Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 6[10] September 2017 : 111-116

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD
Global Impact Factor 0.876
Universal Impact Factor 0.9804
NAAS Rating 4.95

ORIGINAL ARTICLE **OPEN ACCESS**

Organic Farming in Banana

A.R. Kaswala*, P.K. Dubey and K.G. Patel
Department of Soil Science and Agricultural Chemistry, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari-396450, Gujarat
***email:** anandnau@gmail.com

ABSTRACT

A field experiment was conducted to study the impact of in-situ decomposition of farm residue with microbes activators and its effects on yield and quality of banana and soil properties under farming. This experiment was conducted during kharif of 2012-13, 2013-14 and 2014-15 at Organic Farm, Navsari Agricultural University, Navsari (Gujarat). The experiment was laid in randomized block design with four replications. The higher bunch weight and yield were found to be highest with application of full dose of nitrogen i.e. 300g/plant through bio compost: castor cake: vermicompost in equal proportion (T_1). Potassium content in banana fruit was significantly higher with treatment T_5 (Farm Residue @ 10t/ha + 2 % Jeevamrut @ 400 L/ha) but was at par with most of the treatments. Significantly higher content of Mn, Cu and Zn was observed in treatment T_3 (Farm Residue @ 10t/ha + 2 % Panchgavya @ 400 L/ha). Addition of farm residue did not change the physical property which is reflected by non significant differences in bulk density but it increased the OC content and improved the available N status of the soil. Available P_2O_5 and K_2O were only affected during 2012-13 and 2013-14, respectively. Significantly higher content of available P_2O_5 was recorded with treatment T_6 (Farm Residue @ 10t/ha + Microbial consortia @ 2 kg/ha) whereas that of lowest in treatment T1 during 2012-13. Reverse trend was observed in the case of available K_2O during 2013-14.

Keywords: Banana yield, nutrient content, soil properties, organic farming

Received 11.05.2017 Revised 29.07.2017 Accepted 15.08.2017

INTRODUCTION

All organic residues incorporated into the soil undergo decomposition from the original residues as a result a series of products is formed. As the original material and the initial products undergo further decomposition, they become a brown black organic complex known by the name humus. It is worth noting that nutrient management through organics play a major role in maintaining soil health due to build up of soil organic matter, beneficial microbes and enzymes, besides improving soil physical and chemical properties. To achieve sustainable soil fertility and crop productivity, the role of organic manures and other nutrient management practices like use of fermented organic nutrients *viz.*, Panchagavya, Jeevamrut, Beejamrut, Sasyamrut, Vermiwash *etc.*, are becoming popular among farmers. These fermented liquid organic fertilizers contain in addition to nutrients, numerable microorganism and growth promoting substances which help in improving plant growth, metabolic activity and resistance to pest and diseases [8]. A major objective of organic farming is to encourage a higher level of nutrients and biological activity in the soil, in order to sustain its quality and there by promote metabolic interactions between the soil and plants. For successful organic farming in any crops it is depend upon the availability of nutrients in right time and right amount. Any mismatch in these two may hamper the production. The availability of nutrients from organic manures depends upon the C:N ratio of the manures. Wider the C:N ratio, slower the nutrient release and sometime immobilization is occurred. Therefore, integration of different organic manures to skew down the C:N ratio can increase the rate of decomposition and speed up the nutrient release. Hence, present investigation is intended to evaluate the impact of *in-situ* residue decomposition on yield and quality of banana and soil properties under organic farming.

