

**EFFICACY OF FERMENTED VEGETABLE
DISCARDS AS A DIETARY INGREDIENT FOR
SHRIMP FEED**

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By

**SAJITHA, S., M. F. Sc.
(MC- 226)**



भक्त अनुप
ICAR

**CENTRAL INSTITUTE OF FISHERIES EDUCATION
(DEEMED UNIVERSITY)**

MUMBAI – 400061

MAY 2010



Dedicated to my family



केन्द्रीय समुद्री मात्स्यिकी अनुसंधान संस्थान

(भारतीय कृषि अनुसंधान परिषद)

पोस्ट बॉक्स सं 1603, एरणाकुलम उत्तर डा.घ., कोचिन - 682 018

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE

(Indian Council of Agricultural Research)

Post Box No.1603, Ernakulam North P.O.

Cochin - 682 018, Kerala State, India.

Phone:(Off)

: 2394867/.....Ext.

2391407

Telegram

CADALMIN, EKM

Telex

0885-6435 MFRI IN

Fax

0091-0484- 2394909/2396685

E-mail


mdcmfri@md2.vsnl.net.in

Dated: 31 May, 2010

CERTIFICATE

Certified that the thesis entitled "EFFICACY OF FERMENTED VEGETABLE DISCARD AS A DIETARY INGREDIENT FOR SHRIMP FEED" is a record of independent bonafide research work carried out by **Mrs. Sajitha, S (MC-226)**, during the period of study from October 2004 to May 2010 under our supervision and guidance for the degree of **Doctor of Philosophy (Mariculture)** at Central Marine Fisheries Research Institute, Cochin, and that the thesis has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or any other similar title.


Major Advisor/Chairperson



Dr. M. N. Venugopal.

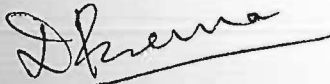

Dr. Imelda Joseph, Senior Scientist


Mariculture Division
CMFRI, Cochin-18

Advisory Committee


Dr. R. Paul Raj, Member secretary
Coastal Aquaculture Authority
Govt. of India, Chennai
Co-chairman


Dr. L. Krishnan, Senior consultant
IGNOU, Cochin
Member


Dr. D. Prema, Senior scientist
FEMD, Member


Dr. Somy Kuriakose, Senior scientist
FRAD, Member

DECLARATION

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Sajitha

(Mrs. SAJITHA, S)

Ph.D. Scholar

Post Graduate Programme in Mariculture

Central Marine Fisheries Research Institute

31st May 2010

Cochin.



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Date 31th May 2010

Place Cochin

Sajitha
(Sajitha S)

सारांश

स्थानीय बाजारों से छोड़े गए मिश्रित तरकारियों को जीवाणु, *बासिलस लिचेनिफोर्मिस* एम टी सी 6824 और *बासिलस कोयागुलन्स* एम टी सी सी 2449 और कवक, *आस्पेरगिल्लस ओरीज़िए* एन टी आई एम 2010 अलग अलग प्रकार उपयुक्त करके किण्वन किया गया। जीवाणु किण्वन के लिए 5 वस और कवक किण्वन के लिए 15 दिवस लग गए और प्रोक्सिमेट मिश्रण और अमिनो आसिड पोफाइल के परिवर्तन का अध्ययन किया गया। *बी. लिचेनिफोर्मिस* और *ए. ओरीज़िए* द्वारा क्रमशः 4 और 12 दिनों में किण्वित उत्पादों (बी एल एफ पी और ए ओ एफ पी) को उनके एमिनो आसिड पोफाइल, प्रोक्सिमेट मिश्रण, खनिज (Cu, Zn, Mg, Mn और Fe) फाइटिक अम्ल स्तर के आधार पर घंट खाद्य के संघटक के रूप में उपयुक्त किया गया। दोनों बी एल एफ पी और ए ओ एफ पी का परीक्षण I और परीक्षण II में क्रमशः *पी. मोनोडोन* के आहार में पशु डिम्भक के लिए 10, 15 और 20% की दर में और किशोरों के लिए 5, 9 और 12% की दर में समावेशन हुआ। सभी आहारों का ऊष्मय मान 3240 cal g^{-1} से ऊपर था। लगभग 45 दिनों के लिए परीक्षणात्मक आहार से खिलाए गए चिंगटों की प्रतिक्रिया की तुलना >50% पशु प्रोटीन और अकिण्वित मिश्रित तरकारी चूर्ण से बनाए गए प्राणिज्यिक चिंगट खाद्य (यू एफ पी) से खिलाए गए चिंगटों से की गयी। बढ़ती, खाद्य परिवर्तन अनुपात (एफ सी आर) और प्रोटीन क्षमता अनुपात (पी ई आर) के आधार पर 9-12% ए ओ एफ पी और 10-15% बी एल एफ पी समावेशित आहार की क्षमता बेहतर देखी गयी। सामान्यतः किण्वित तरकारी उत्पादों युक्त खाद्य से खिलाए गए चिंगटों की बढ़ती और खाद्य उपयोगिता क्षमता यू एफ पी खाद्य से खिलाए गए चिंगटों की अपेक्षा उच्चतम देखी गयी। *पी. मोनोडोन* पशु डिम्भक में किए गए परीक्षण I में 10% ए ओ एफ पी युक्त खाद्य वजन बढ़ाव (375%), एस जी आर (0.67%), पी ई आर (0.43) और एफ सी आर (3.93) की दृष्टि से बेहतर देखा गया। 20% बी एल एफ पी (1439%) युक्त खाद्य में एपारेन्ट नेट प्रोटीन यूटिलाइजेशन उच्चतम था। *पी. मोनोडोन* के किशोरों में किए गए परीक्षण II में, 9-12% ए ओ एफ पी युक्त खाद्य वजन बढ़ाव और एस जी आर की दृष्टि से बेहतर देखा गया। 9% और 12% ए ओ एफ पी (0.26) युक्त खाद्य में प्रोटीन क्षमता अनुपात उच्चतम दिखायी पडी। 12% ए ओ एफ पी युक्त खाद्य में खाद्य परिवर्तन क्षमता कम देखी गयी। 9% बी एल एफ पी (79.24%) युक्त खाद्य में ए एन पी यू अधिकतम था। परीक्षण I में 15% बी एल एफ पी (34.26%) युक्त खाद्य ने उच्चतम प्रोटीन पाच्यता और 10% बी एल एफ पी (74.23%) युक्त खाद्य ने उच्चतम वसा पाच्यता दिखायी। दूसरे परीक्षण में, 9% ए ओ एफ पी युक्त खाद्य ने उच्चतम प्रोटीन (68.93%) और वसा (77.24%) पाच्यता दिखायी। परीक्षण I और II में क्रमशः 20% बी एल एफ पी (75%) और 9% बी एल एफ पी (68%) युक्त खाद्य से खिलाए गए चिंगटों में कारकास प्रोटीन का उच्चतम संचयन देखा गया। परीक्षण I और II में क्रमशः 15% बी एल एफ पी (7.93%) और 12% ए ओ एफ पी (8.09%) युक्त खाद्य से खिलाए गए चिंगटों में ऊतक लिपिड का स्तर उच्चतम देखा गया। परीक्षण I और II में क्रमशः ए ओ एफ पी 1 (21.66%) और ए ओ एफ पी 2 (23.86%) के लिए सूखी चीजों की प्रतिशतता देखी गयी। वर्तमान अध्ययन से यह मालूम पडा कि *पी. मोनोडोन* के खाद्य में 9-12% ए ओ एफ पी और 10-15% बी एल एफ पी समावेशित करने से बढ़ती, अतिजीवितता और शारीरिक संघटन में कोई प्रतिकूल प्रभाव नहीं देखा गया।

