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Effect of different sugars on dry weight of *fusarium oxysporum* causing wilt disease of tomato on 10th day of inoculation period

Gajanan Dinkar Mule
Department of Microbiology, Swami Vivekanand Senior College, Mantha, Jalna, Maharashtra, India

Abstract
Utilization of sugar it is source of carbon by *fusarium oxysporum* fungi for production of their biomass. The sugar source viz. carbon sources used were suitable for Mannos, dextrose, sucrose, fructose, D-xylose, Galactose, mannitol, lactose, Arabinose and control (no sugar source). Maximum sugar utilized by *fusarium oxysporum* fungi from Dextrose (177 mg) for stimulate and producing maximum biomass, mannose, Galactose, fructose, sucrose was also average stimulate the growth of fusarium *oxysporum* fungi and Minimum growth found in the source arabinose (10 mg) (Table No. 1). Moore and Chupp (1952) [3] reported that all the three isolates of Fusarium oxysporum f. sp. lycopercisi, *Fusarium oxysporum f. sp*. conglutinans and *Fusarium oxysporum f. sp*. were able to utilize a number of carbon sources and hydrolysed starch. Naik *et al.* (2010) reported that sugar source more convenient for growth of *fusarium oxysporum.*

Keywords: tomato wilt, Sugar source, Fusarium oxysporum f. sp. lycopercisi and inoculation period etc

Introduction

Fusarium wilt of tomato is a soilborne disease that occurs worldwide.

Once introduced to a field, the Fusarium wilt pathogen is almost impossible to eradicate.

The best way to manage Fusarium wilt is to plant tomato varieties that are resistant to the races of the pathogen that are present in the field.

Fusarium wilt of tomato occurs in most regions where tomatoes are grown. This disease can result in yield losses of up to 80% when severe. The pathogen can infect the crop at all growth stages, entering through the roots. The fungus grows into the xylem (water conducting tissue) where it can spread within the plant. Colonizing the xylem results in the inhibition of water flow and the wilt symptoms (Davis, R. *et al*, 2013) [10]

Fusarium wilt is caused by the fungus *Fusarium oxysporum* forma specialis *lycopersici* (*Fol*). The "forma specialis" designation means that this specialized version of the species infects tomatoes. Three races (1, 2, and 3) of the pathogen have been identified based on their ability to cause disease on tomato varieties with different forms of disease resistance (Cai, G. *et al* 2003).

Race 1 infects varieties with no genetic resistance to Fusarium wilt. This race is widely distributed, found in most tomato growing areas of the world. Race 2 was first identified in 1945 from a tomato variety that is resistant to race 1. Race 2 can now be found in many tomato growing areas of the world. Race 3 was first identified in Australia in 1978, and a few years later it was detected in Florida and then in California in 1987 on tomato varieties that are resistant to both races 1 and 2. Research indicates that the race 3 isolates have developed locally from race 2 isolates in California and Florida, rather than being introduced from Australia (Fisher, M. 2017). In California, race 3 was found only in the Sutter Basin area for several years, but it has now spread to Fresno County and other major processing tomato growing areas in the state. Race 3 is now present in Mexico and areas of North and South Carolina (Jones, J *et al*, 2014) [6].

The initial symptoms of Fusarium wilt are a yellowing and wilting of leaves, usually after flowering when the tomato fruit are starting to increase in size. These symptoms often develop only on one side of a plant, or on one branch, or even on one side of a leaf. This pattern of symptom expression distinguishes Fusarium wilt from other wilt diseases of tomato. The symptoms start on the lower leaves of the plant and move upward as the disease progresses (Fisher, M. 2017) [9].

Material and Methods

1. Collection of material

The present experiment conducted *In Vitro* at Department of Microbiology, swami Vivekanand senior college Jalna. During this experiment, plant sample were collected from Tomato infected by rot disease of tomato in growing track of mantha tehsil district jalna (MS).

2. Isolation of *fusarium oxysporum* method followed by C.V.Chudhary in 2006, faruk patel, Sumia Fatima and sopan chavan 2018.