MATERIALS AND METHODS

The present experiment was conducted at Organic Farm, Navsari Agricultural University, Navsari during *kharif* of 2012-13, 2013-14 and 2014-15 to study the impact of *in-situ* residue decomposition on yield and quality of banana and soil properties under organic farming. The soil of experimental area contained 0.80, 0.75 and 0.78 per cent OC and 263, 254 and 256 kg available N/ ha during 2012-13, 2013-14 and 2014-15, respectively. The experiment was laid out in randomized block design with four replications. Seven treatments viz. **T_1:** 100% N (300 g N/plant) through bio compost (BC): castor cake (CC): vermicompost (VC), **T_2:** Farm Residue @ 10t/ha + 2 % banana pseudostem sap (BPS) @ 400 L/ha, **T_3:** Farm Residue @ 10t/ha + 2 % Panchgavya @ 400 L/ha, **T_4:** Farm Residue @ 10t/ha + 2 % Amrutpani @ 400 L/ha, **T_5:** Farm Residue @ 10t/ha + 2 % Jeevamrut @ 400 L/ha, **T_6:** Farm Residue @ 10t/ha + Microbial consortia @ 2 kg/ha and **T_7:** Farm Residue @ 10t/ha were applied. NADEP compost @ 2.0 kg per pit along with *Azatobactor,* PSB @ 5.0 kg/ha and 0.5% each of *Pseudomonas* and *Trichoderma* were drenched @500ml/plant at the time of planting. Crop residue @10/ ha. was applied in equal two splits after two and four monts of planting. Residue was spread on the ridge and applied 2 per cent each of liquid formulation on residue as per treatments and then the residue was covered by thin layer of soil. Observations were recorded on randomly selected five plants from each plot. Soil samples from each plot after harvest of crop were taken and analyzed for physical and chemical properties through standard methods.

RESULTS AND DISCUSSION

Growth and yield

The data pertaining to growth of banana crop (plant height) indicated that nitrogen application through biocompost: castor cake: vermicompost (T_1) significantly increased the plant height during all the individual years as well as in pooled analysis, but it was at par with treatment T_4 (Farm Residue @ 10t/ha + Amrutpani @ 400 L/ha) during the year 2012-13, 2013-14 and in pooled analysis. In the year 2014-15 treatment T_1 was found at par with treatments T_2, T_3 and T_4. Plant height was significantly poor and lower in treatment T_7 (Farm Residue @ 10t/ha) during all the periods (Table 1). The increase in plant height could be attributed to the higher uptake of nutrients, particularly nitrogen [13]. The lower values for vegetative growth in plant height and dry matter production may be attributed to the shortage/deficiency of nitrogen which might have increased the ABA levels in all parts of the shoot, root and xylem exudates [10] and dropping the gibberellic acid levels of the shoots and decreased in production and export of cytokinins from roots to shoot and leaves ultimately resulting in reduced growth [11]. Bunch weight was also influenced significantly due to residue management and higher bunch weight was recorded with treatment T1 during all the year (Table 1). Pooled analysis indicated that application of full dose of nitrogen *i.e.* 300g/plant through biocompost: castor cake: vermicompost (T_1) increased the bunch yield by 47.4% compared with yield recorded in treatment T_7.

In the case of banana yield (t/ha), similar trend was also observed as observed in case of plant height of the crop. The highest yield of 72.8 t/ha with treatment T_1 was observed in the pooled analysis (Table 2). Several workers have also reported that application of different organic manures like FYM, neem cake and vermicompost gave higher number of fingers, finger weight and yield in banana plants [5, 9, 1, 3]. Significant improvement in the population of soil microorganisms *viz.*, bacteria, fungi and actinomycetes was noticed, at different crop growth stages of sesame by Ravusaheb *et al.,* [15] when organics (*viz.* compost, vermicompost, GLM) applied in combinations with fermented organics (*viz .* beejamrut, jeevamrut, panchagavya). Higher yield response owing to application of organics ascribed to improved physical, chemical and biological properties of soil resulting in better supply of plant nutrients, which in turn led to good crop growth and yield. In present study periodic application of liquid formulation enhanced the microbial activity which mineralize the farm residue and supply the plant nutrients continuously and thus, harmonized the supply and demand of the nutrients. This in turn would have assisted for the increased yield of banana. This is in confirmation with the findings of Somasundaram *et al.* [16] in banana.