ABSTRACT

Mixed vegetables discards from the local market were fermented using bacteria, *Bacillus licheniformis* MTCC 6824 and *Bacillus coagulans* MTCC-2449, and fungus, *Aspergillus oryzae* NCIM 2010 individually. The bacterial fermentation was carried out for 5 days and fungal fermentation for 15 days and changes in the proximate composition and amino acids profile etc. were studied. *B. licheniformis* and *A.oryzae* fermented products (BLFP and AOFP) derived on days 4 and 12 respectively were used as a shrimp feed ingredient based on their amino acids profile, proximate composition, mineral (Cu, Zn, Mg, Mn and Fe) and phytic acid levels. Both BLFP and AOFP were incorporated in *P. monodon* diet at the rate of 10, 15, 20 % and 5, 9, 12 % in trial I and trial II respectively. The calorific value of all the diets was above 3240 cal g⁻¹. The response of shrimp fed on the experimental diets for 45 days was compared with a commercial shrimp feed (CF), a feed prepared with >50% protein of animal origin (NCF) and an unfermented mixed vegetable discard powder incorporated feed (UFP). On the basis of growth, food conversion ratio (FCR) and protein efficiency ratio (PER), 9-12% AOFP and 10-15 % BLFP incorporated diets were found to exhibit improved performance. In general, growth and feed utilization efficiencies of shrimp fed diets containing fermented vegetable product were superior to those fed diets containing UFP. In trial I with *P. monodon* postlarvae, diet with 10% AOFP recorded better performance in terms of weight gain (375%), SGR (0.67%), PER (0.43) and FCR (3.93). ANPU was the highest for diet with 20% BLFP (1439%). In trial II *P. monodon* juveniles fed diets containing 9-12 % AOFP performed better in terms of weight gain and SGR. PER was the highest for diet with 9% and 12% AOFP (0.26). Lower FCR (5.73) was observed in diet 12% AOFP. ANPU was the maximum for diet with 9% BLFP (79.24%). Diet with 15% BLFP showed the highest protein digestibility (34.26%), and diet with 10% BLFP showed highest fat digestibility (74.23%) in trial I. In the second trial, diet with 9% AOFP showed the highest protein (68.93%) and fat (77.24%) digestibility. The highest accumulation in carcass protein was recorded in shrimp reared on diet with 20% BLFP (75%) and 9 % BLFP (68%) in trial I and II respectively. The highest tissue lipid level occurred in shrimp fed with the diet containing 15% BLFP (7.93%) and 12% AOFP (8.09%) in trial I and II respectively. The dry matter percentage was obtained for AOFP1 (21.66%) and AOFP2 (23.86%) in trial I and II respectively. From the present study, it is concluded that an inclusion level of 9-12 % AOFP or 10-15 % BLFP in the diet of *P. monodon* do not have any adverse effect on growth, survival, and body composition.

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INTRODUCTION