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NUTRITION OF *GLOEOSPORIUM AMPELOPHAGUM* CAUSING ANTHRACNOSE OF GRAPE

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A total of 210 *Gloeosporium ampelophagum* isolates were tested against carbendazim. Some of them were resistant (9.17 µg/ml). The growth of resistant isolate (GA-35) was always higher on didfferent carbon, nitrogen and phosphate sources. Amylase, Carboxymethyl cellulose, dextrose, cellobiose, ammonium carbonate, ammonium nitrate, ammonium oxalate, ammonium hydrogen phosphate, calcium phosphate were most favourable for the growth of resistant isolate.

Keywords : Anthracnose; Carbendazim; Fungicide resistance; Grape; Nutritional factors.

Introduction

Anthracnose of grapes *(Vitis vinifera L.)* is a serious disease on vines and also on fruits. The fungicide carbendazim is recommended for the pathogen[1]. In addition fungicide resistance is also observed in this pathogen against carbendazim[2,3]. Of the 210 total isolates of *G. am*pelophagum GA-1 (MIC 1.86 µg/ml) was found to be sensitive while isolate GA-35. (MIC 9.17 µg/ml) was found to be resistant. Hence the attempts were made to see nutritional status of these two isolates.

Materials and Methods

Different carbon, nitrogen and phosphorous source were incorporated (3%) in Czapek Dox medium in the plates. The plates were inoculated at the center and incubated for 7 days. The diameter of colony and sporulation was recorded in both the resistant and sensitive isolates.

Results and Discussion

Sixteen carbon sources, 11 nitrogen sources and 7 phosphate sources were used in this study. The growth and sporulation were recorded. The results are depicted in Table 1, 2 and 3. In general growth of the carbendazim resistant isolate was always higher than the sensitive isolate. Sporulation however, differed in some cases. The highest growth and sporulation was seen on maltose, glucose and mannitol. Less growth was seen on galactose and mannose. Of the nitrogen sources the growth resistant isolate was less when compared with control. This reduction was found to be maximum due to sodium nitrite and silver nitrate was completely inhibitory to both the isolates. In case of phosphate sources sodium hydrogen phosphate and potassium hydrogen phosphate were stimulatory to both the resistant and sensitive isolates.

Sucrose, D-xylose, D-fructose, urea, ammonium oxalate, potassium hydrogen phosphate and sodium hydrogen phosphate were stimulatory to the carbendazim resistant isolate, while D-fructose, sucrose, urea, ammonium oxalate, potassium nitrate, sodium nitrate, potassium hydrogen phosphate, sodium hydrogen phosphate were highly stimulatory to sensitive isolate. There are certain reports on the nutritional factors involved in the growth of different pathogens[4-7]. Bollen[8] reported that benomyl resistant strains of *Pythium brevicompactum* and *P. corymbiferum* had higher growth rate than sensitive one. Comparison between the

(MIC- Minimal Inhiibitory cencentration It was done by following formula

$$Y = \frac{H}{I + Exp\ (a+bx)}$$

Y = Radial growth as percentage of control.
H = Upper limit of the curve
Exp = Logarithmic exponent
a= REgression constant, b = Regression coefficient X = measured points.)

Table 1. Effect of carbohydrates on growth and sporulation of *Gloeosporium ampelophagum* isolates senstive and resistant to carbendazim.

Sr. No.	Carbohydrates (3%)	Growth (mm)*	
		Sensitive isolate	Resistant mutant
1.	Amylose	41.71 (0.64)[1]	45.00 (1.60)[1]
2.	Carboxymethyl cellulose	30.42 (0.32)	34.14 (0.64)
3.	Dextrose	348.85 (6.08)	41.57 (6.24)
4.	D(+) cellobiose	34.57 (4.16)	37.14 (4.80)
5.	D(-) fructose	34.57 (7.04)	38.28 (7.68)
6.	D(+) galactose	5.28 (0.32)	6.85(0.00)
7.	D(+) maltose	36.85 (5.76)	39.85 (6.08)
8.	D(-) ribose	31.28 (1.60)	33.14 (0.96)
9.	D(-) sorbitol	30.85 (0.96)	34.14 (0.32)
10.	D-xylose	30.71 (6.72)	32.28 (7.36)
11.	Glucose	42.85 (6.40)	45.29 (6.72)
12.	Lactose	26.85 (0.32)	30.57 (0.64)
13.	Mannose	9.71 (1.48)	12.57 (0.32)
14.	Mannitol	38.57 (0.64)	41.00 (0.96)
15.	Starch	36.42 (1.92)	38.42 (2.24)
16.	Sucrose	22.14 (6.72)	25.14 (7.36)
17.	Control	0.00 (0.00)	0.00 (0.00)

* Average of 7 days, 1 sporulation (10^4/ml)

Table 2. Effect of nitrogen on growth and sporulation of *Gloeosporium ampelophagum* isolates senstive and resistant to carbendazim.

Sr. No.	Carbohydrates (3%)	Growth (mm)*	
		Sensitive isolate	Resistant mutant
1.	Ammonium carbonate	20.65 (3.84)[1]	23.42 (4.48)[1]
2.	Ammonium nitrate	27.57 (4.80)	31.14 (5.44)
3.	Ammonium oxalate	27.42 (9.60)	30.57 (10.88)
4.	Ammonium sulphate	25.42 (3.84)	29.14 (4.80)
5.	Calcium nitrate	34.00 (6.40)	37.57 (7.04)
6.	Magnesium nitrate	32.42 (6.72)	36.00 (7.68)
7.	Potassium nitrate	35.28 (7.04)	37.85 (7.36)
8.	Silver nitrate	0.00 (0.00)	0.00 (0.00)
9.	Sodium nitrate	35.71 (7.36)	37.42 (8.00)
10.	Sodium nitrite	4.14 (2.24)	7.42 (2.56)
11.	Urea	31.85 (8.96)	34.14 (10.24)
12.	Control	35.28 (6.08)	38.42 (6.72)

* Average of 7 days, 1 sporulation (10^4/ml)

Table 3. Effect of phosphate on growth and sporulation of *Gloeosporium ampelophagum* isolates senstive and resistant to carbendazim.

Sr. No.	Carbohydrates (3%)	Growth (mm)*	
		Sensitive isolate	Resistant mutant
1.	Ammonium hydrogen phosphate	18.00 (6.08)[1]	28.14 (7.36)[1]
2.	Calcium phosphate	35.42 (4.48)	37.42 (2.88)
3.	Di-Ammonium hydrogen phosphate	29.28 (5.76)	31.42 (6.72)
4.	Di-Potassium hydrogen phosphate	33.42 (6.72)	35.28 (7.68)
5.	Di-sodium hydrogen phosphate	30.71 (6.08)	32.85 (7.04)
6.	Potassium hydrogen phosphate	37.14 (7.68)	39.57 (8.64)
7.	Sodium hydgrogen phosphate	41.28 (7.36)	43.85 (8.00)
8.	Control	34.28 (3.84)	38.28 (5.76)
	S.D.	6.47 (1.23)	4.67 (1.67)

* Average of 7 days, 1 sporulation (10^4/ml)

physiological characteristics of sensitive and resistant strains of *Aspergillus flavus* was studied by Gangawane and Reddy[9]. They found that carbendazim resistant strain was physiologically very active. Inhibition of growth of resistant strain by certain nutritional sources may have practical importance in the management of this pathogen.

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