Tobacco Research 40 (1) : 51- 54, 2014

EFFECT OF BIO-DEGRADED TOBACCO STALK COMPOST ON THE LEAF YIELDS OF BURLEY TOBACCO IN THE AGENCY AREA OF EAST GODAVARI DISTRICT OF ANDHRA PRADESH.

P. HARISHU KUMAR, R. SUBBA RAO, K. SIVA RAJU AND G. ADINARAYANA

ICAR-Central Tobacco Research Institute, Rajahmundry-533 105, Andhra Pradesh, India

(Received on 12th December, 2013 and accepted on February, 2014)

Key words: Burley tobacco, Tobacco stalk compost, Yield

After the tobacco leaves are primed totally at the end of the crop growth, the FCV tobacco stalks are generally left as such in the field or removed and burnt without putting them for proper usage. Of late, farm yard manure is becoming scarce and its utility is dwindling in the tobacco crop production. Build up of organic matter in the light soil is essential for proper crop growth and development. In order to develop bio intensive nutritious organic manure from the tobacco stalks, different method were used to decompose and the resultant product was tested on the tobacco crop productivity.

Tobacco stalks were cut in to 5 cm pieces and decomposed by pit method using *Plurotus* sp. or *Pseudomonas* sp or fortifying with urea or single super phosphate in combination as per mentioned and were compared with FYM on the productivity of burley tobacco and its effects on soil chemicals properties.

The experiment consisted of six treatments i.e. five composts and control FYM conducted in RBD with three replications. The burley tobacco crop was applied with 2.5 t/ha organic manure keeping FYM as check, besides the normal fertilization @ 120:60:120 kg N, P_2O_5, K_2O/ha in two split does (N&K) and P as basal dose only at 10 DAP and 20 DAP in dollop method (Krishnamurthy *et al*., 2005). The five composts were prepared with the following composition. Compost A- 2% SSP (wt/vol) + *Plurotus* sp.; Compost B -2% SSP (wt/vol) + *Pseudomonas* sp.; Compost C - 2% urea (wt/vol) + *Plurotus* sp.; Compost D- 2% urea (wt/vol) + *Pseudomonas* sp.; Compost E - 2% SSP + 2% urea + *Plurotus*+ *Pseudomonas.* The test crop Banket A1 was planted adopting a spacing of 120 X 60 cm on ridges. The crop received all the recommended package of practices. The mature and ripe leaves (Weybrew *et al*., 1984) were harvested and air cured in burley tobacco barn. After curing for 21 days, the leaves were weighed and leaves, curable leaves and harvest index (HI) was worked out. The soil sample collected were analyzed for P, EC, OC, available P, available K and soil chlorides (AOAC, 1970). The leaf nicotine, reducing sugar and chlorides were estimated as per the standard procedures (Harvey *et al*., 1969; Hanumantha Rao *et al*., 1980). The data were statistically analysed and interpretation were drawn.

All the five types of composts were at a par with FYM in getting burley cured leaf yields. The composts did not bring any significant variations in the soil chemical properties also.

The pH, enzymatic activity, K, P and number of fungal colonies were presented in Table 1. The pH of various composts indicated that under SSP fortification, *Pseudomonas* sp. reduced the pH of the compost B to acidic range while *Purotus* maintained neutrality in compost A. It was reverse when the fortifying material changed from SSP to urea. Accordingly under the acidic pH conditions, the acid phosphatase activity was more compared to others. In the compost B, where the pH was 7.5, the alkaline phosphatase activity was more *Pseudomonas* inoculation to the stem bits under SSP and urea fortification. It is therefore felt that depending on the crop's requirement of pH, The compost could be prepared and applied for the best performance of the crops. The bioactivity of the compost indicated that colony forming fungal culture was more under acidic nature of the compost B and A under SSP fortification compared to urea fortification under high pH of 7.5, where urea was used the fungal colonies were less. *Pseudomonas* increased the dehydrogenase activity of the compost compared to *Purotus*. However, the activity was more with urea addition to the compost compared to SSP addition. The higher content of P and K in the experimental research farm's FYM, may be due to the grain feed given to the cattle.

The cured leaf production as influenced by different composts did not bring any significant variation indicating that tobacco stem composts

Table1: Chemical composition, enzyme activity and spore count of different tobacco stem composts

Compost	pH	K (%)	P (%)	ACP*	ALP**	Dehydro-genase	No. of colonies
Compost A: 2% SSP (wt/vol) + *Plurotus* sp	7.06	0.95	0.28	251	495	26.2	6250
Compost B: 2% SSP (wt/vol) + *Pseudomonas* sp.	6.06	1.05	0.28	518	401	35.6	7920
Compost C: 2% urea (wt/vol) + *Plurotus* sp.	7.11	0.85	0.26	487	591	48.0	4510
Compost D: 2% urea (wt/vol) + *Pseudomonas* sp.	7.50	0.95	0.27	493	891	57.2	4860
Compost E: 2% SSP + 2% urea + *Plurotus* + *Pseudomonas*	7.06	1.11	0.30	288	702	24.8	4250
FYM alone	7.39	1.15	0.56	479	675	56.8	1940

*ACP: Acid Phosphatase µg of P –nitrophenol released /g /h
**ALP: Alkaline Phosphatase µg of P-nitrophenol released /g /h;
Dehydrogenase : OD unit/g/24h

Table 2: Effects of various composts on plant height, number of leaves, number of curable leaves, harvest index and N-use efficiency

