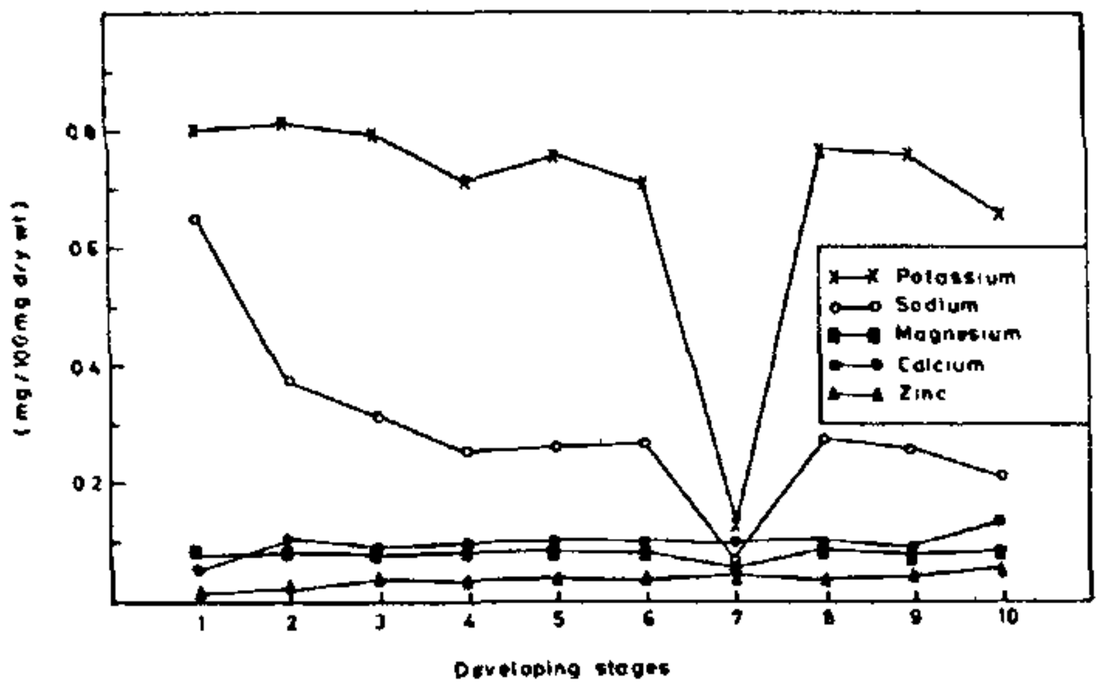

Figure 1. Levels of Sodium, Potassium, Calcium, Magnesium and Zinc during embryonic development of *C. carpio*.
1 = Unfertilized egg, 2 = Blastodisc, 3 = Early morula, 4 = Late morula, 5 = Blastula, 6 = Gastrula, 7 = Closing of blastopore, 8 = Comma, 9 = Eyed, 10 = Prior to hatching (Stages identified at 24°C–26°C).

115–120°. The Na^+, K^+, Ca^{++}, Mg^{++} and Zn^{++} were determined by double beam (AA-575 series) atomic absorption spectrophotometer. The values are expressed as mg/100 mg dry weight.

Changes in the levels of ions at various developing stages are shown in figure 1. High levels of Na^+ and K^+ in unfertilized egg of *C. carpio* are clearly related to holding yolk globulins in solution; the opacity of the egg, due to precipitation of yolk globulins following injury or death, being a natural consequence of exosmosis of electrolytes[4]. Relatively a higher level of Ca^{++} and a marked efflux of Na^+ denote gelation of cytoplasm[5], activation of ATPase[6] and a return to low passive permeability at fertilization[7]. Large scale efflux of Na^+ and K^+ at closing of blastopore is the most significant feature of this study and is visualized to be on account of the release of these ions following extensive degradation of yolk proteins[8]. During comma and eye stages, on the other hand, with the synthesis of a wide array of new proteins and enzymes, uptake of Na^+ and K^+ and the consequent rise in their levels are only too natural. At hatching, however, with the developmental activities at low ebb, there is a slight fall in levels of Na^+ and K^+ and a rise in Ca^{++}, the latter perhaps due to its role in activation of proteolytic enzymes related to hatching.