Pathogen was isolated from infected plant parts by tissue isolation technique on Potato Dextrose Agar (PDA) medium. Diseased parts were cut into small pieces with the help of sterilized blade. Pieces were washed with sterilized distilled water and disinfected with 1 per cent $HgCl_2$ solution for 10 seconds. Thus, obtained disinfected tissues were immediately washed thrice with sterilized distilled water and aseptically transferred on PDA plates. Inoculated Petri plates were incubated at room temperature (27±2 °C).

The obtained culture was purified by using hyphal tip culture method, and maintained on same medium for the further investigations.

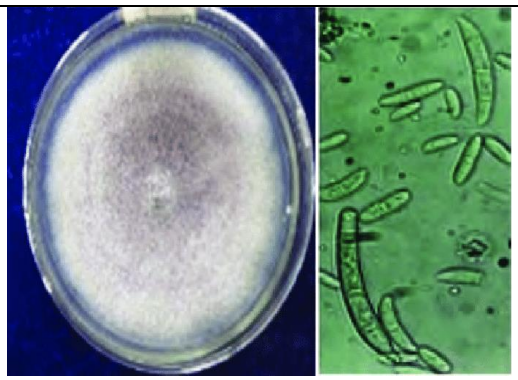
3. Inoculation of *fusarium oxysporum* on media containing different sugar sources method followed by K. T. Arunakumara *et al*., 2015 and Sumia Fatima Sopan chavan in 2018 described method in his research article.

Inoculation of Pathogen on Various Sugar sources were incorporated molecular weight in Richard.s broth. The quantity of nitrogen required in each case was determined on the basis of their so as to provide equivalent amount of Sugar as that of potassium nitrate present in the basal medium. The Sugar sources were Mannose, Dextrose, Sucrose, Fructose, D-xylose, Galactose, Mannitol, Lactose,. Arabinose and control (no sugar) C.D.AT 0.05&0.01 All the above Sugar sources were mixed thoroughly and the pH of medium was adjusted to seven by using 0.1 N sodium hydroxideor 0.1 N hydrochloric acid. The growth of fungus was studied as described under studies of carbon sources. 30 ml of each of the medium was taken in 100 ml flasks, sterilized and then inoculated with 5 mm discs taken from 9 days old culture of *fusarium oxysporum* incubated at 27±1°C for 10 days. Three replications were maintained for each treatment. According to H. S. Nagaraj Rao *et al*., 1964 to Dry weights of the mycelium were estimated after filtering, washing and drying of the harvested mats.

Results and Discussion

In present investigation the fungus *fusarium oxysporum* successful isolate from infected part of plant and observed microscopic characteristics are shown in plate no.1

Fusarium wilt in tomato crop



***Fusarium oxysporium* with microscopic observation**

Plate 1

Effect of different sugars 1% conc. on dry weight of *fusarium oxysporum* causing seed rot disease of tomato on 10th day of inoculation period

Utilization of sugar it is source of carbon by *fusarium oxysporum* fungi for production of their biomass. The sugar source *viz*. carbon sources used were suitable for Mannos, dextrose, sucrose, fructose, D-xylose, Galactose, mannitol, lactose, Arabinose and control (no sugar source). Maximum sugar utilized by *fusarium oxysporum* fungi from Dextrose (177 mg) for stimulate and producing maximum biomass, mannose, Galactose, fructose, sucrose was also average stimulate the growth of fusarium *oxysporum* fungi and Minimum growth found in the source arabinose (10 mg) (Table No. 1). Moore and Chupp (1952) [3] reported that all the three isolates of Fusarium oxysporum f. sp. lycopercisi, *Fusarium oxysporum f. sp*. conglutinans and *Fusarium oxysporum f. sp*. were able to utilize a number of carbon sources and hydrolysed starch. Naik *et al.* (2010) reported that sugar source more convenient for growth of *fusarium oxysporum.*

Table 1: Effect of different sugars on dry weight of *fusarium oxysporum* causing wilt disease of tomato on 10th day of inoculation period.

