

STUDIES ON THE PHYSIOLOGY OF SOME FUNGI
CAUSING HUMAN MYCOSIS : II. EFFECT OF DIFFE-
RENT CARBON SOURCES ON GROWTH OF
TRICHOPHYTON MENTAGROPHYTES (ROBIN)
BLANCHARD. AND *ASPERGILLUS FUMI-
GATUS* (FRESENIUS) THOM AND
CHURCH.

By

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Trichophyton mentagrophytes (Robin) Blanchard. and *Aspergillus fumigatus* (Fresenius) Thom and Church. have been found to cause skin and nail diseases of human respectively. The present study provides information about the role of different sources of carbon as a nutritional factor on growth of both the fungi. To evaluate the role of carbon on the growth of the test-fungi, different sources of carbon have been used. Of these, glucose has been found to be the best source of carbon for growth which is followed by sucrose and maltose.

INTRODUCTION

A detail knowledge of physiology of the parasites is necessary for the eradication of the diseases concerned. Uptil now, very negligible works have so far been done on this line of research. Hence in the present investigation, the role of different carbon sources on the growth of two pathogenic fungi causing human mycosis has been recorded. Of these one is *Trichophyton mentagrophytes* causing skin disease and the other one *Aspergillus fumigatus* causing nail degeneration of the big toe of leg.

The fungi are known to utilise a wide range of natural organic compounds including those of great complexity for the synthesis of structural and functional compounds and as sources of energy. Though some of them utilise chemically complex carbon containing compounds for growth, yet others are selective in their requirements.

MATERIAL AND METHODS

Both the fungi have been isolated aseptically from the two patients and maintain in *Sabouraud Glucose Agar* medium at 30°C.

Glucose-Asparagine basal medium (Lilly and Barnett, 1951) has been selected for the present study.

The basal medium has been first prepared without any carbon source. After preparation the following sources of carbon have been separately added to each medium in several conical flasks. The sources of carbon used in this experiment are glucose, sucrose, maltose, lactose and starch. The sources of carbon have been added in three different concentrations viz., 2.5, 3.0 and 3.5%. The media thus prepared have then been properly plugged and sterilized at 15 lb pressure for 15 minutes. The culture vessels have been inoculated with the spore suspension of the two respective test-fungi separately and incubated at 37°C under diffused light. The pH of the medium has been adjusted to their respective optimum pH by N/15 phosphate buffer. Several flasks with the medium but without any carbon source have been kept as control.

Sufficient number of flasks have been incubated to provide five replicates for each treatment for 20 days. The length of incubation period, necessary for optimum growth for each treatment has been predetermined by running a series of experiments. Every fourth day, five replicates of each treatment have been harvested five times and after drying the mycelia at 60°C for 24 hours the weight was noted.

RESULTS

The results obtained during the experimental periods are given in Tables 1-3. It is evident that glucose is the best source of carbon for growth of *Trichophyton mentagrophytes* followed by sucrose, maltose, starch and lactose. In case of *Aspergillus fumigatus*, the optimum source of carbon for growth is glucose. It is being followed by sucrose, starch, maltose and lactose. Of the different concentrations used, 3.5% is undoubtedly the best source for all the sources of carbon for both the test-fungi except in case of Lactose, it is 3% for *Aspergillus fumigatus*. It has been found that all the sources of carbon have a stimulatory effect on the growth of both the test-fungi.

Table 1. Data (mean) showing the effect of different carbons on the growth of the two test-fungi at different incubation periods.