Quality

The quality parameters in terms of nutrient content *viz.* P, K, Na, Ca, Mg, Fe, Zn, Mn and Cu in fruit are reported in table 3 to 6. The results furnished in table 3 revealed that P and K content in fruit were significantly influenced during individual year and in pooled analysis. Significantly higher content of P and K in fruit was observed with treatment T_6 and T_5, respectively but was at par with other treatments, except treatment T_3 and T_6 in case of K. With respect to Ca and Mg content in pooled analysis, significantly higher content was evaluated with treatment T_4 and T_6, respectively but was at par with treatment T_3 and T_6; in case of Mg content (Table 4). Fe content in fruit was significantly higher compared to other treatments during 2012-13, 2014-15 and in pooled, but was at par with treatment T_2 (Farm Residue @ 10t/ha + 2 % banana pseudostem sap @ 400 L/ha) while during 2013-14 reverse trend was observed. In contrary to Fe, significantly higher Zn in fruit was observed with application of farm Residue @ 10t/ha + 2 % Panchgavya @ 400 L/ha (T_3) during individual year and even pooled analysis also. Significantly lower content of Fe and Zn were reported with treatment T_7. In the pooled analysis these values were significantly lower in treatment T_7, T_5, T_4 and T_5, respectively but was at par with most of the remaining treatments (Table 5). Table 6 illustrated that significantly higher content of Mn was observed in treatment T3 during the year 2013-14, 2014-15 and in pooled. In pooled significantly higher content of Mn and Cu was recorded with treatment T_3 but was at par with T_4, T_5 and T_6 in case of Mn, whereas it was at par with treatments T_2, T_4 and T_6 in case of Cu. Application of BC: VC: CC in the proportion of 33.3: 33.3: 33.4 per cent nitrogen along with banana pseudostem sap @ 8 l/plant showed improvement in nutrient content in papaya fruit under organic farming. Apart from essential plant nutrients, pseudostem sap also contains the growth promoting substances like cytokinin, GA_3 *etc*., which might have exerted beneficial effects on plant growth and ultimately reflected on the nutrient content in papaya [6]. Similar findings in banana have been reported by Bambhaneeya [2] under organic farming.

Soil properties

Application of farm residue did not change the physical conditions in soil which was reflected by non significant differences in bulk density. It may be due to the practicing of organic farming since more than ten years with the continuous addition of organic matter at the experimental area. After the harvest, the soil organic carbon was significantly improved with the application of organic materials. Organic carbon content was influenced during 2012-13 and 2014-15 only and significantly higher content of OC was recorded with treatment T_2 followed by T1 (Table 7). Combined application of biofertilizers and organic fertilizers increased the soil organic carbon, microbial biomass and dehydrogenase activity [4]. Application of organic residue increased the OC content of the soil and improved the available N status of the soil. Significantly higher content of available N *i.e.* 270 kg/ha (T_1), 279 kg/ha (T_1) and 285 kg/ha (T_5) was recorded during 2012-13, 2013-14 and 2014-15, respectively. The available P_2O5 and K_2O content in soil was significantly affected during 2012-13 and 2013-14, respectively. Here, significantly higher content of available P_2O_5 was recorded with treatment T_6 whereas that of lowest in treatment T1 during 2012-13. Reverse trend was observed in the case of available K_2O during 2013-14 (Table 8). Application of 100% RDN through vermicompost+jeevamrut showed higher values of organic carbon, available N, P and K content in soil followed by 100% RDN through vermicompost. The organic carbon, available N, P and K content may be increased due to higher rate of addition and decomposition of organic sources [12]. This result was also in agreement with those reported by Rajulapudi [14] in banana and Jaffar Basha and Basavarajappa [7] in rice.

Table 1: Effect of different treatments on plant height and bunch weight of banana.

Treatments	Plant height (cm)				Bunch weight (kg)			
	2012-13	2013-14	2014-15	Pooled	2012-13	2013-14	2014-15	Pooled
T_1	174.2	185.3	223.8	**194.4**	18.6	20.0	24.3	**20.9**
T_2	150.6	164.8	213.8	**176.3**	15.3	18.0	22.1	**18.4**
T_3	157.2	167.5	208.0	**177.6**	13.4	15.6	19.9	**16.3**
T_4	163.0	179.8	210.3	**184.3**	14.6	15.7	20.0	**16.7**
T_5	156.3	164.2	181.0	**167.1**	13.1	14.5	18.8	**15.4**
T_6	150.6	158.0	203.3	**170.6**	14.3	14.5	18.1	**15.6**
T_7	142.3	147.8	182.8	**157.6**	12.4	12.9	16.0	**13.7**
S.Em.±	*5.55*	*5.42*	*9.44*	***4.0***	*0.8*	*1.0*	*1.21*	***0.55***
C.D. @ 5%	*16.48*	*16.11*	*28.05*	***11.4***	*2.4*	*3.0*	*3.59*	***1.5***
C.V. %	*7.10*	*6.51*	*9.29*	***8.04***	*11.2*	*12.8*	*12.18*	***12.2***
TxT Int.				***NS***				***NS***

