

Coprophilous Mycoflora on Different Dung Types in Southern Desert of Iraq

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Abstract. — Forty species of coprophilous fungi (34 Ascomycetes, 3 Phycomycetes, 2 Basidiomycetes and 1 Deutromycetes) have been developed in the laboratory on the dung of donkey, sheep and camel collected from the semiarid desert areas of the southern Iraq. Fungal species compositions and their percent frequencies in different dung media together with the type of vegetation on which the above animals grazed have been mentioned.

Introduction

Coprophilous fungi are an artificial group of fungi adapted to life on dung and fecal pellets of herbivore animals. These fungi have developed certain special features which help them to reappear on dung and have adapted to a cyclic relationships between dung-herbage-animal gut-dung in the course of evolution (INGOLD, 1953; WEBSTER, 1970; LODHA, 1974).

The suitability of dung as a medium for fungal activity may be attributed to the fact that these substrates contain large quantities of readily available nutrients such as carbohydrates, high nitrogen content, vitamins, and growth factors (LODHA, 1974; WEBSTER, 1970). Moreover, physical structure of the dung, its PH value and high moisture contents may also contribute to its suitability for such fungi (MORRISON, 1959; LODHA, 1974).

Recent studies on coprophilous microflora (fungi and bacteria) suggested that this group plays an important role in the decomposition of the fecal materials, carbon flow and ecosystem energetics (ANGEL & WICKLOW, 1974) and is also considered as an important source of nutrients for coprophagous and mycophagous arthropodes (HALFTER & MATTHEW, 1971).

Previous contributions to the study of this group in Iraq were made by ABDULLAH & RATTAN (1978); ABDULLAH et al. (1976); AHMED et al. (1970—1971), and ISMAIL & AHMED (1970). However, these contributions were only confined to taxonomical studies.

The present study, however deals with the relationships between coprophilous fungi and fecal substrates of three herbivore animals grazing on a semi-arid desert vegetation in the southern part of Iraq.

Materials and Method

Dungs of three domestic animals in Iraq, namely sheep (*Ovis aries* L.), donkey (*Equus asinus* L.) and one-humped camel (*Camelus dromedarius* L.) were used in this work. Most of the samples were collected between February and May, 1981 from the southern semi-arid desert areas as shown in table 1.

Table 1: Dung Samples Collected from Different Sites of the Southern Desert of Iraq Between Feb., May, 1981

Sites	Number of samples			Total No.
	camel	donkey	sheep	
Um Qasr	—	3	3	6
Zubair	—	2	1	3
North Rumaila	2	6	4	12
Basrah-Nassiriah Road	6	2	4	12
Near Jabal Sanam	2	1	2	5
Ur	4	2	1	7
Samawa	6	4	5	15
	20	20	20	60

Each dung gathering was placed in a clean paper bag in the field, labelled and returned to the laboratory. The dung collections were air dried and stored at room temperature (20—25° C) in covered paper containers. Randomly selected pieces (5 grams dry weight) of each dung type from each collection were placed on sterile filter paper moistened with sterile distilled water in 15 cm Petri dishes and incubated at room temperature. After a few days the samples were examined for the fruiting bodies at $\times 50$ magnification with a dissecting microscope. Longer incubation periods upto 60 days were necessary for certain species to develop their fruiting bodies. From time to time a small amount of sterile water was added to the dishes to keep the dung continually moist. Portions of each collection and slides of each species have been deposited at the Mycological Herbarium of the University of Basrah.

The presence of coprophilous fungi was recorded, based on the appearance of their fruiting bodies. The percentage frequencies for each fungus was calculated as follows:

$$\% \text{ frequency} = \frac{\text{Number of dung samples of a particular animal} \\ \text{On which fruiting body was observed}}{\text{Total number of dung samples of that animal} \\ \text{examined}} \times 100$$

The characteristic of the vegetation in the area studied: Camel, sheep and to a lesser extent donkey are the important

animals which are usually grazing on the southern desert shrub vegetation. The plant cover is dominated by *Rhanterium epapposum* — *Haloxylon salicornium* community with other important species such as *Artemisia herba-alba*, *A. scoparia*, *Salsola rigida*, *S. vermiculata*, *Achillea fragrantissima*, *Haloxylon articulatum*, *Astragalus spinosus*, *Teucrium polium*, *T. oliverianum*, *Zilla spinosa*, *Zizyphus nummularia* and *Poa sinaica* (GUEST, 1966; WEINERT & AL-HILLI, 1975; THALEN, 1979). Most of the above mentioned species were listed by SERKAHIA (1956) and KERNICK (1966) as good grazing plants.

Results and Discussion

In the present study, 40 species of fungi have been found fruiting on fecal samples in moist chambers at room temperature (Table 2). The majority of them belong to Ascomycetes (34 species) followed by Phycomycetes (3 species), Basidiomycetes (2 species) and Deuteromycetes (1 species). The highest number (32 species) were found associated with sheep and donkey dungs followed by 14 species on camel dung. The result have shown that there is a high species diversity among coprophilous fungal populations on a desert shrub vegetation. Similar results were found by ANGEL & WICKLOW (1975) on coprophilous fungi associated with fecal substrates in a semiarid grassland in Colorado.

