THE SOURCE OF CARBON AS A DETERMINANT IN DIASTASE-FORMATION BY *ASP. ORYZAE*

As a natural sequence to our studies on the influence of the nature of nitrogen in diastase-formation,[1,2] a study of the role of carbohydrates in diastase formation by *Asp. oryzæ* was taken up. The literature on this subject is meagre and though a certain amount of work has been done by Saito[3] and by Funke,[4] no details are available regarding the comparative diastase forming efficiency of the various forms of carbohydrates. The following is an attempt to determine the relative efficiencies of a group of the more commonly available carbohydrates in stimulating diastase-production by *A. oryzæ*.

Experimental

The carbohydrates used are arabinose, xylose, galactose, glucose, mannose, lactose, maltose, sucrose, raffinose, inulin and starch. The nitrogen source for the organism was potassium nitrate. The salt mixture was composed of KH_2PO_4—2·5 gms., $MgSO_4.7H_2O$—0·5 gm., $CaCl_2.2H_2O$—0·5 gm., $ZnSO_4$—0·025 gm., $FeSO_4.7H_2O$—0·0'5 gm. (dissolved in water, enough HCl added to dissolve the precipitate and volume made up to 250 c.c.).

The composition of the media was as follows: Carbohydrate equivalent to 20 mg. carbon; KNO_3 equivalent to 2 mg. nitrogen; salt solution 0·5 c.c.

Final pH adjusted to 6·5 and vol. made upto 4 c.c. in each case. The method of growing the fungus[5] and the determination of the diastatic activity of the extracts[6] are the same as described previously. The results are given below:—

Table I

Total Activity of the Extracts in Lintner Units

Carbohydrate	Arabinose	Xylose	Galactose	Glucose	Mannose	Lactose
Total Activity (L.U.)	23·1	31·9	28·8	127·9	19·6	15·7

Carbohydrate	Maltose	Sucrose	Raffinose	Inulin	Starch
Total Activity (L.U.)	282·4	53·2	45·9	6·9	280·0

Discussion and Conclusions

The results show that starch and its hydrolytic products, glucose and maltose, are prominent as diastase producers. The other carbohydrates are not efficient in stimulating diastase-formation, the lævorotatory inulin being the poorest. The same phenomenon of increased diastase-production by starch, maltose and glucose in the case of *Asp. niger* has been observed by Funke.[7] Only slight growths were obtained in the case of arabinose, lactose, mannose and inulin; a better growth was, however, secured with raffinose, galactose and xylose as the source of carbon. Sucrose gave rise to a fairly good growth, but in the case of maltose, glucose and starch there was abundant growth.

The increased diastase production by *Asp. oryzæ* with maltose and starch as carbon sources is in accordance with Yudkin's "mass action theory of enzyme formation,"[8] which postulates the mediation of a precursor for the elaboration of adaptative enzyme. The precursor which in the cell may be quite a negligible amount is supposed to be in equilibrium with the enzyme. The addition of the precursor, usually the substrate or its hydrolytic intermediaries will shift the equilibrium in favour of an increase in the concentration of the enzyme.

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