Table 2: Effect of different treatments on yield of banana

Treatments	Yield (t/ha)			
	2012-13	2013-14	2014-15	Pooled
T_1	69.5	74.9	73.8	**72.8**
T_2	57.1	67.4	68.7	**64.4**
T_3	50.1	58.3	65.1	**57.8**
T_4	54.7	58.6	63.1	**58.8**
T_5	58.9	54.4	63.2	**58.8**
T_6	53.3	54.4	58.6	**55.4**
T_7	46.3	48.2	53.4	**49.3**
S.Em.±	*3.0*	*3.8*	*3.6*	***1.96***
C.D. @ 5%	*9.0*	*11.3*	*11.1*	***5.6***
C.V. %	*11.1*	*12.8*	*11.3*	***11.8***
TxT Int.				***NS***

Table 3: Effect of different treatments on phosphorus, potassium and sodium content in banana fruit.

Treatments	P (ppm)				K (ppm)				Na (ppm)			
	2012-13	2013-14	2014-15	Pooled	2012-13	2013-14	2014-15	Pooled	2012-13	2013-14	2014-15	Pooled
T1	505	520	506	**510**	3754	4012	4165	**3977**	146	135	140	**141**
T2	516	644	628	**596**	4022	3425	3825	**3757**	129	124	145	**133**
T3	671	523	654	**616**	3385	3775	3698	**3619**	113	133	135	**127**
T4	552	512	526	**530**	3562	4003	3785	**3783**	137	140	149	**142**
T5	614	601	602	**606**	3774	4352	4158	**4095**	113	132	135	**127**
T6	545	756	621	**641**	3836	3356	3462	**3551**	112	145	139	**132**
T7	550	560	529	**546**	3549	4125	3777	**3817**	160.8	140	146	**147**
S.Em±	*10.5*	*9.2*	*2.3*	***47.9***	*8.6*	*76.6*	*37.4*	***147.5***	*0.4*	*2.7*	*4.1*	***6.0***
C.D @ 5%	*31*	*27*	*7*	***145***	*25*	*225*	*110*	***447***	*1.3*	*8.0*	***NS***	***NS***
C.V. %	*3.8*	*3.2*	*0.81*	***12.1***	*0.4*	*4.0*	*2.0*	***2.6***	*1.0*	*4.0*	*5.8*	***4.2***
YT				***102***	-	-	-	***145***	-	-	-	***8.4***

Table 4: Effect of different treatments on calcium and magnesium content in banana fruit.

Treatments	Ca (ppm)				Mg (ppm)			
	2012-13	2013-14	2014-15	Pooled	2012-13	2013-14	2014-15	Pooled
T1	56.7	58.6	55.1	**56.8**	208	250	227	**228**
T2	52.7	60.1	55.6	**56.1**	225	213	246	**228**
T3	66.7	56.1	60.2	**61.0**	353	286	306	**315**
T4	70.2	60.9	62.6	**64.5**	255	281	281	**272**
T5	56.9	59.2	55.9	**57.3**	220	182	212	**205**
T6	64.2	62.3	60.5	**62.3**	382	248	321	**318**
T7	48.6	54.6	53.9	**52.3**	250	211	240	**234**
S.Em±	1.01	0.64	1.01	**2.01**	2.2	3.7	5.0	**20.8**
C.D @ 5%	2.9	1.9	2.9	**6.1**	7	11	15	**63**
C.V. %	3.4	2.2	3.5	**3.1**	1.7	3.2	3.9	**10.8**
YT	-	-	-	**2.5**				**40**

Table 5: Effect of different treatments on iron and zinc content in banana fruit.

Treatments	Fe (mg/kg)				Zn (mg/kg)			
	2012-13	2013-14	2014-15	Pooled	2012-13	2013-14	2014-15	Pooled
T_1	60.9	59.8	61.7	**60.8**	1.41	1.59	1.49	**1.50**
T_2	59.9	61.4	59.6	**60.3**	1.12	1.61	1.53	**1.42**
T_3	57.2	52.4	55.2	**54.9**	1.93	1.88	1.83	**1.88**
T_4	55.9	57.5	55.6	**56.3**	1.48	1.53	1.51	**1.51**
T_5	53.1	50.2	52.6	**52.0**	1.15	1.24	1.30	**1.23**
T_6	55.7	53.2	50.0	**53.0**	1.33	1.42	1.34	**1.36**
T_7	52.7	51.1	51.0	**51.6**	1.21	1.25	1.29	**1.25**
S.Em.±	*0.86*	*0.91*	*2.47*	***0.93***	*0.03*	*0.04*	*0.03*	***0.06***
C.D. @ 5%	*2.54*	*2.70*	*7.33*	***2.62***	*0.08*	*0.12*	*0.10*	***0.18***
C.V. %	*3.15*	*3.30*	*8.96*	***5.77***	*4.09*	*5.36*	*4.71*	***4.78***
TxT Int.				***NS***				***NS***

Table 6: Effect of different treatments on manganese and copper content in banana fruit.

