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COURSE TITLE: MICROBIAL ECOLOGY

COURSE CODE: MCB 308

ASSIGNMENT: AS A MICROBIAL ECOLOGIST DISCUSS THE VARIETY OF DIVERSE ANALYTICAL TECHNIQUES YOU WILL EMPLOY TO UNDERSTAND THE CRITICAL ROLE OF MICROBES IN SPECIFIC ECOSYSTEMS AND IN MAINTAINING LIFE ON EARTH.

**Question**

As a microbial ecologist discuss the variety of diverse analytical techniques you will employ to understand the critical role of microbes in specific ecosystems and in maintaining life on earth.

**Answer**

* **SUCCESSION OF MICRO-ORGANISMS ON CELLOPHANE FILM**

Tribe (1960) studied the colonization and breakdown of cellophane film (pure regenerated cellulose). The breakdown of cellophane buried in a number of soil was studied. Though variations existed in the soil type, a general pattern of colonization was observed. The colonizers were fungi and out of these, based on morphological and vegetative character, three (3) classes was identified.

1. Those characterized by coarse mycelium which ramifies through the surface of the cellophane and rapidly initiate decomposition by lysis cellulose adjacent to their hyphae. Such fungi are mostly in the form genus Rhizoctonia and were clearly cellulolytic and dominant species at that stage.
2. Members of the second group are mostly species of the well know cellulolytic genera e.g. Chactomium species and Humicola species which exist as co-dominants. These fungal did not ramify extensively with the cellophane but rather they penetrated the thickness at scattered sites by means of rooting hyphae which then branches to form a kind of circular hyphal system.
3. The third group consists of chytrids which develop on the cellophanes pieces. At this stage, the cellophanes are no longer intact but in pieces.

The presence and activities of the initial colonizers (pioneer community) were obviously related to their ability to produce ’’cellulases’’. Though, other factors must have been involved because the soil contains other cellulolytic organisms which rarely appear on cellophane. Bacteria are relatively uncommon during this initial stage of fungal attack. During mycelium senescence however they rapidly increase and presumably utilize either materials diffusing from the hyphae or hyphae itself.

2. The second colonizers are the bacteria. In turn bacteria support a population of nematodes and protozoa. After the micro-organism have colonized cellophane/cellulose, mites, springtails and other worms become active and the substrate becomes unrecognizable by their passage through the guts of these organisms. Cellophane decomposition therefore involves a wide range of micro-organisms and small animals whose occurrence depends on nutrient availability.

* **SUCCESSION OF MICRO-ORGANISMS ON DUNG**

If a freshly dung is placed on a bell jar and a fairly suitable humidity is maintained, a succession of fungal fruitfications can be observed. The first to appear are the Zygomycetes followed by the Ascomycetes then the Basidiomycetes. Each group has been considered to represent sugar, cellulose, and lignin utilizers respectively.

Haper and Webster (1964) while confirming the sequence have shown that it is not a succession based on nutritional factors. They grew a number of fungi involved under a variety of conditions and showed that each group had a characteristic minimum time before commencement of growth and appearance of fruiting bodies. If the fungi are listed in the order based on minimum time, the sequence is also found to be the same as on dung.

According to these author, the succession of fruiting bodies on dung is connected with the duration of necessary developmental periods rather than different assimilatory abilities.

* **SUCCESSION OF MICRO-ORGANISMS ON STERILE HAIR**

Griffin (1960) made a sequential study of sterile human hair placed on the surface of various soils. In general, his observation showed that the first colonizers where fusarium species, penicillium species and some Mucorales. These species rely on simple sugars. The second group of colonizers include chaetomium cochloides, Humicola species Gilocladium roseum and penicillium species. The first two cellulolytic while the last two are polysaccharides users.

The third group are keratinolytic members of Gymnoascaccae which are mainly Ascomycetes. In this case, succession is based on nutrition. This is more clearly shown in the late predominance of species utilizing the most resistance component of the subtract (keratin).