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Research Article

ISOLATION AND IDENTIFICATION OF FUNGAL COMMUNITIES FROM VEGETABLE WASTES COMPOSTS

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ABSTRACT

Compost preparation was carried out at Department of Botany, Bangalore University Bangalore during 2013 and 2014 by using Cabbage, tomato fresh cow dung and mixed vegetable waste. The experiments were laid down in a completely replicated randomized block design with three replication for each treatment. The qualitative and quantitative composition of individual vegetable composts (Tomato waste, Cabbage waste and mixed vegetable waste) were used for the isolation. The fungi were isolated on Potato Dextrose Agar (PDA) and at different temperature 50-55°C. Substantially qualitative differences in the species composition of different vegetables composts were observed. A total of 11 entities were isolated 3 from tomato waste compost, 2 from cabbage waste compost and 4 from mixed vegetable waste at 50°C and 3 at 55°C respectively. This report demonstrates that the qualitative and quantitative characterization of individual composts and fungal communities essential for best industrial application.

Keywords: Compost, fungi, thermophils.

INTRODUCTION

Composting is a biological conversion of solid organic waste into usable end products. Fresh organic putricible residues when added to the soil invariably undergoes decomposition. Their high organic matter content and biological activity make compost effective in various applications. It is well established that the decomposition of organic matter on soil surface brought about by variety of microorganisms. The active component involved in the biodegradation and conversion process during composting is the resident microbial community, among which fungi play a very important role including bacteria and actinomycetes (Jenson 1974 Bollen 1985, Anusuya 2003, Antonellaetal., 2005) .They also degrade complex polymer compounds and bioremediate with a wide range of pollutants (Kastner and Mahra 1996, Minursietal., 2001)

Much information exists about the succession of fungi, mainly thermotolerant and thermophilic fungi (straatsmaetal 1993). In contrast very little information is available about Thermophilic communities during composting of market wastes in particular vegetable wastes.

In brief, since composting methods and different source materials particularly vegetable wastes are associated with differences in the composition of fungal communities. Monitoring individual segregated waste and of resident fungal population in the market waste compost needed to determine its quality and field application. The report focuses on the fungal species composition and load of mycoflora of three different market wastes homogenous and heterogenous compost.

MATERIAL AND METHODS

The dilution plate technique (Parkinson et al.,1971) was employed to isolate fungi from vegetable waste composts. Ten grams of finely powdered compost was suspended in 100 ml sterile water in 250 ml conical flasks. The suspension was diluted to 10^{-5} and 1 ml of each transferred separately to five replicates on Potato Dextrose Agar medium (PDA). Petridishes were incubated at 50-55 °C. The fungal colonies that occurred were isolated, purified and identified. The thermophils thus occurred were identified by Dr.D.Anusuya, Professor, Department of Botany, Bangalore University Bangalore (B.U.B).

RESULTS AND DISCUSSION

The total fungi appeared in all the three compost sample is presented in (table 1). The incubation temperature was 50-55°C. A total of 11 genera were identified from three compost samples of which (Humicola, Penicillium and Scytalidium) were common to all the composts. The greater number of fungal species were recorded in tomato waste compost (TWC) than the other composts which were scanty. Depending on the temperature conditions produced different species of fungal flora.

Incubation period of the compost					
50 °C			55 ° C		
TWC	CWC	MVW	TWC	CWC	MVW
Fungal entities					
Humicolainsolens	Chaetomium sp.	HumicolaSp	Penicillium sp.	Penicilliumsp	Paecilomyces sp.
Sporotrichum sp.	Scytalidium sp.	Aspergillussp		HumicolaSp	Thermoascus sp.
Andrographiscuboidea		Rhizomucorsp			Mycelia sterilia
		Scytalidium sp.			

Table 1: Predominant genera of fungi isolated during composting of vegetable wastes

TWC- Tomato waste compost,

CWC- Cabbage waste compost,

MVW- mixed vegetable waste.

