CARBON REQUIREMENT OF *HENDERSONULA TORULOIDEA* NATTRASS

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(*Received* 11 *February* 1969 ; *revised* 6 *June* 1969)

Effect of 8 different carbon compounds on the growth of *Hendersonula toruloidea* Nattrass, that causes brown rot of fruits of *Malus sylvestris* Mill has been studied. Galactose was the best ; maltose, glucose, sucrose and fructose also supported good growth. Growth was moderate with glycerol and lactose but poor with starch.

Literature is available to show that almost half of the dry weight of fungal cell consists of carbon[1]. Carbon compounds are important in fungus nutrition[1,2] although Schade[2], Schade & Thiamann[3], Skoog & Lindegren[4] and Cheo[5] found that fungi could grow without a carbon source. Some fungi utilize monosaccharides while others readily grow on disaccharides[6,7].

The present investigation deals with the effect of different carbon compounds on the growth of *H. toruloidea* Nattrass, an organism that causes brown rot of fruits of *M. sylvestris* Mill.

MATERIALS AND METHOD

Single spore culture of *H. toruloidea* isolated from diseased fruits of *M. sylvestris*, was maintained on potato-dextrose-agar medium. Richard's medium containing 10·0 g KNO_3, 5·0 g KH_2PO_4, 2·5 g $MgSO_4$ (dehydrated), 0·01 g $FeCl_3$, 50 g. Sucrose and one litre distilled water was used as basal medium. Various carbon compounds, namely *d*-glucose *d*-fructose, *d*-galactose, lactose, sucrose, maltose, starch and glycerol were substituted for sucrose in the basal medium. Fifteen ml nutrient medium was taken in Erlenmeyer flasks (cap 150 ml) and was autoclaved at 15 lb/sq in. for 15 minutes. The *p*H of the medium was adjusted at 5·0 before autoclaving. The inoculation was done with one ml spore suspension of the fungus and incubated for 15 days at 28±2°C. The mycelial mat was harvested on Whatman's filter paper No. 41. Three replicates were taken in each case. The degree of sporulation was recorded on the basis of visual observations, viz., excellent, good, fair and poor.

OBSERVATIONS

Table 1 gives the dry weight of the mycelium after 15 days. It is evident from Table 1 that organism is unable to grow and sporulate on the media lacking carbon and grows best on galactose. Maltose, glucose, sucrose and fructose support good growth; glycerol and lactose, moderate growth while growth on starch was poor.

TABLE 1

AVERAGE DRY MYCELIUM WEIGHTS AND SPORULATION OF H. *Toruloidea* ON DIFFERENT CARBON SOURCES

Carbon compounds	Dry weight (mg)	Sporulation
d-Galactose	6661	Excellent
Maltose	5815	Good
d-Glucose	525	Fair
Sucrose	440	Good
d-Fructose	416	Fair
Glycerol	290	Good
Lactose	266	Poor
Starch	240	Poor
Control (no carbon)	000	
General Mean	380·88	

S. E. 58·00; C. D. at 5% level P 121·85

1 2 3 4 5 > 6 7 8 > 9

DISCUSSION

Carbohydrates are the common source of carbon for fungi. The variation of growth due to different carbon compounds may be attributed to differences in permeability of cell wall or to presence or absence of specific enzyme necessary for the respiratory steps followed by that compound during its assimilation[8]. It is evident from the present investigation that the organism was able to utilize galactose, maltose, glucose, sucrose, fructose, glycerol, lactose and starch when they were replaced separately as carbon sources in the basal medium. Galactose gave the optimum growth. Galactose is also reported to be a good source of carbon by Grewal[9], Misra & Mahmood[10] working with *C. capsici*, Wolf[11] for *Ustilago zeae*, Horr[12] for *Aspergillus niger* and Saksena[21] for *G. cingulata*. However galactose was found unsatisfactory for the growth of organisms studied by Lilly & Barnett[1], and Hawker[13]. Srivastava[20] also recorded slow growth of *A. tenuis* on galactose. These investigators believed that poor growth on galactose was due to structural configuration. The other possibility may be that organism takes time to adapt itself to this sugar.

Maltose, glucose, sucrose and fructose also supported good growth of the present fungus except lactose. These sugars were also reported to be good sources of carbon by Grewal[9]. Maltose was significantly better than other disaccharides. Tandon & Chandra[14] found that maltose and sucrose were good supporters of growth of *C. gloeosporoides*, *Cercosporina ricinella* and *Curvularia penniseti*. Margolin[15] found *Phytophthora cactorum* and *Pythium ascophallon* failed to grow on maltose. Maltose, glucose and sucrose were readily utilized by the present organism as it is believed that the hydrolytic enzymes such as invertase in case of sucrose and 'Maltase' in case of Maltose were available in the fungus[16]. Lactose was the poor source of carbon probably because (lactase) was not produced by the fungus as is reported by Tandon & Bilgrami[16] in case of *Phyllosticta cycadina*, *P. atrocarpina* and *Pestalotia mangiferae*, Saksena[21] in case of *G. cingulata*, Cantino[17] in case of *B. pringsheimi* and Srivastava & Saksena[19] in case of *C. gloeosporoides* penz. and Margolin[15] in case of *S. racemosum*.

Glycerol was also a good source for the present organism. Grewal[9] working with *C. phomoides*, *C. lindemuthianum* and *A. tenuis* Srivastava & Saksena[19] in case of *C. gloeosporoides* also regarded it as a good source of carbon. In present investigations starch is found to be the poorest source of carbon giving least growth of the fungus. Kakeura[18] also recorded non-utilisation of starch in case of *S. libertiana* but Srivastava & Saksena[19] recorded optimum growth of *C. gloeosporoides* penz. on starch.

ACKNOWLEDGEMENTS

Thanks are due to Professor R. C. Mathur, Head of the Botany Department, D. A. V. College, Kanpur for providing facilities for the present investigation.

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