Production of Animal Feed Protein from Vignaunguriculata and Cicerarietinum

S.Anbuselvi, JeyanthiRebecca, L.Sharmila S.Merina Paul Das

ABSTRACT--- Single cell proteins are rich essentialin nutritive aminoacids,the building blocks of protein are highly essential for the maintenance of the living system. SCP is used as animal feed and dietary rich food for humans. Many raw materials are used for the production of SCP. This work was carried out to extract a single cell protein from yeast using Vignaunguriculataand Cicerarietinums substrate. The maximum yield of crude protein was observed in 15days of fermentation.

Keywords— single cell protein,nitrogen ,carbon,fermentation.

INTRODUCTION

The rapid increase of population and rapidly declinewasteof natural resources have showed drought, infertile soil and food scarcity ,specifically protein shortages in world countries since the latter half of 20th century. Single Cell Protein production has evolved as angood alternative. The dried cells of microbes produced commercially as source of essentialaminoacids and used as human food or animal feed which are collectively known as SCP[1-4].

Yeasts,aunicellular microbeis readily suitable to cultivation of protein rich food and to manipulate process needs[4-8]. Thus in a considerable advancement in biotechnology to make yeast based food and animal feed products.TheTproduction stands as the goodalternative to supplement the requirements of protein rich food and feed-grade protein, vitamins and amino acids[10,11]. Pulse husks are rich source of protein which increases the quality of proteins.

MATERIALS AND METHODS

Cowpeaand chick pea husk waste were collected from dal processing industry. This was used as substrate for submerged fermentation using yeast to extract single cell protein. Isolation of yeast and subculturing procedures was carried out as described by Kreger-Vanrij[12,13].

MEDIA PREPARATION

Production of SCP was carried out in afermented mediumwith different carbon and nitrogen sources at a pH of 5.Each medium was poured into 250 ml flask and autoclaved for 15 minutes. Take few ml of inoculums of yeast from main culture was poured into each medium. The process was kept at 25-28ºC under good static conditions. The determination of product and its different parameters were carried out in 6-10 day intervals[14-16]. Protein and carbohydrate content of the sample were analyzed[17-21] .

Revised Manuscript Received on July 10, 2019.

S.Anbuselvi, Department of IBT,BIHER, Chennai-73, T.N,India. (anbuselvichennai@yahoo.com)
JeyanthiRebecca, Department of IBT,BIHER, Chennai-73. T.N,India.
L.Sharmila,S, Department of IBT,BIHER, Chennai-73. T.N,India.
Merina Paul Das, Department of IBT,BIHER, Chennai-73. T.N,India.

RESULTS AND DISCUSSION

Protein rich in legumes were subjected to submerged fermentation for production of SCP from yeast using cowpeaand chick peahuskas substrate [23,24]. The different carbon sources used were glucose,fructose, lactose and maltose. Production of SCP is enhanced on a nitrogen source of urea and peptone[25,26].

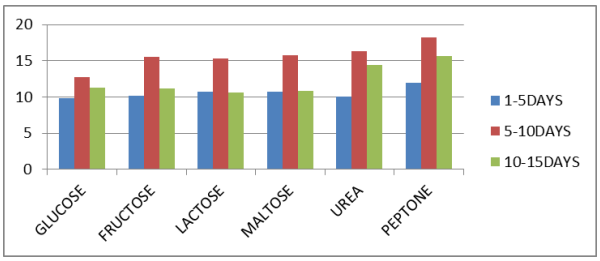

Figure1: Protein profile in different carbon and nitrogen sources

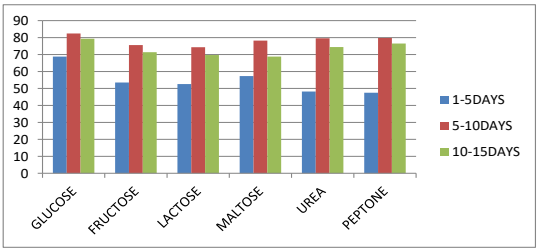

Figure2:Carbohydrate profile in SCP yield at carbon and nitrogen sources

The nutritive source of cowpea husk and chick pea husk were analyzed by various biochemical assays. The nutritive value of pulses husk were changed when treated with anaerobic fungi. The protein concentration in cowpea husk was found to be rapid increase in fructose substituted medium (8.2mg). It attained good product of 9.2mg in 6-10days of fermentation, but rapidly reduced to 4.4mg of protein (Fig 1,2). The nitrogen source of peptone was found to be rapid yield of 7.5mg in last stages of fermentation. Similar results were also observed in green gram and Bengal gram husk[27,28].