The greatest number of species isolated at 50°C wereHumicola and Penicilliumsp which demonstrates that quantitative domination of two species namely Humicola and Penicillium.

Of the most abundant species in all the three composts, the thermotolerant fungi Humicola and Penicillium Sp. displayed a significant greater load though Sporotrichum, Scytalidium showed prevalence in cabbage waste compost and mixed waste compost and many species solely were present in mixed vegetable compost (table 1) other species described as thermotolerant or thermophilicChaetomium were isolated from cabbage waste compost.

There were significant differences between composts of tomato and cabbage in the quantitative composition. Distribution of Humicola sp. prevailed in almost all the three composts, where asPaecilomyces was present only in mixed vegetable waste compost(MVW).

These results contribute to the microbiological understanding of market wastes (vegetable waste) compost, whose fungal component is often overlooked. Compost mainly made from homogenous wastes (individually) and combined vegetable waste. There are many reports pertaining to plant debris and the

fungal load (Thorn, 1997)

Though the fungal communities are greater than in many agricultural soils (Luppimoscaetal 1976)

Most of the fungal species were common to all the three composts belong to Humicola, Penicillium,Scytalidium,Paecilomyces and Arthrographis at 50°C many regarded as most common in composting materials, due to the thermotolerance capacity to degrade wide range of organic waste (Miller 1996).

Several thermotolerant or thermophilic species (Domsch et al.,1980) were isolated from vermicomposts and their potential for growth in soil(Rajasekaran and Maheswari 1993). The results of all the individual and consortia of vegetable wastes and the experimental approach used in this study suggest that at 50 °C the thermotolerant fungi were active component of all the compost samples tested.

CONCLUSION

The study shows that all the microorganisms isolated are thermotolerant and highly sensitive beyond 50°C however, the rate of occurrence slows at 55°C. Further, studies on the isolation of enzymes are recommended.

REFERENCES

1. Anusuya D and Sridhara T A (2003). Biodiversity of fungi during composting of lignocellulosic wastes. J.Microb.World 5(1) pp.9-10.
2. Bollen G J (1985). The fate of plant pathogens during composting of crop residue. In: composting of Agricultural and other wastes, Ed by Gasser, J.K.R., Elsevier. Applied Science Publishers, London, pp. 282-290.
3. Domsch K H, Gams W,Anderson T H (1980). Compendium of soil fungi. London, England: Academic Press.865p.
4. Jensen V ,(1974). Decomposition of Angiosperm Tree Litter.Biology of plant litter decomposition (Ed bu Dickinson, C.H and Pugh, G.J.F). Academic press, London, pp69-104.
5. Kastner M, Mahro B, (1996). Microbial degradation of polycyclic aromatic hydrocarbons in soils affected by the organic matrix of compost. ApplMicrobiolBiotechnol 44:668-675.
6. LuppiMosca A M, FilipelloMarchisioV,Fontana A, (1976). Micoflora di unterrenoorticolo.Allionia 21:13-32.

7. Miller F C, (1996). Composting of Municipal Solid waste and its Components. In: Palmisano A C, BarlazMA,eds. Microbiology of solid waste.CRS Press. P115-154.
8. Minussi R C, de Moraes S G, Pastore G M, Duran N, (2001). Biodecolourization screening of synthetic dyes by four white rot fungi in a solid medium: possible role of siderophores. LettAppl microbial 33:21-25.
9. Parkinson D,Gray T R G and Williams S T (1991). Isolation of microorganisms . In: methods for studying the ecology of soil Microorganisms. IBP Handbook No.19, Black Well, London, pp.36-55.to.
10. Rajasekaran A K, Maheshwari R, (1993). Thermophilicfungi :an assessment of their potential for growth in soil. J. Biosci., Vol . 18,pp 345-354.
11. Straatsma G, Samson R A (1993). Taxonomy of ScytalidiumThermophilum, an important thermophilic fungus in mushroom compost. Mycol Res 97:321-328.