CHAPTER IX

GENERAL DISCUSSION AND CONCLUSIONS
Leaves are the chief centres of activity which discharge various physiological functions in the chlorophyllous plants. Carbohydrates being the chief metabolic products of the photosynthetic plants, have special importance in the nutrition of disease causing organisms. Inside host they exist in two states : (1) simple and (2) complex forms. The food of the first category is assimilated as such and the pathogens have not to strain on that account while the utilization of complex substances is accomplished by only those micro-organisms which can satisfactorily break them (Tandon, 1963).

Nutrition is one of the most important factors which influence the growth and sporulation of fungi. In order to understand the general behaviour of fungi, it is essential to know about their nutritional requirements. Nutrition is not a simple process as it is largely affected by both physical and chemical factors. The available nutrients also form an important part of the environment. The conditions provided by the host constituents are therefore, in no way less prominent than other factors in influencing the life of a pathogen.

The optimum pH values for Pestalotia sapotae and P. versicolor were found to be the same. These similarities in their pH requirements might be due to the adaptation to similar, if not the same, external conditions.

The utilization of monosaccharides by fungi is usually direct and does not involve any molecular breakdown.
Failure to utilize monosaccharides has been referred to the structure and configuration of the sugar or the lack of enzyme necessary for its phosphorylation (Lilly & Barnett 1953). It was found that both the fungi could grow and sporulate satisfactorily on all the carbon compounds tested except malic acid. Cirillo (1951) on the other hand found that if glucose, mannose and xylose were taken singly in the medium their utilization was almost immediate, but in mixtures these monosaccharides were utilized in the order mannose, glucose and xylose. It has been postulated that such a preferential utilization of substrates in mixtures is a competition for the specific carrier systems.

Oligosaccharides are complex sugars composed of two or more monosaccharide units linked together through a glycosidic linkage. Their utilization either involves the hydrolysis or the phosphorylation of the glycosidic bond; both these reactions are catalysed by specific enzymes. The direct assimilation of disaccharides although rare, has also been reported by Smith (1949), Mandels (1954), Tandon (1961), Chandra (1961), Hasija (1965) and Sahni (1966). The present results show that lactose was utilized directly by Pestalotia sapotae and F. versicolor, while sucrose, maltose and raffinose were first hydrolysed into their component sugars and then utilized. On maltose Pestalotia versicolor gave better growth than on glucose.
(its hydrolytic product). A simultaneous synthesis of an oligosaccharide, maltotriose, was also observed in this case. Such synthesis of oligosaccharides during the assimilation of maltose is known (Tandon & Bilgrami, 1957, 59; Wilson, 1960; Sehrotra & Agnihotri, 1961; Sam Dayal, 1961; Agnihotri, 1964; Vasija, 1965). Tandon & Bilgrami (1957) have attributed better growth on maltose than on glucose (its constituent sugar) to the maltotriose which probably plays an important role in making maltose a better source of carbon. According to Tandon (1961) the superiority of the maltose over glucose is due to the transglycosidation, which also causes the replacement of glycosidic bonds along with its hydrolysis and this results in the synthesis of oligosaccharides as intermediates during assimilation. The present findings support his view, as \textit{E. versicolor} which was able to synthesize on oligosaccharide during assimilation of maltose gave better yield on it than on glucose while \textit{E. sakatae}, which could not synthesize oligosaccharide, grew well on glucose than on maltose.

The dry weight yield was better on the mixture of hydrolytic products than on oligosaccharides alone. Good growth on mixed carbon source may be explained in part by the induction of new enzymes and availability of the sugars right from the beginning (Cochrane, 1958; Chandra, 1961).
Both the fungi showed diverse responses towards the various sources of nitrogen. Nitrites are generally utilized by fungi after reduction to ammonia (Netrajan, 1958; Cochrane, 1958).

The steps involved are

\[ \text{NO}_3 \rightarrow \text{NO}_2 \rightarrow \text{NH}_2\text{O} \rightarrow \text{NH}_3 \]

(nitrate) (nitrite) (hydroxylamine) (ammonia)

Since nitrite is an intermediate product in the pathway of nitrate utilization, the fungi which are able to grow on nitrites should also grow on nitrites, but in the present investigations it was not found so. Failure to utilize nitrite has been explained on the basis of their known toxicity in acid range. According to Cochrane & Guan (1936) and Card & Full (1945), the nitrites are usually in the form of undissociated nitrous acid which produces inhibiting effect on the growth, especially in the acid range. The ability of a fungus to utilize nitrate or nitrite may be attributed to the presence or absence of necessary enzymes or inability to synthesize the specific transport system to carry it across the cell membranes for utilization.

In general the poor growth on ammonium nitrogen is due to the sharp fall in pH of the culture medium which becomes strongly acidic. The present findings indicate
that ammonium oxalate and ammonium tartarate supported poor growth of _F. versicolor_ and _L. sapotae_ even though the final pH was towards alkaline side. These results agree with those of Tandon (1951) who has stated that during the utilization of ammonia when oxalates or tartarates are used instead of chlorides or sulphates the final pH does not drop down.

Amino acids are generally utilized directly (Scott, 1952), but certain fungi probably deaminate them before assimilation (Lilly & Barnett, 1951).

According to Yemm & Folkes (1955), a striking feature of the study of amino acid metabolism in recent years has been the recognition of "families" of closely related amino acids, viz.,

1. "Glutamic" (Glutamic acid, glutamine, proline and arginine).
2. "Aspartic" (Aspartic acid, asparagine, methionine, threonine and isoleucine).
3. "Pyruvic" (alanine, valine and leucine).
4. "Aromatic" (Typtophane, tyrosine and phenylalanine).
Wolf (1947) has stated that amino acids are probably the first to be utilized since they can be assimilated for the synthesis of proteins with the least need for energy. The efficiency with which an amino acid is utilized depend on its configuration and the synthesis of necessary enzyme by the organism.

The behaviour of various sulphur compounds varied with the organisms tested.