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Microflora Associated with the Gut Content of Isopod (*Burmoniscus* Sp nova; Philosciiidae)

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Abstract

High number of spore producing fungi dominated the digestive track of isopod rather than either less spore producing speckes composition of microbial communities The plate counts indicated extensive bacterial growth in the gut contents, while fungal counts decreased along the intenstinal track.

Introduction

Isopod commonly feed on dead and decaying plant material which supports a number of microorganisms. They occur mostly in the surface region of soils especially in the litter layer, where they can play a decisive role not only in the plant litter decomposition, but also in microbial dissemination and in mixing and inoculating soil microhabitats with microbes which they carry on their body surfaces. Although their feeding habits and digestion have been studies in detail (Hassall *et al*, 1987; Gunnarsson, 1987; Dudgeon *et al*, 1990 and Van Wensem *et al*, 1993), study on population composition at the specific level of their intestinal microbial communities and their role in the passive dispersal of microbes is meagre (Ineson and Anderson, 1985).

Studies on microflora of the digestive tract of isopod have so far received little attention from soil microbiologists and a knowledge of animal diets is useful in assessing the role of soil isopod in litter decomposition. Therefore, an attempt was made for a better understanding of the role of isopod ingestion on microorganisms in soils by analysing the gut contents of field caught animals.

Material and Methods

Burmoniscus specimens (Sp nova; Isopoda; Philosciidae) were collected in the month of July to September, 1993 from the litter layer of alder *Alnus nepalensis* D. Don) forest at Upper Shillong 5.5 km in the west of Shillong (altitude 1500 m MSL; latitude 25°34' N; longitude 91°56' E). Serial dilutions were prepared from the gut contents of these organisms which were obtained aseptically under laboratory conditions as outlined by Kayang *et al.* (1996) and were plated onto nutrient media (Ineson and Anderson, 1985). Fungi were isolated on Rose Bengal Agar medium (Difco Manual, 1953) using Nystatin (100 g ml^{-1}) to suppress fungi. Three replicates were incubated at 20°C for 5-10 days for fungi and 3 days for bacteria and microbial colonies were counted. Identification of the fungi was done by following Gilman (1957), Barnett and Hunter (1972) and Domsch *et al* (1980). No attempt was made to identify bacteria.

Results and Discussion

Altogether 26 fungal species were isolated from the gut contents (Midgut = 26 and Hindgut = 16) or *Burmoniscus* sp nova (Table 1). Earlier it has been demonstrated that the fungi are sensitive to isopod feediing and litter with a high fungi content is

Table 1

Fungi isolated from the gut contents of Isopod (*Burmoniscus* sp nova).

Fungal species	Gut contents					
	Midgut			Hindgut		
	July	Aug	Sept	July	Aug	Sept
Mucor hiemalis (Wehmer)	+	+	+	+	+	+
M. racemosus (Fres)	-	+	+	-	-	-
Absidia glauca (Haugeni)	-	+	+	-	-	-
Cunninghamela sp	+	-	-	-	-	-
Rhizopus oryzae (Went & Prinsen) -	-	+	-	+	+	
R. stolonifer (Ehrenb)	+	+	-	+	-	-
Chaetomium globosum (Kunze)	-	+	-	-	-	-
Melanospora zamae (Corda)	-	+	-	-	+	-
Phoma glomerata (Wollenweber & Hochafel) -	-	+	-	-	+	
Rhizoctonia solani (Kuhn)	-	+	+	-	+	+
Alternaria alternata (Fr Keissler)	+	+	+	-	+	-
Aspergillus flavus (Link)		+	+	+	+	+
A. nidulans (Van dentatus)	+	+	-	-	-	-
A. niger (Van Tieghem)	-	+	+	+	+	+
Cladosporium cladosporioides (Fresenius de vries)	-	+	+	+	+	+
C. herbarum (Persoon) Link	-	+	+	-	-	-
Curvularia lunata (Walker) Boedijn	+	+	-	-	-	-
Fusarium moniliforme (Sheld)	+	+	-	-	+	-
F. solani (Mart, Saac)	+	-	+	-	-	-
Humicola grisea (Traaen)	-	+	-	-	+	-
Monilia sitophylla (Mont, Saac)	-	+	+	-	-	-
Nigrospora sphaerica (Sacc) Mason	-	-	+	-	-	+
Paecilomyces verioti (Bainer)	-	+	+	+	+	+
Torula herbarum (Pers. ex Gray)	-	+	-	-	-	-
Trichoderma viride (Pers. ex Gray)	-	+	+	-	+	+
T. koningii (Oudem)	-	+	-	-	+	-
White sterile mycelia	-	+	+	-	+	-
Black sterile mycelia	+	+		-	-	-

- Not isolated.

preferred (Gunnarsson, 1987 and Stockli, 1990). The midgut region harboured higher fungal colony forming units (cfu) than that of hindgut region (Fig. 1). This indicated that digestion of fungal tissue occurs in the midgut region (Gunnarsson and Tunlid, 1986). A high number of spore producing fungi dominated the gut contents (Table 1) suggesting that spores of certain fungi were resistant to the enzymatic digestion compared to mycelial forms and this influenced the species composition of microbial communities (Kayang *et al*, 1996). Whereas, more bacterial colony forming units (cfu) were counted from midgut then in the hindgut region (Fig. 1). These results suggest that the alimentary canal is a very suitable microenvironment for multiplication of the bacteria ingested

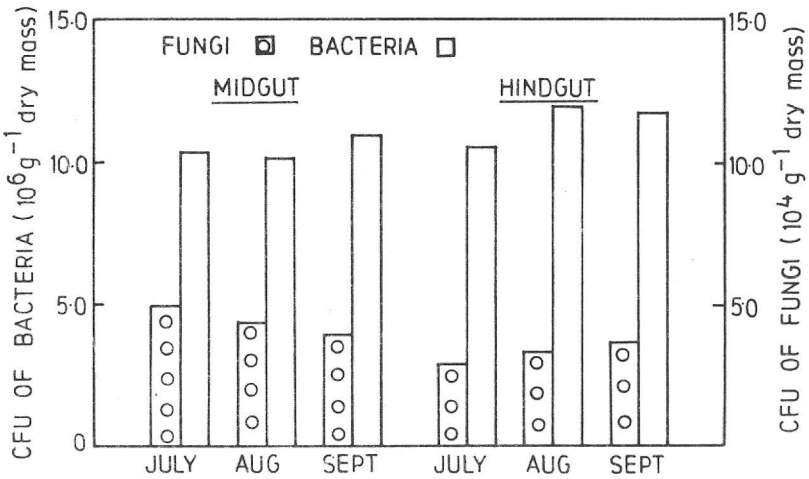

Fig. 1

along with the food or that it contains a high density reservoir of microorganisms which invade the food as it is passing through (Ullrich *et al.*, 1991 and Van Wansem *et al*, 1993). Another reason for the increase in the bacterial population may be due to chemical changes in ingested materials such as in pH or C:N ratio (Hassall *et al*, 1987). It was clear from the results that the microflora was altered in both density and species composition by passing through the alimentary system of isopod which may have a neutral, negative or positive effect on the decomposition processes.

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