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DEXTRANASE PRODUCTION BY CERTAIN PLANT PATHOGENIC FUNGI

DEXTRANASE, which hydrolyses α-1, 6 glucosidic linkages in dextran, is of common occurrence in moulds and bacteria[1,2]. Though amylases are secreted by fungi they are reported not to hydrolyse any bonds in dextran even though the type of glucosidic linkage in dextran and starch is similar. Three soil-borne plant pathogenic fungi, *viz.*, *Rhizoctonia bataticola*, root-rot fungus of peanut, *Sclerotium oryzae*, stem-rot fungus of rice and *Fusarium oxysporum* f. *melonis*, the muskmelon wilt fungus were tested for the production of extra cellular dextranase and the results are reported here.

Czapek's medium containing dextran at 3% level as carbon source was dispensed in 50 ml quantities into 250 ml Erlenmeyer flasks, sterilized at 15 lb psi and inoculated with 8 mm disc of the fungi. Replicates were maintained for each organism. After 15 days of inoculation the biomass was filtered through previously oven dried and weighed filter-paper, dried at 105° C for 24 hr and reweighed. The dry weights of the biomass were recorded separately. The culture filtrates were retained for enzymes assay. The assay method described by Tsuchiya *et al.*[2], was followed with a modification for determining the dextranase activity. The reaction mixture contained 4 ml of 1% dextran suspended in sodium acetate-acetic acid buffer (pH 5·1), 2 ml of the buffer and 2 ml of the enzyme source. The release of the reducing sugar was estimated at 0 and 2 hr[3]. The activity of the enzyme on starch was also investigated.

The biomass production and enzyme activity of the three fungi are reported in Table I.

TABLE I

Effect of dextran on growth and dextranse production of the three fungi

Fungus	Biomass (mg)	Enzyme activity* (mg/ml)	
		On Dextran	On Starch
Rhizoctonia bataticola	250·0	0·223	0·295
Sclerotium oryzae	104·5	0·017	..
Fusarium oxysporum f. *melonis*	200·5	0·038	0 030

* Expressed as glucose equivalents.

Although Bourdu and Quilet[4] have reported the occurrence of dextran in the roots of *Anchusa sempervirens*, the substance, however, has not been located on most plant species[5]. Dextranase production by plant pathogens has not so far been reported. In the present study, of the three pathogens *R. bataticola* exhibited a marked dextranase activity and recorded a higher biomass followed by *F. oxysporum* f. *melonis* and *S. oryzae*. Interestingly, the culture filtrate from *R. bataticola* hydrolyzed starch effectively while that of *F. oxysporum* f. *melonis* showed only traces of activity. However, the enzyme from *S. oryzae* failed to act upon starch. Repression or inhibition of pathogen's enzyme(s) by fungitoxicants of the host, such as phenols was reported earlier[6 7 8]. The ability of *R. batatiola* and *F. oxysporum*. f. *melonis* to elaborate dextranase that can also act upon starch might therefore be of importance in pathogenesis as the dextranase might be active in case of amylase inhibition or repression by fungitoxicants of the host. Extracellular dextranase production by certain saprophytic fungi is well known[2]. All the three plant pathogens in the present study are soil-borne. Dextran is present in soil through the synthesis by soil bacteria[9]. Production of dextranase by these soil-borne plant pathogens

might therefore aid them in utilising dextran as a substrate in their saprophytic survival.

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FATTY ACID OXIDATION BY THE LEG MUSCLES OF *CYBISTER* BEETLE DURING VIGOROUS EXERCISE

IT is well recognized now that some insects are capable of utilizing fatty acids during their vigorous muscular activity as in flight[1-2]. Earlier studies have revealed that the flight muscles of some insects are capable of oxidizing only short chain fatty acids—butyrate and octanoate but not higher chain fatty acids—palmitate and stearate[3-4]. George and Bhakthan[5], observed that the flight muscle homogenate of the honey bee *Apis dorsetta* was capable of oxidizing butyrate.

That added carnitine stimulates fatty acid oxidation is now very well understood[6-7]. The aquatic dytiscid beetle *Cybister confusus* has an efficient leg muscle system. It is possible therefore that the leg muscles have an efficient biochemical machinary to meet the exigencies of energy demands, for all its spasmodic actions. The present investigation is aimed at ascertaining the ability of the leg muscles of the *Cybister* beetle to oxidize various fatty acids during its vigorous exercise.

The adult *Cybister* beetles, were vigorously exercised following the method described elsewhere[8]. Muscle homogenate and mitochondrial preparations were obtained as outlined in an earlier study[7]. Sodium salts of butyrate, octanoate, palmitate and stearate were used as substrates for fatty acid oxidation. The oxygen uptake by the different preparations was expressed as μl per mg protein per 30 min. The procedure followed was essentially similar to that described elsewhere[7]. The effect of added carnitine on palmitate oxidation was tested in the muscle homogenate as well as in the mitochondrial preparation with 0·15 M DL-carnitine. The protein contents of the homogenate and mitochondrial fraction were determined according to the method of Lowry *et al.*[9].

The respiratory measurements obtained by the unexercised and exercised leg muscles homogenate preparations (Table I) after the addition of the various fatty acids revealed that they are capable of oxidizing only short chain fatty acids butyrate and

TABLE I

Oxidation of butyrate, octanoate. palmitate and stearate by the exercised and unexercised leg muscle homogenates of the Cybister *beetle*

Substrates	O_2 uptake (μl/mg. protein/30 min.)	
	Unexercised	Exercised
Endogenous	38	46
Butyrate	49	55
Octanoate	45	55
Palmitate	37	37
Stearate	36	37
Succinate*	70	103

The results presented in Tables I and II are averages of three readings in each case.
* Used for comparison.

TABLE II

Effect of added carnitine on the palmitate oxidation by the leg muscle homogenate and mitochondrial fraction of the Cybister *beetle*

Substrates	O_2 uptake (μl/mg. protein/30 min.)	
	Homogenate	Mitochondrial pellet
Endogenous	39	32
Palmitate added	37	33
Carnitine added	45	39
Carnitine + Palmitate added	47	50