4075	3302
10 litre KKKP + 4t cow dung manure	2430	4277	4860	4277	1225	1225	3660	3052
Control	1723	2680	3446	2680	900	900	2546	1780

350 Kg NPK ha^{-1} = NPK; 10t Poultry manure ha^{-1} = PM; 10t Cow dung manure ha^{-1} = CM; 10 Liter KKKP + 4t Poultry manure ha^{-1} = 10 Litre KKKP+ 4t PM ha^{-1}; 10 Liter KKKP + 4t Cow dung manure ha^{-1} = 10 Litre KKKP+ 4t CM ha^{-1}; No Treatment of manure = Control.

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