The carbohydrate was found to be better in fructose enriched medium (51.8mg) in final stage of fermentation. The sugar was gradually raised from 6-10days and slow rate of reduction at15days of fermentation. The sugar content

was found to be low in nitrogen rich of urea and peptone at starting stage of fermentation but rapidly raised to 57.5/100mg in final fermentation (Fig 2). These changes indicated the rapid uptake of carbon and nitrogen sources for stimulation of protein enriched product [29,30].

Glucose enriched medium showed maximum amount of carbohydrate (84.4mg) in 6-10days of process. The carbohydrate was found to be higher in lactose substituted medium. The nitrogen sources of peptone and urea enriched medium showed 41mg of carbohydrates than carbon enriched medium

CONCLUSION

The product of SCP in an yeast medium along with nutrient source of husk of *unguriculata andCicer* were possible by submerged fermentation. The quality of SCP depends on the nutritive source of waste used and stages of product . The supplementation of sugar and ammonium rich constituents were utilized by microbes to stimulate SCP production.

REFERENCES

1. Foss EJ, Genetic basis of proteome variation in yeast: *Nature Genet*. 39,2007, 1369–1375.
2. Das, J., Paul Das, M., Velusamy, P., "Sesbaniagrandiflora leaf extract mediated green synthesis of antibacterial silver nanoparticles against selected human pathogens", SpectrochimicaActa - Part A: Molecular and Biomolecular Spectroscopy, v-104, pp-265-270, 2013.
3. Shell M, New developments in bread making: Food Manufacture,7,1997, 72, 21-22
4. Vijayaraghavan, K., Nalini, S.P.K., Prakash, N.U., Madhankumar, D., "Biomimetic synthesis of silver nanoparticles by aqueous extract of Syzygiumaromaticum", Materials Letters, v-75, pp-33-35, 2012.
5. IyayiEA.and D.M. Losel, Protein Enrichment of cassava By-Products through Solid State Fermentation by Fungi: The Journal of Food Technology in Africa,6(4),2001, 116-118 .
6. Caroline, M.L., Sankar, R., Indirani, R.M., Vasudevan, S., "Growth, optical, thermal and dielectric studies of an amino acid organic nonlinear optical material: l-Alanine", Materials Chemistry and Physics, v-114, i-1, pp-490-494, 2009.
7. Humphrey, AE, Product outlook and technical feasibility of SCP,1975,1–3. Cambridge, Massachusetts, MIT Press
8. Vijayaraghavan, K., Nalini, S.P.K., Prakash, N.U., Madhankumar, D., "One step green synthesis of silver nano/microparticles using extracts of Trachyspermumammi and Papaversomniferum", Colloids and Surfaces B: Biointerfaces, v-94, pp-114-117, 2012.
9. Khaerlyaled, .GhanemM, Abdelmonem EL,.Refai and Magda EL. Gazaerly , Some fermentation parameters influencing Single Cell Protein production by Saccharomyces uvarum: Agricultural Wastes, 15,1987, 113-1206
10. Prabhakar, J., Senthilkumar, M., Priya, M.S., Mahalakshmi, K., Sehgal, P.K., Sukumaran, V.G., "Evaluation of Antimicrobial Efficacy of Herbal Alternatives (Triphala and Green Tea Polyphenols), MTAD, and 5% Sodium Hypochlorite against Enterococcus faecalis Biofilm Formed on Tooth Substrate: An In Vitro Study", Journal of Endodontics, v-36, i-1, pp-83-86, 2010.
11. Kreger-van Rij The Yeasts a taxanomic study:.Ameterdam; Elsevier Science,1984,247.
12. Khanaa, V., Thooyamani, K.P., Udayakumar, R., "Cognitive radio based network for ISM band real time embedded system", Middle - East Journal of Scientific Research, v-16, i-12, pp-1798-1800, 2013.
