

EFFECT OF DIFFERENT CARBON SOURCES ON GROWTH OF *HEXAGONIA POLYGRAMMA* MONT.

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In order to find out the role of carbon on growth of the test-fungus different sources of carbon including sugars and organic acid were used. The experiments with organic acids were abandoned due to poor responses by both the types of mycelia of the test fungus. Of the sugars, glucose is the best source and is followed by maltose, sucrose and laevulose in succession.

INTRODUCTION

Carbon is known to be one of the essential elements required by fungi for their nutrition of several compounds and as source of energy. Some fungi utilize chemically complex carbon-containing compounds for growth, while others are selective in their requirements. A great variety of amino-acids, organic acids, sugars and their derivatives, alcohol and other more complex organic compounds have, so far, been treated as the sole sources of carbon in the medium for growth of fungi. Glucose has been considered to be the universal source of carbon for growth of fungi. Some wood-rotting fungi have been found to decompose cellulose (Campbell, 1932 ; Lindeberg, 1946). Blumer and Schepfer (1940), Hirayama (1938), Herrick (1940), Treschow (1944) and others have reported that different pentose and hexose sugars are preferred by different fungi as sources of carbon. Mizumoto (1956), Samajpati and Banerjee (1971) and several other workers have observed that many species of Basidiomycetous fungi utilize sucrose as the best source of carbon. De Baun, *et al.* (1950), and Robbins *et al.* (1963) have reported that fungi can also utilize organic acids as source of carbon.

MATERIAL AND METHODS

The standard *Glucose-casein-hydrolysate* basal medium (Leonian and Lilly, 1945) has been prepared without any carbon source. The different carbohydrates and organic acids used in this experiment as carbon-sources are maltose, glucose, sucrose, starch, laevulose, citric acid, malic acid, oxalic acid and succinic acid. 2.0, 2.5 and 3.0 per cent concentrations (by wt.) of the aforesaid compounds have been used and each compound has been mixed separately with the medium. The selected carbon compounds have been added to the medium and taken in requisite

number of Erlenmeyer flasks (250 ml.). The other necessary experimental procedures were, however, the same as described by Samajpati and Banerjee (1971). The pH of each medium before and after sterilization as well as different harvesting periods have been recorded.

RESULTS AND DISCUSSION

The results obtained during the investigation have been recorded in Tables 1-3.

In case of organic acids, the growth of both the primary and the secondary mycelia of *H. polygramma* reveal a poor manifestation even after 15 days of incubation, as the medium has been found to have pH between 3-4. Therefore, it is evident that the mycelia of both types are unable to utilize the organic acid sources in that condition. Later, this portion of the experiment have been abandoned due to non-availability of any presentable data.

The other carbohydrate sources have presented better results at pH between 5—5.5. All the carbohydrates at 3.0 per cent concentration have given significant results in case of both the primary and the secondary mycelia with the exception of starch where it is 2.5 per cent. Of these, glucose has the maximum stimulatory effect on growth of the fungus and this has been followed by maltose and starch successively. Sucrose and laevulose have also some stimulatory effect on growth of this test-fungus.

Table 1. Data (mean) showing the effect of different carbon sources on the vegetative growth (mg) of the primary and the secondary mycelia of *Hexagonia polygramma*

Carbansource	Concentration %	Mycelium		Carbon source total
		Primary	Secondary	
Maltose	2.0	139.66	180.22	159.94
	2.5	143.60	207.66	175.66
	3.0	189.00	241.77	215.38
Glucose	2.0	141.44	193.88	182.66
	2.5	219.33	208.88	214.11
	3.0	198.77	273.55	236.16
Sucrose	2.0	102.00	100.00	101.00
	2.5	134.33	176.66	155.38
	3.0	166.88	213.33	190.11
Starch	2.0	197.88	164.66	181.27
	2.5	199.33	224.44	211.88
	3.0	209.11	233.88	201.50
Laevulose	2.0	108.22	155.55	131.88
	2.5	150.66	153.88	152.27
	3.0	148.88	166.44	157.27
Control		43.33	71.66	57.60
Mycelium mean		157.65	185.39	

S. E. for Mycelium = $\pm .000141$

S. E. for Carbon source = $\pm .000447$

S. E. for Mycelium $\times$ Carbon source = $\pm .00060$

C. D. for Mycelium at 0.05 of P = .0039057

C. D. for Carbon source at 0.05 of P = .000447

C. D. for mycelium $\times$ carbon source at 0.05 of P = .0077280

Table 2. Data (mean) showing the effect of interaction of different carbon source and different incubation periods on the vegetative growth (mg.) of the primary and the secondary mycelia of *Hexagonia polygramma*

Carbonsource	Concentration %	Incubation periods (Days)			Carbon source mean
		5	10	15	
Maltose	2.0	80.83	162.50	236.50	159.94
	2.5	85.00	176.50	265.00	175.66
	3.0	99.50	222.11	324.50	215.38
Glucose	2.5	120.50	178.11	232.66	182.66
	2.0	149.50	212.83	280.00	214.11
	3.0	129.66	244.83	335.00	236.16
Sucrose	2.0	61.66	90.83	150.50	101.00
	2.5	83.33	157.33	228.50	155.38
	3.0	114.50	210.83	245.00	190.11
Starch	2.0	92.50	192.66	258.66	181.27
	2.5	120.00	219.83	295.83	211.88
	3.0	140.11	216.66	307.66	201.50
Laevulose	2.0	62.33	146.66	186.66	131.88
	2.5	68.50	174.11	214.11	152.27
	3.0	69.66	162.50	260.83	157.66
Control		37.50	57.50	77.50	57.50
Incubation period mean		95.58	176.56	242.43	

S. E. for Incubation Period $\times$
Carbon source = $\pm .000774$

C. D. for Incubation Period $\times$ Carbon source
at 0.05 of P = .00214398

Table 3. Data (mean) showing the effect of different incubation period on the vegetative growth (mg.) of the primary and the secondary mycelia of *Hexagonia polygramma* under different carbon source

Incubation period (Days)	Mycelium		Incubation period mean
	Primary	Secondary	
5	95.12	96.04	95.58
10	162.43	190.68	176.56
15	215.41	269.45	242.43
Mycelium mean	157.65	185.39	

S. E. for Mycelium = $\pm .000141$

C. D. for Mycelium at 0.05 of P
= .0039057

S. E. for Incubation = $\pm .00038$

C. D. for Incubation period at 0.05 of P
= .0010526

S. E. for Mycelium $\times$ Incubation period
= $\pm .000282$

C. D. for Mycelium $\times$ Incubation period at
0.05 of P = .00078114

Of the nutritional requirements, sugars in all probability are ultimately converted to pyruvic acid through glycolysis path and are further oxidized to

carbon dioxide and water via Citric acid cycle. It can be taken into consideration from the experimental results that the fungus is able to synthesize all the responsible enzymes for these primary conversions of different sugars to glucose for ultimate utilization. These enzymes are α -glucosidase, β -fructofuronosidase (invertase) and amylase.

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