Treatments	Mn (mg/kg)				Cu (mg/kg)			
	2012-13	2013-14	2014-15	Pooled	2012-13	2013-14	2014-15	Pooled
T_1	2.28	1.95	2.20	**2.14**	1.47	1.55	1.48	**1.50**
T_2	1.60	2.50	2.39	**2.16**	1.60	1.79	1.60	**1.66**
T_3	2.79	3.57	2.95	**3.10**	1.90	1.70	1.70	**1.77**
T_4	2.94	2.69	2.55	**2.72**	1.79	1.82	1.66	**1.76**
T_5	2.24	3.15	2.56	**2.65**	1.52	1.59	1.64	**1.58**
T_6	2.86	2.79	2.77	**2.80**	1.68	1.63	1.68	**1.66**
T_7	1.77	2.15	2.65	**2.19**	1.68	1.57	1.58	**1.61**
S.Em.±	0.08	0.05	0.11	**0.18**	0.03	0.03	0.03	**0.05**
C.D. @ 5%	0.23	0.13	0.33	**0.55**	0.10	0.08	0.09	**0.14**
C.V. %	7.0	3.6	8.9	**6.8**	4.4	3.2	3.7	**11.1**
TxT Int.				***NS***				***NS***

Table 7: Effect of different treatments on bulk density and organic carbon content after harvest.

Treatments	Bulk density (g/cc)			Organic carbon (%)		
	2012-13	2013-14	2014-15	2012-13	2013-14	2014-15
T_1	1.41	1.39	1.36	0.92	0.93	1.00
T_2	1.40	1.40	1.44	0.94	0.92	1.03
T_3	1.44	1.45	1.39	0.82	0.87	0.93
T_4	1.45	1.49	1.43	0.79	0.83	0.89
T_5	1.48	1.44	1.38	0.86	0.90	0.97
T_6	1.43	1.42	1.45	0.84	0.87	0.92
T_7	1.43	1.41	1.46	0.77	0.87	0.89
S.Em.±	*0.03*	*0.03*	*0.03*	*0.01*	*0.02*	*0.02*
C.D. @ 5%	*NS*	*NS*	*NS*	*0.03*	*NS*	*0.06*
C.V. %	*4.36*	*4.38*	*3.96*	*2.37*	*5.26*	*3.98*

Table 8: Effect of different treatments on available N, P_2O_5 and K_2O content after harvest.

Treatments	Available N (kg/ha)			Available P_2O_5 (kg/ha)			Available K_2O (kg/ha)		
	2012-13	2013-14	2014-15	2012-13	2013-14	2014-15	2012-13	2013-14	2014-15
T_1	270	279	279	53.5	50.4	46.6	463	483	512
T_2	263	271	275	56.8	49.4	51.7	400	408	455
T_3	251	262	266	50.7	51.1	47.9	438	430	420
T_4	255	263	263	62.7	53.8	52.7	435	450	492
T_5	266	276	285	53.7	54.7	52.4	434	408	456
T_6	255	265	266	65.7	52.8	45.9	409	396	385
T_7	252	258	262	56.6	52.1	48.6	443	454	425
S.Em.±	*4.3*	*4.5*	*4.7*	*1.9*	*2.9*	*2.4*	*14.8*	*16.1*	*27.7*
C.D. @ 5%	*13*	*13*	*14*	*5.5*	*NS*	*NS*	*NS*	*47.8*	*NS*
C.V. %	*3.3*	*3.3*	*3.5*	*6.5*	*11.0*	*9.6*	*6.8*	*7.4*	*12.3*

CONCLUSIONS

Application of full dose of nitrogen *i.e.* 300 g/plant resulted higher bunch weight and yield of banana. Addition of organic materials into the soil with or without liquid formulations and microbes more or less improves the quality of banana fruits. Moreover to this, addition of organic materials improves the soil organic carbon and available nutrients status in the soil. It may due to the decomposition of organic matter which facilitates humus formation and prevents leaching of nutrients. Considering all the aspects from the of the above investigations, addition of organic material could be beneficial for improving yield, quality and soil properties of banana under organic farming in South Gujarat region.

