PART I - GENERAL

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C H A P T E R I

INTRODUCTION

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Introduction :

Maharashtra is one of the major state in India. It forms a part of the Western zone of the country and occupies a area of 306345 sq.kms. Almost the entire area is within the limits of the Deccan trap.

The State is divided into three parts viz.

1) Western Maharashtra
2) Marathwada
3) Vidarba. Western Maharashtra is again divided into three parts i.e.

1) Coastal Konkan area
2) Ghat and
3) Desh, because of the Western Ghat and Sahyadri ranges travesing this area more or less parallal to the West. Geography, climate, vegetation of the state have been discribed in detail by Arunachalam (1967) and Deshpande (1971). The present study is confined to the south Western part of Maharashtra. The area under study includes Satara, Sangli and Kolhapur districts. Among these three districts, the Kolhapur districtis extremely south ward of the Maharashtra and situated between 15° and 17° N.latitude and 73° and 74° E longitude. The total area of district is 8257 sq.kilometers.

Physiographically the area is divided in to 1) Central part (2) Western part and (3) Eastern part.

The soil nature,rainfall and vegetation of these area differ.

Extensive work on taxonomy of fungi have been carried out by various workers viz. Thirumalachar,Kamat,Kulkarni,Chiddarwar, Tilak,Patwardhan,Sathe,Rao,Pande,Annanthanarayana,Sheshadri, Patil,Srinivasan,Tendulkar,Anhosur,Kalani,Muthappa,Thite,Chavan, Jagtap,Kulkarni et al. Their work is mainly confined with the fungi on variety of substrata such as leaves,stem,Soil,decaying material,Nematodes,insects etc. except dung as substratum. No body have paid attension towards coprophilous fungi (except few workers like Kulkarni and Kelkar etc). Therefore,present investigation is concerned with coprophilous fungi from Maharashtra.

Coprophilous fungi means dung loving fungi. Dung is nutrition rich substratum containing carbohydrates,starch,lignin, cellulose, vitamins and other soluble chemicals. These fungi can be easly studied by collecting the dung samples,either fresh or dried,incubating in petridishes lined with moist filler paper or under bell jar depending upon the size of the sample. The period of incubation is different in different samples but generally kept for observation in laboratory about 1-6 weeks in duplicate or triplicate. Daily careful observation of each sample under the binocular or with the help of magnifying glass carried out to observe the growth of the organisms on or in the dung. Fungi of different groups generally show definate succession of growth.

Nutritional hypothesis of Burger (1939,1958) and Garrett (1950,1951,1956) is a base of an explanation of the succession in fungi growing on dungs. Because of the apparent inability of the phycomycetes (Mucorales) to break down cellulose, it is believed that they depend for growth on soluble carbohydrates such as sugars. It is, therefore, held that the early phase of colonization of substrata is by sugar fungi (Mucorales). The capacity to decompose cellulose is well-established amongs the Ascomycetes and Deuteromycetes (Cochrane, 1956) and believed that when the soluble materials are exhausted, the Ascomycetes dominate the substratum. They in turns are succeeded by the Basidiomycetes due to well known for their capacity to decompose lignin and cellulose.

Spores of many coprophilous fungi are stimulated to germinate by digestion. Page (1952) showed that Pilobolus grows best when fatty acids are the carbon source and that pentose and hexose by comparison are poor carbon sources. Lenz and Church (1967) have shown that degradation of lignin can actually occurs within the gutt of the rabbit. Carter (1959) reported that after four weeks there was still an adiquate nutrient level in rabbit pellets to support growth and fruiting of mucorales and it would therefore seem likely that competation for nutrients by other members of the dung microflora or the production of chemicals, might be important in limiting their fruiting span.

Many coprophilous fungi are cosmopolitan in their distribution. Webster (1970) remarked how catholic they are in terms of substrate requirements. There occurrance or absence on any perticular sample seems to be depend greatly on the nature of the substrate with which the spores are vioded. These factors are of importance, the physical nature of the dung, its consistancy, its moisture content and its moisture holding capasity, the chemical nature of the dung, the other organisms which develop on and in it.

The dispersal mechanism of many of coprophilous fungi suggest a cyclic relationship between dung → herbage → animal gut → dung, i.e. they show enterophilous dispersal (Parker & Rhodes, 1950). Dispersal occurs by three ways i) By animal themselves (ii) By air borne and (iii) By the dispersal of spores attached to feeding stuff such as hay diet of herbivorous animal is loaded with an enormous variety of fungal spores, yet few of these fungi fruit on dung. Spore must be indigested for normal development to occur (Buller 1931). Spores of many coprophillous fungi do not germinate readly when placed on to nutrient agar.

Dormancy of fungus spores are of two type (Sussman, 1965): 1) exogenous dormancy (2) constitutional dormancy. Both type of dermancy are represented amongst coprophilous fungi. Dormancy may also be affected by the age of spore (Gamundi & Ranalli 1964,66).

The spores of some coprophilous fungi are stimulated to germinate by biological activation (Baden, 1915).

Mc, Teague Hutchinson and Reed (1959) and Losel showed that the spores of Agaricus bisporus could be stimulated to germinate by living mycelium or by volatile products either from its own mycelium or from other mycelium of other fungi. Temperature of the gut of warm blooded animal is about 37°C and this spores of many coprophilous fungi must be capable of surviving this temperature for period varing from a few hours up to about 3 days.

Dung is an extremely complex substratum containing in addition to the masticulated remnants of the ingested herbage, the remains of a treeming microbials population (Hungate, 1966). The microbes from an important source of nitrogen. Many Micro-organisms are capable of synthesis of water soluble vitamins so that dung contain a rich supply of growth factors. The nitrogen content of dung is high may be over 4% (Lambourne and Reordon, 1962). Another some what unusual feature of dung as a substate for fungal growth is that its pH is high. Most investigators give value about 6.5 (Fries, 1956; Harper, 1962). Dung substrate contain large quantities of readily available nutrients such as carbohydrates, nitrogen, vitamins, and growth factors (Lodha, 1974 and Webster, 1970).

Fungi play an important role in decomposition of the

faecal materials, carbon flow and ecosystem energenties (Angel Wicklow, 1974) and is also considered as an important source of nutrients for coprophagus and microphagus arthropods (Halfter and Matthew, 1971).

Lundqvist (1972) pointed out that there is posible association between forest dwelling animals and certain coprophilous fungi like Idophanus, Corneus, Ascobolus, etc.

Some coprophilous fungi apparently grow and fruit best in the presence of other micro-organisms. Pilobolus Kleinii fruits better in the presence of Mucor plumbens and this has been shown to be due to the release of ammonia by the Mucor (Page, 1959, 1960). Another growth factor present in dung and required for growth and fruiting of Pilobolus has been named Coprogen (Hesseltine et al., 1953).

Soluble & insoluble substances or a balance between the various components present influence the growth and fruiting of coprophilous fungi. Page (1959, 1960) shown that ammonia stimulated sporengial formation in Pilobolus and the release of ammonia by Mucor plumbens can stimulate sporengial production. Coprogen, the growth factor needed by Pilobolus for fruiting is produced by various bacteria.