TABLE I

Effect of sugars on the endogenous respiration of active and starved mycelium of Pestalotiopsis versicolor

	Substrate added	$\mu l\ O_2$/min/g mycelium	
		Active	Starved
1.	None (Buffer only)	4·7	1·4
2.	Glucose	10·2	6·5
3.	Fructose	9·8	6·3
4.	Galactose	8·6	2·9
5.	Sorbose	7·5	3.2
6.	Arabinose	4·8	2·7
7.	Xylose	4·9	3·8
8.	Lactose	2·8	1·2
9.	Maltose	6·9	4·4
10.	Sucrose	7·4	4·1
11.	Raffinose	4·9	1·9
12.	Starch	6·1	4·2

important carbon source. When other carbon sources are supplied, only those related to glucose (fructose, mannose) or composed of glucose units with α-1,4 linkage (maltose, starch) are readily utilized by the fungus. Glucose, maltose, and fructose were the best to be oxidised and supported good growth of the fungus, whereas arabinose and xylose supporting poor growth were low in oxygen uptake. Increased rate of respiration with glucose and fructose perhaps indicates that Embden Meyerhoff pathway is operative with the present fungus[12,13]. Lactose supported negligible growth and was not at all utilized. Lactose and its derivative (glucose and galactose) perhaps could not be converted into phosphorylative derivative and thus were unable to enter the main respiratory pathway[14].

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BIODEGRADATION OF PAPER BAGS BY *ASPERGILLUS* AND *MUCOR* SPECIES

IT is of great importance to sterilize papers and paper bags used for the wrapping of many foods notably bread, butter, sugar, fruits and food grains[1]. The problem of spoilage and biodeterioration of the paper bags, which is communicated here, was characterized by the greenish colouration and deterioration of the paper bags and the spoilage was predominant along the line of sealing. In the present study, the biodeteriogens were isolated and the effect of a few of the antimicrobial compounds studied.

For the isolation of biodeteriogens, spoiled paper bags were streaked on Sabouraud's plates. The plates were incubated at 30° C for 72 hrs. The mould cultures obtained were identified. To see the effect of antifungal compounds on *A. flavus*, the mould was grown in the synthetic medium[2] with and without antifungal compounds. The incubation was carried out at 30° C for 7 days, the mycelia were filtered out, dried at 50° C and weighed.

Cellulase was assayed according to the method of Miller[3]. The test system per 2 ml contained: 100 μ Moles of sodium acetate buffer (pH 5·0), 5 mg of CMC, or 10 mg of cotton or filter-paper or brown paper and 0·5 ml of enzyme. The incubation was carried out at 50° C for one hour. The reaction was stopped by boiling the solution for 10 min. after the addition of 1·0 ml of 3-5 dinitrosalicylic acid. Enzyme unit is defined as the amount of enzyme which liberates 1 mg of reducing sugars at 50° C per hour.

TABLE I

Growth and CMCase activity of culture filtrates of different fungal isolates grown in synthetic medium with CMC as a carbon source

Fungus isolate	Growth (dry mycelial weight in mgs, 50 ml medium)	CMCase activity (Units) (Total units/ 50 ml medium)
1. *A. niger*	105	17
2. *A. fumigatus*	55	6
3. *A. flavus*	70	29
4. *Mucor* spp	73	12

TABLE II

Reducing sugars produced from the cellulosic substrates with filtrate of A. flavus, reducing sugar estimated according to the method of Miller[3]

Cellulosic substrate (50 mg/50ml)	Reducing sugars produced (mgs/hr in 50 ml of medium)
1. Carboxy methyl cellulose	30·5
2. Brown paper	31 5
3. Whatman No. 1 paper	12·0
4. Cotton	8·5

TABLE III

Effect of 8-hydroxy quinoline on the growth of A. flavus

8-hydroxy quinoline (μg/flask of 100 ml)	% Inhibition
1. 0·0 (Control)	..
2. 100·0	5·1
3. 250·0	13·1
4. 500·0	29·0
5. 750·0	27·4
6. 1000·0	63·2

Aspergillus niger, *A. fumigatus*, *A. flavus* and *Mucor* spp. were found in the present investigation on the brown paper bags. These moulds showed CMCase activity (Table I). *Aspergillus flavus* was more prominent among the isolates, and was able to grow on brown papers or white stationary papers without supplementation of any nitrogen or carbon source. It showed very active CMCase, cotton activity and filter paper activity (FPA). It could also degrade brown papers when used as cellulosic substrate (Table II).

TABLE IV

Inhibition of CMCase activity of A. flavus *by vitamin* K_3 *and dimethyl formamide* in vitro

Concentration (μg/2 ml)	% Inhibition of CMCase activity with	
	Vitamin K_3	Dimethyl formamide
1. 0·0	..	..
2. 20·0	..	..
3. 40·0	10	13
4. 60·0	12	22·5
5. 80·0	21	34·5
6. 100·0	30	40·0
7. 125·0	36	49·0
8. 150·0	45	53·0

A number of compounds like diphenyl or O-hydroxy diphenyl[4], aldol derivatives, 8-hydroxy quinoline, acetaldehyde and dimethyl formamide[5] have been reported as fungicides and used in the preservation of paper wraps. The effect of one of the fungicides 8-hydroxy quinoline on the isolated *A. flavus* given in Table III indicates that it inhibits the growth of the organism, whereas another fungicide dimethylformamide inhibits both the growth rate as well as CMCase activity of *A. flavus* (Table IV).

It can be seen from the table that vitamin K_3 which inhibits sporulation of *G. musaiam*[6] does not inhibit the growth of *A. flavus* but reduces the CMCase activity (Table IV), suggesting that dimethyl formamide may more conveniently be used for preserving paper bags.

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