EFFECT OF DIFFERENT CARBON SOURCES ON THE PHYSIOLOGY AND MORPHOLOGY OF THE SPORES OF *HELMINTHOSPORIUM MAYDIS*.

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Studies on the effect of five different concentrations of eight carbon sources on percentage and type of germination of spores of *Helminthosporium maydis* were made at one hour regular intervals. In glucose, galactose, sucrose and lactose 100 per cent germination was obtained within four hours. Whereas, a little germination was observed in only 1 and 2 per cent concentrations of amylose. There was no germination at all the concentrations of oxalic and malic acids. The type of germination was variable but colour of spores remained constant.

INTRODUCTION

Germination is a growth process in which some or all the necessary nutrients are present in the spore 'ab initio.' The possibility of two extremes of relationships to the external nutrients, i.e., complete independence or complete dependence on one or more nutrients along with various degrees of partial dependence on the environment was pointed out by Cochrane (1958), and Nisikado and Miyabe (1926) observed that *Helminthosporium maydis* was more sensitive to the effect of temperature than *H. turcicum*. The growth rate of germ tubes was comparatively faster in *H. maydis*. In *H. turcicum* the germ tubes of the conidia produced appressoria at a temperature range of 20-30°C. Crosier and Braverman (1971) reported that 21 per cent of the conidia of *H. maydis* from hybrid corn fields in Minnesota produced only one germ tube. The rate of germination showed a decline with the age of the conidia but bipolar and monopolar ratio remained fairly constant. Lin (1945) stated that conidia of *Glomerella cingulata* showed a little or no germination in distilled water and in dextrose solution lacking in minerals.

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TABLE 1 : *Effect of different concentrations of three monosaccharides on the germination of spores of* Helminthosporium maydis.

Carbon source		Glucose					Galactose					Sorbose				
Observations	Time in hours.	Concentrations					Concentrations					Concentrations				
		1%	2%	3%	4%	5%	1%	2%	3%	4%	5%	1%	2%	3%	4%	5%
Percentage germination	0	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	1	4	—	—	—	—	—	12	14	16	20	—	—	—	—	—
	2	8	10	70	71	74	21	77	67	76	50	8	18	88	74	50
	3	94	100	71	89	83	82	91	80	100	92	18	96	94	91	63
	4	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Type of germination	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	1	M	—	—	—	—	—	M+L	—	M	M	—	—	—	—	—
	2	M	M+B	M+B	M+B	M+B	M	M+L	M+B	M+B	M+B	M	M	M+B	M	M
	3	M+B	M+B	M+B	M+B	M+B	M	M+L	M+B	B	M+B	M	M	M+B	M	M
	4	B	B	M+B	M+B	M+B	M	M+L	B	B	B	M	M	M+B	M	M

M = Monopolar
B = Bipolar
L = Lateral

TABLE 2 - *Effect of different concentrations of three sugars and water on spore germination of* H. maydis.

Carbon sources		Lactose					Sucrose					Amylose					Water	
Observations	Time in hours	1%	2%	3%	4%	5%	1%	2%	3%	4%	5%	1%	2%	3%	4%	5%	Distilled.	Tap
Percentage germination.	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	28
	2	83	67	67	50	83	42	79	43	6	20	—	28	—	—	—	—	86
	3	84	86	77	58	100	52	95	53	59	79	24	—	—	—	—	—	100
	4	100	100	100	100	100	100	100	100	100	100	—	—	—	—	—	—	—
Type of germination	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	M
	2	M+B	M	M	M+B	M+B	M+B	B	M+B	M	M	—	M	—	—	—	—	M+B
	3	M+B	M	M	M	M	B	B	M+B	M	M	M	—	—	—	—	—	M+B
	4	M	M	M	M	M+B	B	B	M+B	B	M+B	—	—	—	—	—	—	—

The present paper aims at studying the effect of different carbon sources on the phsiology of the germination of spores of *H. maydis*

MATERIALS AND METHODS

H. maydis was isolated form the diseased leaves of maize and was multiplied on basal medium for further studies. The suspensions of the agar culture were prepared in five different concentrations of glucose, galactose sorbose, lactose, sucrose, amylose, malic and oxalic acids ranging from 1 to 5 per cent. Germination of the conidia was made by Hanging drop technique (Duggar, 1909). Observations on percent and type of germination of the spores were recorded at room temperature at one-hour interval. Germination means the emergenee of germ tube from the spore surface.

RESULTS AND DISCUSSION

Different monosaccharides, disaccharides, polysaccharide and two organic acids were included as carbon sources in the trial. In glucose, galactose and sorbose, germination started within one hour in 1 percent whereas it started after 2 hours in higher concentrations. There was a gradual rise in the percentage of germination and in 2 percent glucose and 4 per cent galactose 100 percent germination was observed after 3 hours. Monopolar type of germination was predominant in sorbose and lactose, whereas, in other sugars mono and bipolar type was in high proportion. In galactose lateral germination was also observed (Tables 1 & 2).

In lactose and sucrose, germination started within one hour. It increased gradually but 100 per cent germination was obtained within four hours. In sucrose, the ratio of bipolar type was higher in low concentrations.

In amylose, low germination percentage was observed in 1 and 2 per cent concentrations after 3 hours. However, there was no germination at all at higher concentrations even after 24 hours. Thus polysaccharide did not favour germination of the spores. At all concentrations of oxalic and malic acids, there was no germination even after 24 hours, indicating a strong inhibitory effect on the germination of the spores. In tap water, 22, 86 and 100 per cent germination was observed after 1, 2 and 3 hours respectively. Whereas, there was no germination in distilled water even after 24 hours. This shows that the fungal spores need some nutrients which are absent in distilled water. The results also reveal that amylose is a poor source of carbon for the germination of spores of *H. maydis* as it was not readily

available to the fungus spores. Whereas, glucose, galactose, sorbose, lactose and sucrose were found to be rich sources of carbon as they were freely utilized by the fungus spores during germination.

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