Research in Food Science and Nutrition

Volume 2

BASIC STUDIES IN FOOD SCIENCE

EDITORS
J.V. McLoughlin
B.M. McKenna

Proceedings of the Sixth International Congress of Food Science and Technology, Dublin, September 18 – 23, 1983

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SCREENING OF DEXTRANASE PRODUCING FUNGI

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Eleven fungal strains (Table 1) obtained from culture collections were screened for dextranase production. Each strain was grown in Kosasics screening medium (Biotechnol. Bioeng. XV, 729-741, 1973) at 24°C for 5 d in a reciprocating water bath operating at 100 rpm. Dextranase activities (Table 1) in cell-free filtrates of the cultures were determined on dextran agar diffusion plates. One dextranase unit was defined as that amount of activity which yielded reducing sugars equivalent to 1 μ mole of iso-maltose min^{-1} at pH 6.0 and 40°C.

TABLE 1 Production and some characteristics of selected fungal dextranases

Strain	Activity[1]	pH opt	temp. opt, °C	pH[2] stability	temp.[3] stability, °C	temp.[4] stability, °C
1) Aspergillus carneus	0.0121	-	-	-	-	-
2) A. carneus	0.0004	-	-	-	-	-
3) Chartomium gracile	0.4810	5.0	60	4.0-11.5	⩽ 60	65
4) Fusarium moniliforme	1.3371	4.0	60	4.5-5.5	⩽ 50	65
5) Paecilomyces lilacinus	0.3881	4.5	50	4.5-7.5	⩽ 65	70
6) Penicillium aculeatium	0.0287	-	-	-	-	-
7) Penicillium funiculosum	0.0257	-	-	-	-	-
8) P. funiculosum	0.0876	-	-	-	-	-
9) P. funiculosum	0.0664	-	-	-	-	-
10) P. funiculosum	0.0151	-	-	-	-	-
11) P. funiculosum	-	-	-	-	-	-

[1] dextranase activity (units ml^{-1}) of cell-free filtrates

[2] > 90% residual activity following 24 h exposure at 37°C

[3] 90% residual activity following heating for 1 min at reported temperature

[4] temperature causing 50% inactivation in 1 min

Based on the results of this primary screening, strains 3, 4 and 5 were selected for further study. The temperature and pH characteristics of cell-free filtrates (dialysed and lyophilized) from these strains, assayed by the blue dextran method of Mattiasson (Anal. Lett. 13(B10), 851-860, 1980), at 40°C and pH 5.0 unless otherwise stated, are summarized in Table 1 and Figs. 1-4. The optimum pH (Fig. 1) was determined on blue dextran dissolved in universal buffer (Analyst. 64, 490, 1939) over the pH range 3.0-7.5. The 3 enzymes lost activity abruptly at pH values slightly on the acid side of the optimum but showed activity over a wide pH range on the alkaline side.

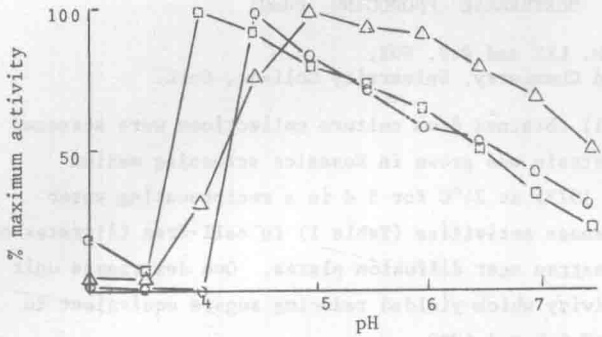

Fig. 1
Activity-pH profile on blue dextran at 40°C
Δ, strain 3
□, strain 4
o, strain 5

pH stability (Fig. 2) was determined by measuring the residual activity after incubation of the enzyme, dissolved in universal buffer at pH values from 3.0 to 11.5, for 24 h at 37°C; the dextranases secreted by strains 3 and 5 were very stable under strongly alkaline conditions. The 3 enzymes were maximally active at 50-60°C but lost activity rapidly > 60°C (Fig. 3). For the determination of heat stability (Fig. 4) the enzymes were dissolved in universal buffer pH 5.0, sealed in capillary tubes, heated for 1 min and the residual activity measured; the 3 enzymes were unstable >~65°C.

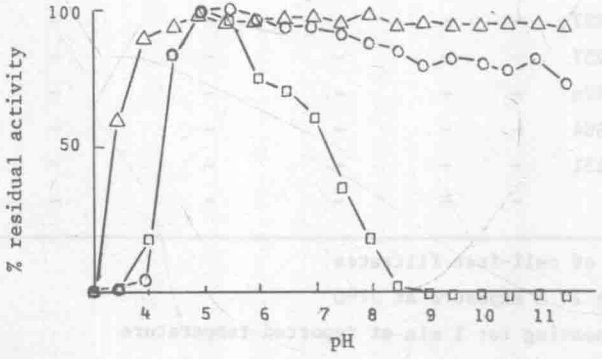

Fig. 2
pH-stability of the 3 dextranases at 37°C for 24 h
Δ, strain 3
□, strain 4
o, strain 5

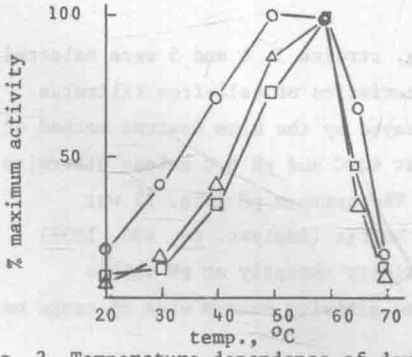

Fig. 3 Temperature-dependence of dextranase activity on blue dextran at pH 5.0
Δ, strain 3; □, strain 4;
o, strain 5.

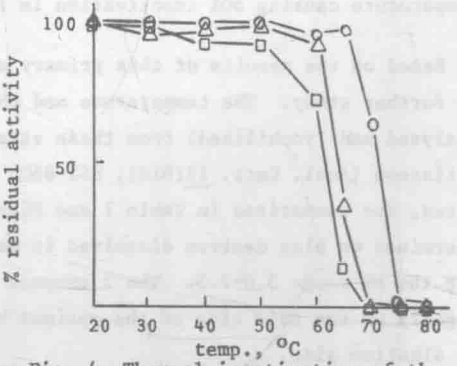

Fig. 4 Thermal inactivation of the dextranases on heating at pH 5.0 for 1 min: Δ, strain 3; □, strain 4; o, strain 5.