Effect of different Carbon sources on the Growth and Sporulation of *Fusarium moniliformy* of Isolate I to IV Obtained from Darbhanga Division (Bihar)

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Abstract : Sugarcane (*Saccharum officinarum* Linn.) is a commercially important cash crop n Darbhanga Division utilized for the production of sucrose, ethanol, biofuel and fiber related commodities. Among the *Fusarium monilitormy* diseases with disease is becoming the major disease. The pathogens collected from different parts of Darbhanga Division were grown on Oat-meal agar medium and their cultural characters were studied. The different isolates were as such grouped in 4 categories on the basis of different places. The isolate obtained from Hasanpur in Samatipur districts was named as isolate I, isolate obtained from Rayam in Darbhanga named as ISOLATE II, isolate from Pandaul (Lohat) in Madhubani district named as isolate III and isolate obtained from Madhepur in Madhubani named as isolate IV. Carbon is the most important element for growth of all the living organisms without which growth is not possible. All the micro-organisms do not grow equally well on any single source of Carbon and best source of organisms are to be determined. For this experiment Richard's medium was selected as a basal medium. All about 10 carbons sources were taken in which sucrose was substituted by other sources in the basal medium.

Keywords : *Fusarium moniliformy*, subghutinans, diseases, Isolate, Carbon, Sources.

I. INTRODUCTION

Sugarcane (*Saccharum officinarum* Linn.) is one of the most important cash crops grown widely in Darbhanga Division. It sustains the organized agro industry, namely the sugar industry; in addition it supports a large number of scattered open pan sugar (Khandsari) and jaggery units in the rural sector. Physiologically it belongs to the C4 cycle group. It occupies a commanding position as an agro industrial crop of the area under investigation. Due to extensive farming as well as frequent flood in the area, this crop suffers a lot of invasions of pathogens. Amongst the pathogens associated with sugarcane at different levels of their pathogenecity through India, *Fusarium moniliforme* var. subglutinans deserves special mention as it considered the major parasite to cause sugarcane wilt (Waraitch. 1981, 1982, 1984 and 1985). Earlier, Wollenweber and Reinking (1925) reported sugarcane as a host of *Fusarium moniliforme* var. subglutinans. Khanna (1947) observed that wilt of sugarcane by *Fusarium moniliforme* var. subglutinans had assumed serious proportion in certain parts of North Bihar where the damage was 20-25% in tonnage which resulted in a serious drop in sugar recovery. Yield of wilted caves has shown a tremendous decline (2.18 - 4.71%) in juice quality against the estimated recovery of 11.25 to 12.89% in healthy canes (Khanna, 1951).

II. MATERIAL AND METHODS

According to Hussain and Kelman (1958) the enzyme cllulose may play a part in the development of some wilt diseases. They observed that wilt cause pathogens produces celluloses freely in culture. The

cellulose is of two types C1 and Cx. But according to Wood (1959) it is difficult to assess the significance of celluloses in the vascular wilts. Although there is no direct evidence that they are produced in vivo condition in the tracheal elements would not seem unfavourable for their secretion, because sugars would be absent or present only in very low concentration, and because the layers next to the wall probably have the lowest proportion of impregnating and metrical substances together with the highest concentration of cellulose micro fibrils.

Role of toxins in plant wilt disease development has been reviwed by Dimond (1962, 1966, 1970). Sadasivan (1960), Gaumann (1957, 1958), Beckman et. al. (1962) Corden and Chamber (1991) and Lakshmi Narayan (1958). According to Dimon (1970) the wilt pathogens invade and establish themselves in the conductive xylem and they release toxic metabolites into vessels and being Carried with the transpiration stream cause its pollution. These metabolites are mainly polysaccharides, glycopettides and hydrolytic enzymes but according to Sadasivan (1961) fusaric acid, lycomerismin are the chief toxic metalbolites causing vascular plugging of the host plant and finally bring about the wilt of the host.

For this experiment Richard's medium was selected as a basal medium. All about 10 carbon sources were taken in which sucrose was substituted by other sources in basal medium. 50 ml. medium was taken in each of 150 ml Erlenmeyer flask. The flasks with medium were sterilized, inoculated and incubated at 25 ± 1^0C. After 14 days of incubation, dry mycelial weight was taken as per materials and methods. Triplicates were maintained for each Carbon source. Sporulation was also determined. Results were obtained and recorded in Table No.-1.

Table No. 1

Effect of different carbon sources on the growth and sporulation of F. moniliforme var. Subglutinans.

Sr. No.	Source	ISOLATE-I		ISOLATE-II		ISOLATE-III		ISOLATE-IV	
		Dry Mycilial We. in Mg.	Sporulation	Dry Mycilial We.In.Mg.	Sporulation	Dry Mycilial we. in MG.	Sporulation	Dry Mycilial We. in Mg.	Sporulation
1.	Sucrose	512.33	+++	508.66	+++	506.33	+++	501.66	+++
2.	Lactose	486.33	+++	482.66	+++	477.66	+++	473.66	+++
3.	Glucose	472.66	+++	467.66	+++	462.66	+++	460.66	+++
4.	Fructose	332.66	+++	328.00	+++	326.33	+++	325.00	+++
5.	Maltose	314.33	++	307.66	++	305.66	++	301.66	+++
6.	Manitol	275.00	++	278.66	++	302.33	++	271.66	++
7.	Starch	262.33	++	257.66	++	256.66	+++	252.66	++
8.	Xylose	258.66	++	355.66	++	257.33	++	248.66	++
9.	Sorbitol	252.33	++	248.33	++	247.66	++	233.00	++
10.	Raffinose	206.33	++	203.66	++	203.66	++	197.66	++

III. Results and Discussion

From Table No. 1 it is clear that the carbohydrates used have profound effect on growth and sporulation of isolates I to IV of *F. moniliforme var. subglutinans*. Maximum growth and sporulation were obtained in sucrose followed with Lactose, Glucose, Fructose and Maltose. Maximum dry weight was obtained in isolate I but maximum sporulation was found in isolate II when grown in medium substituted by glucose and lactose. Minimum growth and sporulation was found in isolate II when grown in medium substituted by glucose and lactose. Minimum growth and sporulation was found in Raffinose.

The utilization of various carbon compounds may depend either on ability of fungi to utilize the certain simpler form or its power to convert the simplex carbon compound into simpler one, such as glucose and cellobiose which may easily utilize. The degradation of complex carbohydrates by the fungi depends upon

the production of necessary hydrolytic enzymes such as pectinases, cellulases and amylases as reported by Cochrane (1958), Dees and Stahmann (1962), Wood (1967) and Choudhary (1983 & 1990).

Hsiech et. al. (1979) reported that the effect of nine carbon sources on the growth and sporulation of *F. moniliforme* var. subglutinans. Out of these they considered that soluble starch is the most suitable for the production of macro conidia followed by Maltose, Galactose, Xylose and Lactose.

Raffinose is generally considered as poor source of carbon as observed by Agarwal and Sarabhoy (1978), Mukherji and Mazumdar (1971), Roy (1971) and Sinha (1979. According to Lilly and Barnett (1951), majority of fungi utilize raffinose but non utilization is also very common. In the present investigation sucrose was found as the most suitable Carbon source for the growth and production of macro and micro conidia.

IV. CONCLUSION

Effect of different Carbon sources on the growth and sporulation of *F. moniliforme* var. Subglutinans were studied. Maximum growth and sporulation were obtained in sucrose followed with lactose. Minimum growth and poor sporulation were obtained in Raffinose.

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