Effect of Carbohydrates on production of hydrolytic enzymes in different species of *Fusarium*

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SUMMARY

Amylase production was found to be stimulated due to fructose, lactose and maltose in all five species of *Fusarium* while, CMC showed inhibitory effect in all tested species of *Fusarium* and Mannitol and Sucrose inhibited *F. oxysporum*. Lactose proved to be best source for production of amylase in all tested fungi, maltose in case of *F. roseum* and mannitol in case of *F. semitectum*. Protease production was found to be poor in sucrose, CMC and mannitol in all five species of *Fusarium* while lactose was found to be best source for production of protease. Lactose inhibited growth of *F. dimerum*, *F. semitectum* and *F. roseum*. Fructose stimulated growth of *F. dimerum*, *F. moniliforme* and *F. semitectum*. Lipase production was favoured due to fructose, maltose in case of *F. oxysporum*, *F. moniliforme* and *F. semitectum*

Key words :

Different species of *Fusarium* are known to infect variety of seeds in field as well as storage. Hence, *Fusarium* is responsible for seed biodeterioration as prominent fungus responsible for production of different hydrolytic enzymes. The production of amylase by *Fusarium* and its significant role in seed damage has been reported by Dingle *et al*. (1953) and Brown (1965). Earlier workers reported that the loss in the seed weight, as well as oil content may have relation with lipolytic nature of seed mycoflora. Goodman and Christensen (1952) found degradation of seed protein and their successive utilization by the associated seed mycoflora due to proteolytic nature of seed mould. Production of these hydrolytic enzymes is influenced by various sources of nutrients. The carbohydrates are one of the prominent source of nutrients which are responsible for production of hydrolytic enzymes. During present study the production of amylase, protease and lipase was studied by growing *fusarium* on liquid medium .

MATERIALS AND METHODS

Twenty five ml. of the medium was poured in one hundred ml. conical flask, autoclaved at 15 lbs and incubated separately with 1 ml. spore suspensions of five *Fusarium* species which were maintained on PDA plants for seven days. The flasks were incubated for six days at 25±2^{0}C. On seventh day the contents were filterred through Whatman No.1 filter paper. The filtrates were collected in presterilised bottles and termed as crude enzyme prepration.

Amylase preparation was done by growning *Fusaria* on liquid medium containing starch 1%, KnO_3 0.25%, KH_2PO_4 1%, and $MgSO_4$ $7H_2O$ 0.05%,at pH 5.5and activity was determined by cup plate method as described by Danai (1994). The production of protease by the *Fusarium* was studied by growing them on lliquid medium containing casein hydrosylate 5%, glucose 1%, KH_2PO_4 0.1%, $MgSO_4$ $7H_2O$ 0.05%, and pH 5.6. The assey of protease was done by using the method described by Rao and Mukharjee (1990) and Lipase preparation was studied by using liquid medium containing 1% grounut oil, KNO_3 0.25%, KH_2PO_4 0.1%, and $MgSO_4$ $7H_2O$ 0.05%, pH 5.0.The activity was assayed as described by Danai (1994).

RESULTS AND DISCUSSION

Surface sterilized seed samples of *Cajanus cajan*, *Cicer arietinum*, *Phaseolus mungo*, *Phaseolus radiatus* and *Glycine max* were used for isolating the fungi and utilized for the production of different hydrolytic enzymes.

The six carbohydrate sources *viz*., fructose, lactose, maltose, sucrose, CMC and mannitol were used to study their effect on the production of hydrolytic enzymes by five species of *Fusarium*. The results are given in Table 1. Amylase production was found to be stimulated due to fructose, lactose and maltose in all five species of *Fusarium* while, CMC showed inhibitory effect in all tested species of *Fusarium* and mannitol and sucrose inhibited

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Table 1 : Effect of carbohydrates on production of hydrolytic enzymes in *Fusarium* species

Sr. No.	*Fusarium* spp.	Cabohydrates (1%)						
		Control	Fructose	Lactose	Maltose	sucrose	CMC	Mannitol
Amylase*								
1.	*F.dimerum*	21	23	24	21	19	16	18
2.	*F.moniliforme*	23	25	28	24	22	20	20
3.	*F.oxysporum*	24	27	27	26	20	18	16
4.	*F.roseum*	18	22	24	27	18	14	21
5.	*F.semitectum*	20	25	29	26	18	17	27
Protease*								
1.	*F.dimerum*	12	18	12	20	06	10	13
2.	*F.moniliforme*	15	25	18	19	10	11	05
3.	*F.oxysporum*	18	20	19	20	12	07	08
4.	*F.roseum*	16	20	17	16	08	14	10
5.	*F.semitectum*	14	28	14	16	15	12	06
Lipase**								
1.	*F.dimerum*	09	10	12	06	08	10	-
2.	*F.moniliforme*	12	25	14	12	10	-	-
3.	*F.oxysporum*	16	20	16	10	-	18	14
4.	*F.roseum*	10	-	12	09	08	12	11
5.	*F.semitectum*	14	22	14	10	-	08	-

-- Nil, * Expressed as diameter of zone in mm.
** Units One unit is equivalent to 0.05N NaOH required to neutralize fatty acid liberated

F. oxysporum. Lactose proved to be best source for production of amylase in all tested fungi, and presence of maltose in case of *F. roseum* and mannitol in case of *F. semitectum*.

Protease production was found to be poor in sucrose, CMC and mannitol in all five species of *fusarium* while, fructose and lactose were found to be best sources for production of protease. Similar pattern was observed in maltose, sucroses with *F. oxysporum*, CMC and mannitol in *F. roseum*. Lipase production was more in case of fructose except *F. roseum*. In case of *F. oxysporum* the highest production of the lipase was in presence of CMC.

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