REFERENCES

1. Athani, S.I., Revanappa & Dharmatti, P.R. (2009). Influence of organic fertilizer doses and vermicompost on growth and yield of banana. *Karnataka Journal of Agricultural Sciences*. 22(1): 147-150.
2. Bambhaneeya, S. M. (2014). Effect of intercropping in banana under organic farming on nutrient content and uptake of crops and chemical composition of soil. M.Sc. thesis submitted to Navsari Agricultural University, Navsari.
3. Bhalerao, V.P., Patil, N.M., Badgujar, C.D. & Patil, D.R. (20090. Studies on integrated nutrient management for tissue cultured Grand Naine banana. *Indian Journal of Agricultural Research*, 43(2): 107-112.
4. Gogoi, D., Kotoky, U. & Hazarika, S. (2004). Effect of biofertilizers on productivity and soil characteristics in banana. *Indian Journal of Horticulture*. 61(4): 354-356.
5. Gubbuk, H., Paydas, S. & Kaska, N. (19930. Effects of different nitrogen and farmyard manure levels on the stem and finger growth and the durations of fruit development of Cavendish and Basrai banana clones. *Doga Turk Tarim ve Ormancilik Dergisi*. 17(1): 239-253.
6. Italiya, A. P. (2012). Effect of different proportion of organic manures on yield and quality of organically grown papaya. Ph.D. thesis submitted to Navsari Agricultural University, Navsari (Gujarat).
7. Jaffar Basha, S. & Basavarajappa, R. (2015). Effect of organic and inorganic sources of nutrients on soil chemical properties under aerobic rice cultivation. *Karnataka J. Agric. Sci.,* 28(4): 489-493.
8. Jenkinson, D.S. & Ladd, J. N. (1981). Microbial biomass in soil: Measurement and turnover. In: Soil biochemistry (E.A. Paul and J. N. Ladd, Eds.), pp. 415-471, Dekker, New York.
9. Kanamadi, V.C., Rahulkumar Bhavidoddi Shirol, A.M., Thammaiah, N. & Athani, S.I. (2004). Influence of organic and inorganic fertilizers on growth and yield characters of banana *cv.* Rajapuri. *Karnataka Journal of Horticulture*. 1(1): 81-85.
10. Krauss, A. & Marchner, H. (1982). Influence of nitrogen nutrition, day length and temperature on content of gibberellic and abscisic acid and on tuberization in potato plants. *Potato Research*. 25: 13-21.
11. Krauss, A. (1978). Tuberization and abscisic acid content in *Solanum tuberosum* as affected by nitrogen nutrition. *Potato Research*. 21: 183-193.

12. Laharia, G. S., Darshana U. Patil & Damre, P. R. (2013). Effect of organic sources on soil fertility, nutrient uptake and yield of soybean. *Crop Res.,* 45(1, 2 & 3): 155-159.
13. Nalina, L., Kumar, N., Soorianathasundram, K. & Jeyakumar, P. (2009). Effect of different nutrient levels on growth and development of tissue cultured banana *cv.* Robusta (AAA). *Indian Journal of Horticulture*. 66(2): 169-174.
14. Rajulapudi Hema (2013). Effect of organic manures and biofertilizers on growth, yield and fruit quality of banana *cv.* Grand Naine (AAA). M.Sc. thesis submitted to the Dr. Y.S.R. Horticultural University, Venkataramannagudem.
15. Ravusaheb, Munji, Babalad, H.B., Prasanna Kumara, B.H. & Pushpa, V. (2010). Effect of organics and fermented organics on yield, soil available N, P2O5, K2O kg/ha and microbial count in sesame. *An Asian Journal of Soil Science*, 5(2): 379-385.
16. Somasundaram, E., Kuttimani, R. & Velayudham, K. (2014). Eco-friendly nutrient management practices for yield and quality of banana. Proceedings of the 4th ISOFAR Scientific Conference on *'Building Organic Bridges',* at the Organic World Congress held at Istanbul, Turkey during, 13-15 October.

CITATION OF THIS ARTICLE

A.R. Kaswala, P.K. Dubey and K.G. Patel. Organic Farming in Banana. Bull. Env. Pharmacol. Life Sci., Vol 6[10] September 2017:111-116