Sr. no.	Sugar /concentration 1%	Dry weight in mg
1	Mannose	148
2	Dextrose (glucose)	177
3	Sucrose	97
4	Fructose	112
5	D-xylose	60
6	Galactose	115
7	Mannitol	20
8	Lactose	64
9	Arabinose	10
10	Control (no sugar) C.D.AT 0.05&0.01	85

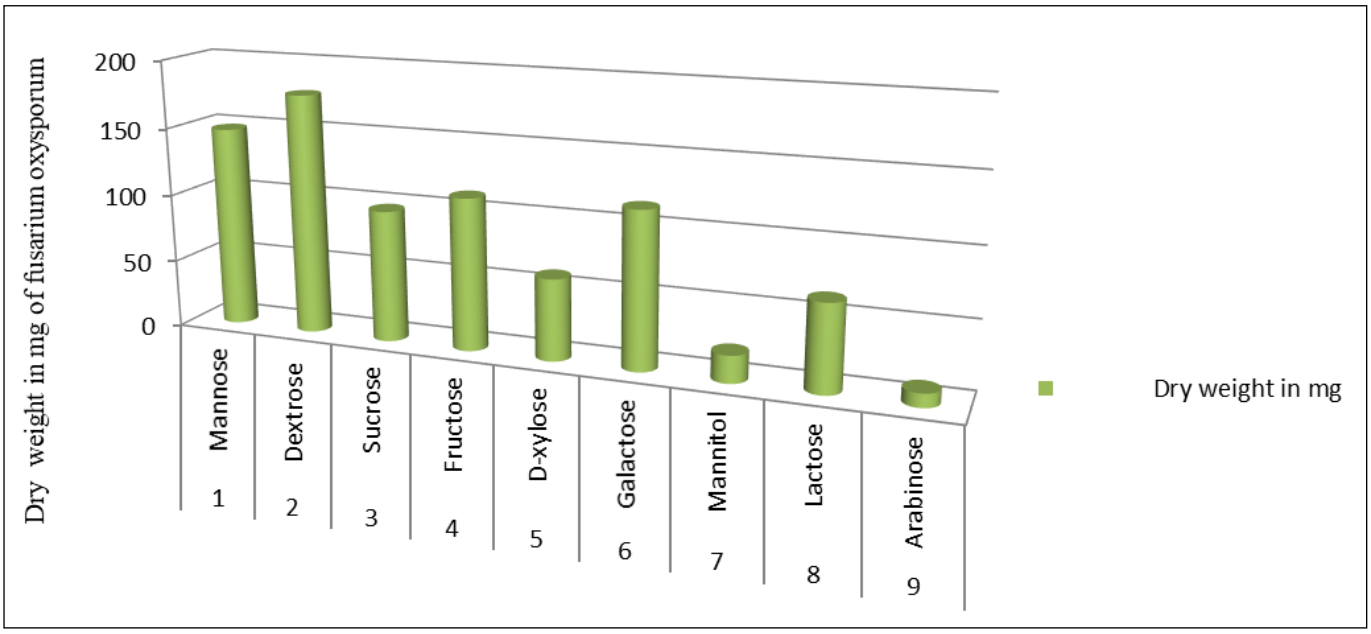


Fig 1: Effect of different sugar on dry weight of fusarium oxysporum on 10th day inoculation period

The highest dry weight of fusarium spp found in sugar source of dextrose 177 mg followed by mannose 148 mg, galactose 115mg, fructose 112mg and least but consider in sucrose, lactose and almost non-effective sugar source is arabinose respectively.

Conclusion

Use of source of sugar 1% conc. For isolation of *fusarium oxysporum* causing wilt disease of tomato on 10th day of inoculation period, the highest utilization of sugar source dextrose by fusarium for their growth of mycelium ultimate get maximum sporulation of fusarium. So, present research help to plant pathologist and microbiologist would be use proper source for isolation of fusarium spp.

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