Sources of Carbon	Concentration of Carbon (%)	Fungi		Carbon (T) means
		<i>T. mentagrophytes</i>	<i>A. fumigatus</i>	
Glucose	2.5	125.9	172.2	149.0
	3.0	137.8	191.6	164.7
	3.5	167.8	207.6	187.7
Starch	2.5	121.8	162.0	141.9
	3.0	142.6	186.2	164.4
	3.5	170.8	194.9	182.8
Sucrose	2.5	97.0	138.4	117.7
	3.0	115.6	151.6	133.6
	3.5	176.8	191.2	184.0
Maltose	2.5	102.2	157.4	129.8
	3.0	124.8	169.0	146.9
	3.5	141.4	214.6	178.0
Lactose	2.5	50.4	48.6	49.5
	3.0	84.0	105.6	94.8
	3.5	95.2	99.6	97.4
Control		24.6	26.8	25.7
Fungus (F) means		117.4	151.09	

S.E. for F means = ± 0.01

S.E. for T means = ± 1.44

S.E. for F \times T means = ± 2.25

C.D. for F means at 5% of P = ± 0.028

C.D. for T means at 5% of P = ± 4.16

C.D. for F \times T means at 5% of P = ± 6.50

Table 2. Data (means) showing the role of different incubation periods on the effect of carbons on the growth of the two test-fungi.

Incubation Periods (Days)	Fungi		Incubation days (I) means
	<i>T. mentagrophytes</i>	<i>A. fumigatus</i>	
4	94.3	122.4	108.4
8	109.8	143.9	126.9
12	150.1	190.7	170.4
16	124.6	157.3	141.0
20	108.1	141.0	124.5
Fungus (F) means	117.4	151.09	

S.E. for I means = ± 0.03

S.E. for F \times I means = ± 1.36

C.D. for I means at 5% of P = ± 0.086

C.D. for F \times I means at 5% of P = ± 3.930

Table 3. *Data (mean) showing the role of different carbons on the effect of incubation periods on the growth of the two test-fungi.*

Sources of Carbon	Concentration of Carbon (%)	Incubation periods (days)					Carbon (T) means
		4	8	12	16	20	
Glucose	2.5	125.5	146.0	191.8	152.0	135.0	149.1
	3.0	145.5	166.0	211.5	159.8	140.8	164.5
	3.5	162.0	194.0	242.5	181.0	159.0	187.1
Starch	2.5	118.5	133.5	168.5	150.0	139.0	141.3
	3.0	131.5	152.5	200.5	176.5	161.0	164.4
	3.5	147.0	175.5	230.0	191.5	170.3	182.2
Sucrose	2.5	101.0	112.5	142.0	122.0	111.0	117.4
	3.0	113.0	120.5	166.5	143.0	125.0	133.2
	3.5	150.0	166.5	225.5	198.5	179.5	184.4
Maltose	2.5	114.0	129.5	161.0	127.5	117.1	129.2
	3.0	133.5	144.0	175.1	150.0	132.0	146.1
	3.5	154.0	175.5	212.6	189.5	158.5	178.4
Lactose	2.5	25.5	35.5	77.0	60.1	49.5	49.6
	3.0	42.5	80.0	139.0	111.0	101.5	94.2
	3.5	62.0	79.5	139.0	111.5	95.0	97.2
Control		9.1	24.5	44.0	32.0	19.0	25.1
Incubation days (I) means		108.4	126.9	170.4	141.0	124.5	

S.E. for I×T means = ±3.84 C.D. for I×T means at 5% of P = ±11.09

DISCUSSION

A study on the responses exhibited by both the test-fungi under different carbon sources makes it possible to discuss, in a general way, some of the salient features regarding the relation of carbon sources and these fungi.

After evaluating the role of different sources of carbon on the growth of both the test-fungi it has been found that glucose is the best source of carbon among the sugars used. It is being followed by sucrose and maltose in succession. Starch and lactose have moderate stimulatory effect on both the test-fungi. Dasgupta and Shome (1959) have also reported that glucose is the optimum source of carbon for the growth and sporulation of the dermatophytes. Shome

(1959) has further noted that glucose has also the stimulatory role on the pigmentation of the dermatophytes. Of the different concentrations used (2.5, 3.0 and 3.5%), 3.5% has been found to be the best concentration in all the cases.

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