B. SUMMARY

Title:	Large-scale production of α-amylase from *Aspergillus oryzae*
Research institute:	University of Jaffna
Chief Scientific Investigator:	Prof. V. Arasaratnam
Period of contract:	2nd April 1996 to 17th October 1998
(Dates of award and completion)	

Scientific Background and scope / objectives of the project

As the strain *A. oryzae* 22788 produced very low α-amylase activity, it was decided to isolate a good α-amylase producing. *A. oryzae* strain from natural sources like rice. Despite the progress in submerged cultures, surface cultivation, which was a common method in traditional fermentation processes, has shown little progress and significant expansion of application. However taking into consideration, the simplicity of the cultivation equipment and lower expense for operation, more application of this traditional method with advanced knowledge is being expected by developing country like Sri Lanka. Hence solid surface cultivation was selected to produce α-amylase from *A. oryzae*. Cheap carbon and nitrogen sources such as rice bran, wheat bran, soy meal powder can be utilized for large scale production of α-amylase.

Experimental method

Different *A. oryzae* strains were isolated from rice medium and *A. oryzae* B_{12} was he best among the strains. It was maintained by serial transfer fortnightly on a Potato Dextrose Agar (PDA) medium.

Studies were conducted in rice bran, soy meal powder and wheat bran as the initial raw material. Effect of different rice bran/wheat bran to soy meal powder were studied. The medium was inoculated with spores with concentration of 10^7 spores g^{-1} medium.

Under the optimized ratio of rice bran to soy meal powder, effect of different age and size of the spore inoculum were studied.

Effect of different extractants, extraction time, extractant pH and mouldy medium to extractant ratio were studied.

Results obtained

Enzyme extraction was increased up to 30 min and there after no significant increase in activity was observed when the enzyme from mouldy medium was extracted using distilled water as extractant (Table 7). Enzyme was best extracted in 0.01M citrate-phosphate buffer (pH 5.2) in the mouldy medium to buffer ratio of 1 : 8 (Table 7 and 8). The optimum pH for extraction was 4.5 (Table 9).

The results on effect of different age and size of the spores on α-amylase production are given in Figures 3 & 4.

Maximum α-amylase activity obtained at 96h of cultivation of different ratios of soy meal powder to rice bran (5:0, 4:1, 3:2, 2:3, 1:4 and 0:5) on enzyme production are given in Figure 5. The substitution of rice bran with wheat bran at the same ratios as rice bran led to a reduction in time from 96h to 48h and maximum activities obtained are given in Figure 6.

Conclusions

Enzyme was best extracted in 0.01M citrate-phosphate buffer (0.01M) at pH 4.5, in the mouldy medium to buffer ratio of 1:8. Fermentation time for α-amylase production by *A. oryzae* B_{12} has been shortened from 114h to 48h by using a medium containing soy meal powder to wheat bran in the ratio of 1:4.