

**EFFECT OF CARBON SOURCES ON THE GROWTH AND YIELD OF
OXALIC ACID BY *SCLEROTIUM ROLFSII***

By

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The carbon sources play an important role on the yield of oxalic acid and mycelial growth of *Sclerotium rolfsii*. The growth natural and one mutated strains (S. r. -X₂) is maximum in presence of starch supplemented medium whereas S. r. -X₁ strain grows best in presence of inulin. Sucrose is the best carbon source for the yield of oxalic acid by natural and S. r. -X₁ strain but it is inulin for S. r. -X₂. All the strains fail to utilise xylose and acetic acid carbon sources.

INTRODUCTION

Higgins (1927) has stated that *Sclerotium rolfsii* usually produce oxalic acid on a variety of media. Bateman and Beer (1965) have found rapid accumulation of oxalic acid in infected tissues and also investigated the synergistic interaction between oxalate accumulation and polygalacturonase activity during pathogenesis. They (1965) have also reported that carboxymethyl cellulose is the best carbon source for oxalate accumulation in culture media. Bagyaraj and Sirsi (1965) have stated that *S. rolfsii* isolated from bean (*Phaseolus vulgaris*) grows and synthesizes oxalic acid in glucose-peptone solution. The present communication deals with the effect of different carbon sources on the growth and yield of oxalic acid by natural and X-ray mutated strains of *S. rolfsii*.

MATERIALS AND METHODS

The natural strain of *Sclerotium rolfsii* was isolated from cotton seedlings growing in the Baruipur Agricultural Farm, Calcutta University, West Bengal. The high yielding strains S. r. -X₁ and S. r. -X₂ were obtained by X-ray treatment (Chakrabarti and Samajpati, 1971). The mycelial culture of all the strains were maintained on potato dextrose agar medium. Potato-broth liquid medium was used as basal medium. The basal medium was supplemented separately with different carbon compounds (9 sources of carbon including monosaccharides, disaccharides, polysaccharides and l-organic acid). The concentration of carbon in each case was 20 g/l of medium.

Each Erlenmeyer flask (150 ml) contained 30 ml of sterilized medium. This was inoculated with sclerotia (5 in each flask) of *S. rolfsii* (natural and mutated strains separately) and incubated for 12 days at 30° (± 1.0°C). Finally the

harvested mycelia were dried at 65°C for 24 hours, cooled in a desiccator and weighed. From the culture filtrate of each flask biochemical estimation of oxalic acid were done following the method of Bateman and Beer (1965). The quantitative data was calculated on the average of five replicates.

RESULTS AND DISCUSSION

The results obtained during the experimental period have been presented in the table below :

Table 1. *The effect of various carbon compounds on the growth and yield of oxalic acid by natural and two mutated strains of Sclerotium rolfsii at 12 days of growth. Results, expressed as mg (dry wt. mycelium) per 30 ml medium and mg per 30 ml medium (as oxalate) are mean values of five readings.*

Sources of Carbon	Growth			Oxalic acid		
	Natural	S.r.—X ₁	S.r.—X ₂	Natural	S.r.—X ₁	S.r.—X ₂
Dextrose	435 ±8	553 ±10	558 ±9	139 ±2	184 ±3	187 ±3
Starch	804 ±11	714 ±8	755 ±11	161 ±2	198 ±4	189 ±3
Maltose	609 ±15	702 ±9	586 ±11	142 ±3	212 ±5	162 ±4
Inulin	663 ±13	715 ±12	487 ±15	175 ±2	230 ±4	228 ±5
Sucrose	743 ±11	648 ±15	642 ±18	180 ±4	242 ±3	227 ±4
L—Arabinose	577 ±10	576 ±11	544 ±16	172 ±3	214 ±4	204 ±2
D—Fructose	723 ±8	694 ±7	678 ±15	169 ±3	222 ±3	219 ±4
D—Xylose	—	—	—	—	—	—
Acetic acid	—	—	—	—	—	—

It is evident from the data in Table 1 that starch, sucrose, fructose, inulin, and maltose supported excellent growth for all three strains although starch appeared to be the optimum source for natural and S. r. -X₂ strains while inulin was for S. r. -X₁ strain. All the strains failed to grow on xylose and acetic acid containing media. Johnson and Joham (1954) has stated that the growth of test fungus on xylose, galactose and glucose are comparable whereas Abeygunawardena and Wood (1957) and Kodanda and Apparao (1963) have reported that sugars support only sparse growth of the fungus. Maxwell and Bateman (1968 a) have reported that glucose and starch support the growth of the fungus but galactose, xylose and succinic acid are not so favourable for growth. The present data reveals that all the strains of *S. rolfsii* fail to grow in presence of xylose and acetic acid when used as a sole source of carbon and also show diverse nature in utilizing the different carbon sources.

The results of experiments using different carbon sources indicate that oxalic acid production is greatly influenced by carbon sources. Maxwell and Bateman (1968 b) have reported that glucose or any other carbon source with any organic or aminoacids resulted in oxalate accumulation. They further revealed that succinate, fumarate, citrate and glycolate yielded more oxalic acid than other organic acid. In the light of our results obtained it is noticed that sucrose is the optimum carbon source of natural and strain. S.r. -X₁ in regards of oxalic acid production. In natural strain, inulin and arabinose also gave good result in comparison with others. Whereas in S. r. -X₁, other good sources are inulin, fructose and arabinose. Strain S. r. -X₂ yielded more oxalic acid in presence of inulin though sucrose also gave good result. Therefore the experimental data reveal that as a whole sucrose and inulin gave result in oxalic acid production by the three strains.

Besides, above all data reveals that there is no definite relationship between the growth of test fungus and the rate of oxalic acid production by the test-fungus which support the views of Maxwell and Bateman (1968 c)

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