LUNDQVIST (1972) pointed out that there is a positive association between forest-dwelling animals and certain coprophilous fungi.

In the present study a group of fungi such as *Ascobolus immersus*, *Iodophanus carneus*, *Chaetomium circinatum*, *C. spirale*, *Podospora decipiens*, *P. prethopodiales*, *Kernia nitida*, *Sordaria fimicola*, and *Mucor sp.* have been found on all types of dung examined and with high frequencies. Most of these species have also been reported to occur on a wide range on dung substrates by PARKER (1979), ANGEL & WICKLOW (1975), RICHARDSON (1972) and LUNDQVIST (1972).

In this study a group of fungi such as *Podospora longicaudata*, *Sordaria humana*, *Sporormiella teretispora* and two *Coprinus sp.* were found confined to donkey dung while *Lophotrichus brevirostratus*, *Podospora inaequalis*, *Podospora communis*, *Sporormiella intermedia*, *S. pulchella* were found resitricted to sheep dung.

Coprophilous mycofloras on camel dung are rather poorly known, because they are only rarely collected and studied. This study has shown that 14 species of coprophilous fungi were found in association with this substrate. The fewer number of species encountered on this substrate are probably reflections of physicochemical nature of this substrate or due to the fact that certain plant species are preferred by the sheep and donkey as valuable grazing plants which are probably not grazed by the camels. *Zygopleurage faiyumensis* was found only on camel dung in this study. LUNDQVIST (1969) and ABDULLAH &

Table 2: Percentage Frequencies of Coprophilous Fungi Occurring on Three Different Types of Dung

Coprophilous fungi	% frequencies on dung of		
	sheep	donkey	camel
Ascomycetes:			
<i>Ascobolus crenulatus</i> KARST.	15	5	—
<i>Ascobolus immersus</i> PERS. ex PERS.	85	80	60
<i>Ascodesmis microscopica</i> (CROUAN) SEAVER	10	65	—
<i>Ascodesmis porcina</i> SEAVER	5	60	—
<i>Ascophanus lacteus</i> (COOKE & PHILL.) SACC.	10	10	—
<i>Chaetomium bostrychodes</i> ZOPF	25	30	—
<i>Chaetomium circinatum</i> CHIVERS	15	5	5
<i>Chaetomium globosum</i> KUNZE ex FRIES	30	30	—
<i>Chaetomium murorum</i> CORDA	15	5	—
<i>Chaetomium olivaceum</i> COOKE & ELLIS	15	5	—
<i>Chaetomium spirale</i> ZOPF	45	30	15
<i>Coprotus duplus</i> KIMBROUGH, LUCK-ALLEN & CAIN	5	10	—
<i>Iodophanus carneus</i> (PERS. ex PERS.) KORF	15	20	5
<i>Iodophanus</i> sp.	—	15	25
<i>Kernia nitida</i> (SACC.) NEIUWL.	30	35	5
<i>Lasiobolus</i> sp.	10	25	—
<i>Lophotrichus brevirostratus</i> AMES	5	—	—
<i>Podospora communis</i> (SPEG.) NIESSL	5	—	—
<i>Podospora decipiens</i> (WINTER) NIESSL	5	10	15
<i>Podospora inaequalis</i> (CAIN) CAIN	10	—	—
<i>Podospora longicauda</i> (GRIFF) CAIN	—	5	—
<i>Podospora prethopodialis</i> CAIN	5	15	10
<i>Saccobolus depauperatus</i> (BERK. & BROOME) E. C. HANSEN	5	35	—
<i>Saccobolus minimus</i> VEL.	5	30	—
<i>Sordaria fimicola</i> (RAB.) CES. & DeNOT.	5	45	20
<i>Sordaria humana</i> (FUCKEL) WINTER	—	35	—
<i>Sporormiella australis</i> (SPEG.) AHMED & CAIN	15	—	5
<i>Sporormiella commutata</i> (NIESSL) AHMED & CAIN	5	15	—
<i>Sporormiella intermedia</i> (AUERSW.) AHMED & CAIN	50	—	—
<i>Sporormiella minima</i> (AUERSW.) AHMED & CAIN	45	—	25
<i>Sporormiella pulchella</i> (HANSEN) AHMED & CAIN	10	—	—
<i>Sporormiella teretispora</i> AHMED & CAIN	—	15	—
<i>Tripterospora erostrate</i> (GRIFF.) CAIN	5	10	—
<i>Zygopleurage faiyumensis</i> LUNDQ.	—	—	5
Basidiomycetes:			
<i>Coprinus</i> sp. I	—	30	—
<i>Coprinus</i> sp. II	—	35	—
Phycomycetes:			
<i>Pilobolous kleinii</i> van TIEGHEM	—	65	10
<i>Pilaria</i> sp.	5	20	—
<i>Mucor</i> sp.	10	15	5
Deuteromycetes:			
<i>Aspergillus candidus</i> LINK	5	10	—

RATTAN (1978), however, have recorded this species on a variety of animal dung including that of sheep and donkey.

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