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Effect of neem leaf litter extract on decomposing potential of certain fungi

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The effect of Neem leaf litter extract on decomposition of wheat straw in vitro by *Aspergillus niger, A.flavus, A.terreus* and *Tricoderma lignorum* was studied. The maximum decomposition was caused in decreasing sequence by *T.lignorum* (33.8%) *A.niger* (24.7%), *A.terreus* (21.57%) and *A.flavus* (15.26%). The addition of extract of decomposing neem leaves stimulated the decomposition by *A.niger* and *A.flavus* by 12.7% and 13.7% respectively, where as by *T.lignorum* and *A.terreus* was inhibited by 4.69% and 4.86% respectively. The decrease in the rate of decomposition by *T.lignorum* can be attributed to the decrease in the activity of polygalacturonase activity but in case of *A.terreus*, the decomposition was due to carboxymethylcellulase (CMC).The stimulation of decomposition by *A.niger* and *A.flavus* can be attributed to increase in polygalacturonase (PG) activity.

Key words : CMC, PG, LE, Mean, Fungi.

INTRODUCTION

Neem (*Azadirachta indica A.Juss*) also called Indian lilac, belongs to the family Meliaceae.It is considered to be one of the most promising trees of 21st centuary.The tree has been used in curing so many ailments that has been named as so called, "The Village Pharmacy" (Stix,1992).

In India, more than 300 insect species have been screened against Neem (Kohli *et al.*, 1998). Neem extract contains azadirachtin (having the strongest antifeedent and growth regulatory effects), azadiradion, nimbocil oil, epiniobocinol, salanin and meliantrion. (Narwal, 1999).

Azadirachtin has also been proved to be a chitin synthesis inhibitor but the role of this inhibition as the primary mode of action has not been investigated so far (Schmutterer, 1988).

The bitterness of Neem is due to an array of complex compounds called triterpenes; or more specifically "limonoids".Nearly 100 protolimonoids, limonoids or tetranotriterpenoids, pentanotriterpenoids and some nonterpenoids constituents have been isolated from various parts of Neem tree (Jones *et al*., 1989; Koul *et al.*, 1990).

The most important bioactive principle is azadirachtin, possess insect growth regulating activity (Schmutterer, 1990). The biological activity of the extract includes feeding repellent,oviposition,growth regulation, sterility and direct toxicity(Narwal,1999).

Young Neem leaves contain water (60%), carbohydrate (23%), proteins (7%) more than 3% minerals, 1% fat and at least 10 amino acids proteins. They also contain other nourishing minerals, caritenoids and nutritive compounds. (Kraus, 1995).

It is now realized that plant litter (dead remains of plants at soil surface) is decomposed by a sequence of events involving physical processes like the leaching and mechanical breakdown as well as through biological processes like microbial degradation which involves several exoenzymes (Sinsabaugh et al.,1981).A number of studies by Went and Stark, 1968; Cooper, 1982; Weyer, 1994; Mamilov *et al.*, 2000 and Dilly *et al.*, 2001 have confirmed that fungal communities play a predominant role in litter decomposition.

MATERIALS AND METHODS

Neem leaf litter was collected on newspaper sheets placed beneath the Neem trees growing in Meerut College, Meerut and Hapur road,Meerut. One week collection was brought to the lab, thoroughly washed and surface sterilized. The material was then airdried. The air dried litter was ground.100 gm powder were suspended in 1000 ml of sterilized distilled water and shaken for 24 hours. The suspension was filtered through double- layered muslin cloth. The filtrate was centrifuged at 10,000 rpm for 20 minutes and supernatant so obtained was filtered through what man No.1 filter paper. The volume of filtrate was raised to 1000 ml using distilled water. The filtrate so obtained was sterilized by passing it through 0.2 micron dispensable bacterial filter. Four fungal species *viz., Aspergillus niger, A.flavus, A.terreus and T.lignorum*

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Table : Dry weight of wheat straw and percentage decomposition in control flasks as well as those inoculated with the test fungi in the absence and presence of Neem leaf extract(After 60 days)

Treatment		Dry Weight*	Percentage Decomposition	Percentage Simultation/Inhibition
1.	Water +A.niger	1.43±0.07	24.73	+ 12.7
2.	L.E +A.niger	1.46±0.05	27.89	
3.	Water +A.flavus	1.61±0.06	15.26	+ 13.16
4.	L.E +A.flavus	1.57±0.09	17.36	
5.	Water +T.lignorum	1.26±0.04	33.68	- 4.69
6.	L.E +T.lignorum	1.29±0.03	32.12	
7.	Water +A.terreus	1.49±0.05	21.57	- 4.86
8.	L.E +A.terreus	1.51 0.07	20.52	
	Control	1.90±0.05	—	—

*Mean of 5 replicates

were selected and for the study as these were found a bit good decomposers of wheat straw. (Singh, 2004). All the four test fungi were grown on agar plates containing Czapek's medium. When growth was abundant, the surface growth was removed with sterile spatula and the mycelia as well as the spores were mixed thoroughly in 150 ml of sterile distilled water in 250 ml flasks.

RESULTS AND DISCUSSION

The results of the investigations are presented in the given table. The dry weights of wheat straw and percentage decomposition in control flask as well as those inoculated with test fungi in the absence and in presence of neem leaf extract (after 60 days) have studied.

The addition of neem leaf extract had the slightly negative effect on litter decomposition by *T. lignorum* and *A.terreus*, while it had moderate stimulatory effect on the decomposition potential of *A.niger* and *A.flavus.* Nimbdin has been reported to be antifungal as it can inhibit the growth of *Tinea rubrum* (Murthy and Sirsi, 1958). Gedunin isolated from neem seed oil have been reported to possess antifungal activity. (*Rao et al.*1977).

Jacobson (1986) has already reported antimycotic activity with extract of different parts of neem. The leaf extract of *Azadirachta indica* has already been recorded as a strong inhibitor of *Curvularia lunata* (Bhownick and Vadhan ,1981); *Phytopthora capsici*(Anandraj and Leela ,1996); *Curvularia tubercularia* and *Alternaria alternata* (Srivastva and Lal,1997) and *Rhizoctonia solani* (Kurucheve et al.,1997).

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