13. Mandels M, Hantz L. and Nystrom J. 1974. Enzymic hydrolysis of waste cellulose: Biotech. and Bioeng,16, 1974, 1471– 1484.
14. Khanaa, V., Mohanta, K., Saravanan, T., "Comparative study of uwb communications over fiber using direct and external modulations", Indian Journal of Science and Technology, v-6, i-SUPPL.6, pp-4845-4847, 2013.
15. Pujol, F and Susan B,Production of single cell protein from plantain skin: European Journal of applied microbiology and biotechnology 18,1983,361-368.
16. Kumaravel, A., Pradeepa, R., "Efficient molecule reduction for drug design by intelligent search methods", International Journal of Pharma and Bio Sciences, v-4, i-2, pp-B1023-B1029, 2013.
17. Ranganna.S, Manual of Analysis of fruit and vegetable products:1997**,** New Delhi
18. Harish, B.N., Menezes, G.A., "Antimicrobial resistance in typhoidal salmonellae", Indian Journal of Medical Microbiology, v-29, i-3, pp-223-229, 2011.
19. Lowry,OH,Rosebrough,N J, Farr AL and Randall RJ,Protein estimation: J.Biol.Chem,1951,93 – 195.
20. Caroline, M.L., Vasudevan, S., "Growth and characterization of an organic nonlinear optical material: l-alanine alaninium nitrate", Materials Letters, v-62, i-15, pp-2245-2248, 2008.
21. JE Hodge and BT Hofreiter., Carbohydrate analysis:*Methods in Carbohydrate chemistry,*1962, New York.
22. Kumar Giri, R., Saikia, M., "Multipath routing for admission control and load balancing in wireless mesh networks", International Review on Computers and Software, v-8, i-3, pp-779-785, 2013.
23. Dunlap CE, Production of singlecell protein from insoluble agricultural wastes by mesophiles in SCPII:1975 , Cambridge, Massachusetts, MIT Press,244-268.
24. Kumaravel, A., Udhayakumarapandian, D., "Consruction of meta classifiers for apple scab infections", International Journal of Pharma and Bio Sciences, v-4, i-4, pp-B1207-B1213, 2013.
25. BhaskarMitra, .Vishnu das D, Rahul Nair R and Lijinragavan , Biochemical studies on growth of single cell protein with yeast extract supplement under varied biotic and abiotic factors: Asian J of Food and Agro Industry , 5(4),2012,:234-250.
26. Kumarave, A., Udayakumar, R., "Web portal visits patterns predicted by intuitionistic fuzzy approach", Indian Journal of Science and Technology, v-6, i-SUPPL5, pp-4549-4553, 2013.
27. S.Anbuselvi**,**SurabhiMahalanobis and ManasJha , Optimization of singlecell protein using Green gramhusk and Bengal gram husk by yeast" International Journal of Pharm. Sci.Rev Research 2013, 28(1) 35; pp188-190.
28. Poongothai, S., Ilavarasan, R., Karrunakaran, C.M., "Simultaneous and accurate determination of vitamins B1, B6, B12 and alpha-lipoic acid in multivitamin capsule by reverse-phase high performance liquid chromatographic method", International Journal of Pharmacy and Pharmaceutical Sciences, v-2, i-SUPPL. 4, pp-133-139, 2010.
29. AmitkumarMondal,SamadritaSengupta,JayatiBhowal and DK Bhattacharya, Utilization of fruit wastes producing single cell protein:Interl.J. Sci.,Environ.Technol.,1(5);2012,430-438.
30. Anbuselvi, S., Chellaram, C., Jonesh, S., Jayanthi, L., Edward, J.K.P., "Bioactive potential of coral associated gastropod, Trochus tentorium of Gulf of Mannar, Southeastern India", Journal of Medical Sciences, v-9, i-5, pp-240-244, 2009.