Treatment	Plant height (cm)	No. of curable leaves	No. of total leaves	Cured leaf (kg)	Harvest index kg/kg N	N-Use efficiency
FYM	1.98	39	43	3350	0.25	27.92
Compost A	1.99	40	43	3731	0.27	31.10
Compost B	1.98	39	42	3354	0.24	27.95
Compost C	2.00	40	43	3674	0.25	30.62
Compost D	2.02	40	43	3507	0.24	29.23
Compost E	1.92	38	41	3501	0.27	29.18
SEm±	**0.04**	**0.72**	**0.70**	**125.9**		
CD (P=0.05)	**NS**	**NS**	**NS**	**NS**		
CV (%)	**9.94**	**6.45**	**6.39**	**21.47**		

are equally good as that of farm yard manure for burley tobacco crop production (Table 2). Through the differences are not significant, compost A recorded higher cured leaf of 3731 kg/ha recording 11.38% improvement over FYM application (3350 kg/ha). However, all the composts have reported higher cured leaf value over the conventional FYM application.

Biometrical observation revealed that tobacco stalk composts are equally effective as that of FYM in recording plant height, number of leaves, number of curable leaves and HI (Table 2). However, compost A has recorded more harvest index compared to other indicating a positive balance toward economic produce to other plant parts.

Leaf chemical composition indicated the lowest leaf nicotine content due to compost A and E while the reducing sugars were higher in the leaf due to compost A, B and FYM (Table 3). The compost A has produced leaf with low nicotine, higher sugars and low chlorides, a positive trait for blending purpose (Table 3).

The residual soil fertility did not indicate any significant variation due to different compost application compared to FYM (Table 4). It is interesting to note that wherever, *Pseudomonas* was used as cellulose degraders recorded lower value of organic carbon and soil available phosphorus compared to their counterparts with *Plurotus* sp, a lignin degrader. The effects were reflected in cured leaf production also. Whereas,

Table 3: Effect of various composts on quality characters

Treatments	**Nicotine** (%)	**Reducing sugars** (%)	**Chlorides** (%)
FYM	1.81	1.05	0.16
Compost A	1.55	1.02	0.14
Compost B	1.73	1.04	0.15
Compost C	1.96	0.92	0.17
Compost D	2.16	0.85	0.19
Compost E	1.55	0.84	0.15
SEm±	**0.05**	**0.05**	**0.01**
CD (P=0.05)	**0.15**	**0.014**	**0.02**
CV (%)	**3.44**	**21.37**	**10.80**

Table 4: Effect of various composts on residual soil chemical properties

Treatments	**pH**	**EC (dS/m)**	**OC (%)**	**Av. P (kg/ha)**	**Av. K (kg/ha)**	**Chlorides (ppm)**
FYM	5.02	0.58	0.45	22.12	472.5	33
Compost A	5.22	0.54	0.31	24.09	392.0	28
Compost B	2.14	0.48	0.28	21.49	465.5	25
Compost C	5.00	0.56	0.33	23.10	472.5	28
Compost D	4.90	0.51	0.28	22.22	490.0	32
Compost E	5.09	0.49	0.37	21.65	432.2	26
SEm±	**0.09**	**0.07**	**0.06**	**2.43**	**44.76**	**2.8**
CD (P=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
CV (%)	**4.39**	**44.46**	**47.76**	**5.45**	**30.80**	**55.53**

the reverse trend was recorded with respect to leaf nicotine, may be because of the wider C: N ratio.

It is inferred that application of tobacco stalk compost was as good as FYM in the production of quality cured leaf. However, compost A recorded higher cured leaf with less nicotine and more reducing sugars compared to other tobacco stalk compost over FYM, which is a favorable factor.

REFERENCES

AOAC. 1970. *Official Method of Analysis*. Association of official Analytical chemists, Washington.

Hanumantha Rao, A., C.V.S.S.V. Gopal Krishna and B.V.V. Satyanarayana Murthy. 1980. Determination of chlorides in tobacco by auto analyzer. **Tob. Res.** 7: 92-5.

Harvey, W.R., H.M. Stahr and W.C. Smith. 1969. Automated determination of reducing sugars and nicotine alkaloids on the same extract of tobacco leaf. **Tob. Sci**. 13: 13-5.

Ishithoya, K. 1961. Studies on maturity of tobacco leaves. **Coresta Inform**. **Bull**.1: 99.

Kaki, J. and Y. Sugizaki. 1971. Starch and sugar of tobacco leaves during maturity stage. **Soil Sci. Pl. Nutrition** 17: 27-32.

Krishnamurthy, V., R. Subbarao and K. Deo Singh. 2005. *Indian burley tobacco. Its production and quality for export.* Central Tobacco Research Institute, Rajahmundry-533105, India.

Kumaresan, M., C. Chandrasekhararao and R. Athinarayanan. 2003. Effect of different organic manures on the growth attributes, yield, quality and economics of chewing tobacco in Tamil Nadu. **Tob. Res**. 29: 31-4.

Murthy, G.S.R., C.R.K. Kurup and A.S. Sastry. 1962. Determination of chloride content of tobacco. A rapid electro-titrimetric method Indian. **Tob. Res.** 12: 151-4.

Tandon, H.L.S. 1995. *Micro nutrient Research and agricultural Production*. Fertiliser Development and Consultation Organization, New Delhi, p. 164.

TSO, T.C. 1990. *Production, Physilogy and Biochemistry of Tobacco Plant*. Ideals inc., Beltsville, USA. P. 753.

Weybrew. J.A., W.G. Woltz and R.J. Monroe. 1984. Harvesting and curing of flue cured tobacco: Effects of ripeness at harvest and duration of yellowing on yield physical characteristics, chemical composition and smoker preference. NC State Univ. Raleigh, NC. Pp. 7-26.