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STUDIES ON PECTINASE PRODUCTION IN TOMATO FUNGI ON DIFFERENT CULTURE MEDIA

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ABSTRACT Tomato (*Lycopersicon esculentum* Mill.) is one of the common vegetables grown all over the country extensively almost the year round. The crop is reported to be affected by about twenty diseases of microbial origin. Among them, the fungal pathogens have been found to affect and damage severely the tomato fruits both in field at different developmental stages as well as in the market during storage. This may result in the qualitative and quantitative loss of tomato fruits. The fungi are known to produce different hydrolytic enzymes during pathogenesis. These enzymes degrade the food contents. In the present investigation, pectinase production in relation to different culture media was studied in the fungi isolated from tomato fruits. The media were found to affect the pectinase production in the fungi isolated from tomato fruits.

KEYWORDS : Pectinase production, tomato fungi, culture media.

INTRODUCTION:

Tomato (*Lycopersicon esculentum* Mill.) is one of the common vegetables grown all over the country extensively almost the year round. The crop is reported to be affected by about twenty diseases of microbial origin. Among them, the fungal pathogens have been found to affect and damage severely the tomato fruits both in field at different developmental stages as well as in the market during storage. This may result in the qualitative and quantitative loss of tomato fruits.

It is the well known fact that the fungi produce different hydrolytic enzymes during pathogenesis. The hydrolytic enzymes produced by the fungi like cellulases, pectinases, amylases, lipases and proteases are known to degrade food contents. Sreekantiah *et al*. (1971) found that, *Alternaria alternata, Fusarium solani* f.sp. *minus, Pleospora infectoria* and *Alternaria solani* were capable of producing all the four kinds of hydrolytic enzymes, viz., pectinase, cellulase, amylase and proteinase. Balsubramanian (1972) reported that, protease along with cellulase and pectinase was found to be effective in infection by *Rhizopus stolonifer* within the tissue. Mehta *et al*. (1974) found that, during pathogenesis of tomato fruits, *Alternaria* sp. produce pectolytic and celluloytic enzymes. They also reported that, polygalacturonase and pectin methyl galacturonase are found to play important role in pathogenesis due to *Alternaria solani* and in *A. tenuis* (*A. alternata*) infection. Ramasami and Shanmugam (1976) studied pectolytic and celluloytic enzymes of *Rhizoctonia bataticola in vitro* and *in vivo*. Hasija and Batra (1981) recorded that, *Phoma destructiva* produced pectin transliminase and polygalacturonase in diseased tomato fruits, while pectin methyl esterase, pectin methyl galacturonase occurred in both healthy and diseased tissue. Hasija and Batra (1984) found that, *Phoma destructiva* causing fruit rot of tomato fruits produced all types of pectic enzymes (PME, PMG, PG and PGTE *in vitro*).

In the present investigation, pectinase production on different culture media was studied in the fungi isolated from tomato fruits.

MATERIAL AND METHODS:

a) Production of pectinase:

For the production of pectinase i.e. pectin methyl galacturonase (PMG), the fungi were grown in different liquid culture media viz. Glucose nitrate, Pectin peptone, Pectin nitrate and Pectin ammonium nitrate. Twenty five ml of each medium was taken separately in 100 ml conical flasks and autoclaved at 15 lbs pressure for 20 minutes. The flasks on cooling were inoculated separately with 1 ml standard spore suspension of test fungi prepared from 7 days old cultures grown on PDA slants. The flasks were incubated for 6 days at 25 °C. On 7th day, the flasks were harvested by filtering the contents through Whatmann No. 1 filter paper. The filtrates were collected in pre-sterilized bottles and termed as crude enzyme preparations.

b) Enzyme assay (Viscometry):

The Ostwald's viscometer was thoroughly cleaned with distilled water and dried before use. Six ml of 1% pectin in 2 ml of 0.2 M acetate buffer pH 5.2 and 4 ml of enzyme source were taken in viscometer and were thoroughly mixed and incubated at 25°C temperature. The efflux time of the mixture at 0, 5,10,20,30,40,50 and 60 minutes was recorded with the help of stop watch. The percent loss of viscosity was calculated by using the formula:

$$\text{Per cent loss of viscosity} = \frac{To-Tx}{To-Tw} \times 100$$

Where To = Flow time in seconds at zero time
Tx = Flow time of the reaction mixture at time 'T'
Tw = Flow time of distilled water.

RESULTS AND DISCUSSION:

Table 1: Production of pectinase in tomato fungi on different media

Fungi	Media			
	Non-substrate	Substrate		
	Glucose nitrate	Pectin peptone	Pectin nitrate	Pectin ammonium nitrate
	% Viscosity loss after 40 minutes			
Alternaria solani	66.6	70.5	72.2	76.8
Geotrichum candidum	15.0	54.7	83.3	85.2
Fusarium roseum	40.2	65.7	58.7	67.5
Fusarium oxysporum	45.5	71.2	66.6	73.5
Phoma destructiva	23.3	62.5	44.5	72.9
Rhizoctonia solani	25.7	65.2	64.7	61.5
Phytophthora sp.	11.9	87.5	83.3	84.7
Cladosporium fulvum	21.4	68.5	66.6	62.3
Curvularia lunata	30.1	58.3	61.5	67.3
Aspergillus niger	10.0	79.2	86.6	88.5
Aspergillus flavus	14.2	81.8	80.2	69.5
Penicillium expansum	00.00	82.3	80.0	71.3
Rhizopus stolonifer	17.4	59.7	55.7	68.9

From Table-1, it becomes clear that, all the fungi except *Penicillium expansum* were able to produce pectinase in Glucose nitrate (non-substrate) medium. However, maximum pectinase production was observed on the substrate media. Among the substrate media, maximum pectinase production was found on Pectin ammonium nitrate by all fungi except *Rhizoctona solani, Phytophthora sp. , Cladosporium fulvum, Aspergillus flavus* and *Penicillium expansum* which showed maximum pectinase production on Pectin peptone. As

compared to Pectin peptone and Pectin ammonium nitrate, Pectin nitrate was found to be poor medium for pectinase production. Constitutive nature of pectinase production was also reported by Brown (1915) and Tribe (1955). Pectic substances were found to be inhibitory for pectic enzyme production in *Pythium debaryanum* (Ashour, 1955 and Gupta, 1956) and *Cladosporium cucurmerianum* (Husain and Rich, 1958). On the other hand, adaptive nature of pectinase production was reported in *Fusarium moniliforme* (Singh and Wood, 1956), *Rhizoctonia solani* (Deshpande, 1960), *Helminthosporium apattarnae* (Deshpande and Deshpande, 1968) and *Penicillium chrysogenum* (Phaff, 1947) and *Fusarium lycopersici* (Waggoner and Diamond, 1955).

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