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SOME NEW RECORDS OF FUNGI CAUSING TURMERIC RHIZOME ROT

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IN recent years fungal infection has been a serious problem[1], in storage in the seed rhizomes centres, like Krishna district (Andhra Pradesh), Tiruchirapalli and Coimbatore districts (Tamil Nadu) and Barua Sagar, Jhansi (UP). Considering that fungal infestation may be initiated in the field itself, freshly harvested rhizome samples were collected from two important centres, Coimbatore (1980) and Barua Sagar (1980–1982) and our studies are reported in this communication.

As much as 21% of rhizomes carried rotting symptoms in the Coimbatore samples, while 18, 16 and 20% disease incidences were noted in Barua Sagar samples of 1980, 1981 and 1982 respectively. This suggests that substantial rotting is initiated in field itself and even if a part of this inoculum is carried to the storage centres, it may lead to spoilage of large number of rhizomes.

Most of the rotted rhizomes were covered by white, grey and pink-coloured mycelia. Some were deshaped and also shrinked. The fungi associated with these rhizomes were isolated following usual mycological techniques after surface sterilization.

Ten fungi were found consistently growing on diseased bits plated on blotter and Czapek's agar plate. These were inoculated on surface-sterilized healthy

Table 1 *Per cent rot at different days of incubation at* $30 \pm 1°C$

Name of Pathogens	Mode of inoculations											
	Knife injury				Pin pricks				Spore suspension			
	PI	7 days	14 days	21 days	PI	7 days	14 days	21 days	PI	7 days	14 days	21 days
Aspergillus flavus	100	2.50	13.38	23.38	100	1.95	3.57	6.00	100	1.40	4.19	9.81
A. niger	100	2.72	15.04	25.04	100	2.23	4.89	7.42	100	1.60	3.88	7.14
A. tamarii	60	1.90	7.80	10.54	100	1.55	4.28	8.80	—	—	—	—
Cladosporium cladosporioides	100	1.65	13.47	22.47	100	1.73	5.02	10.84	100	2.53	7.10	12.52
Cephalosporium acremonium	50	0.00	3.38	8.51	—	—	—	—	—	—	—	—
Drechslera tetramera	60	0.00	3.71	7.10	—	—	—	—	—	—	—	—
Fusarium culmorum	50	0.00	5.20	10.57	—	—	—	—	—	—	—	—
F. nivale	50	0.00	4.40	9.50	—	—	—	—	—	—	—	—
F. oxysporum	60	0.82	7.10	15.20	—	—	—	—	—	—	—	—
Macrophomina phaseolina	100	2.31	18.51	26.85	100	1.73	5.02	10.84	100	2.87	9.88	14.26
Control	—	—	—	—	—	—	—	—	—	—	—	—

PI = per cent infection

rhizomes through knife injury method[2], through pin-prick injury method and through inoculation on uninjured rhizomes following dip in spore suspension (300 spores/ml). The amount of rot[3] and symptoms produced was accounted for and tabulated.

All the ten isolates reproduced rotting symptoms on healthy rhizomes through knife injury method (table 1). *Aspergillus flavus*, *A. niger*, *Cladosporium cladosporioides* and *Macrophomina phaseolina* caused 100% infection and decayed 22 to 26% rhizome tissues after 21 days of incubation. Other six isolates developed infections on 50–60% rhizomes and spoiled 7 to 15% rhizome tissues within the same period. *Aspergillus tamarii* in addition to the above four developed rots through pin pricks, but the intensity of rotting was reduced to just 6 to 10%.

Aspergillus flavus, *A. niger*, *Cladosporium cladosporioides* and *Macrophomina phaseolina* were able to penetrate and establish infection through intact host surface also showing 100% infection and decaying 7 to 14% rhizome tissues. Thus these fungi demonstrated greater virulence potentiality. The avenues created by their infections may also facilitate the infection of other weaker pathogens thereby causing greater losses to this important commodity.

Turmeric rhizome is known to be spoiled by *Sclerotium rolfsii*[1], *Pythium graminicolum*[4] and *Pythium myriotylum*[5] but except for *Aspergillus flavus*[6] the other nine pathogens reported herein have been recorded for the first time to cause rotting of turmeric rhizomes.

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ENDOSPERM IN *HYOSCYAMUS NIGER* L.

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HYOSCYAMUS, commonly known as Henbane and a native to the Mediterranean region and temperate