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Isolation and Characterization Study of Feather Degrading Bacteria

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Keywords: Feather, Compost, Keratinase, Degradation.

ABSTRACT

In present study, we first to reduce the problem of feather disposal & reduce the environmental pollution and also produce feather compost which can be used in agricultural field. Feather show 90% protein in its composition. The main component can be keratin protein. It is fibrous and insoluble in nature protein is highly cross-linked with disulphide bonds. In chicken, feather accounts up to 5-7% of the live weight. Three different bacterial were screened from natural habitat i.e. soil whose degradation potential is considerable & identified with the help of biochemical test and on VITEK-2 autoanalyzer. The Isolate no II shows considerable feather degradation, this indicate that Isolate no II have good potential for keratinase enzyme production. The present study helps to screen keratinase producing microorganisms and it's potential for enzyme production.



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INTRODUCTION

Chicken Feather is waste product of poultry industry. Billion's tons of waste are generated each year by a commercial poultry industry. Poultry farms are distributed throughout the country especially in rural India and creating a serious solid waste problem in India. Even in metro polian cities traditional disposal strategies of chicken feather is not properly designed. Existing methodology is expensive and not much effective. They are often burned in incineration plants buried in land fields or recycled into low quality animal feed. This disposal method is restricted to generate greenhouse gases & pause to danger to environment. Poultry feather contain about 90% keratin & because of high mechanical stability & resistant to proteolysis. Poultry waste needs to treat throughout proper way to minimize greenhouse effect which pose hazardous impact on environment. So attempt were made isolate keratinase producing bacteria for degradation of feather in a poultry wast. In recent years, feather treated with microbial keratinase is attracting wide attention with several applications. Keratinase-used to treated feather is increasingly considered as a viable source of dietary protein in food and feed supplements, as the enzyme-treated end product retained high nutritive value. The present studies detect the use of these approaches to characterize and improve keratinase production by isolates obtained from poultry farms and feather dumps.

MATERIALS AND METHODS

Screening of feather degrading bacteria from soil sample:- Soil sample was collected from near poultry farm and are spread on nutrient agar plate three different type of colony are detected these are collected for feather degradation.

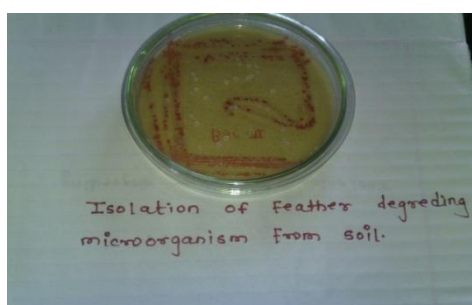
Identification Feather degrading bacteria:- Isolated feather degrading bacteria on nutrient agar medium these are identified with the help of biochemical test and on VITEK-2 autoanalyzer.

Pilot-scale degradation:- 100 gm hammer milled feather where transferred to sterile tray. Uniform bed were prepared 0.5N NaCl solution was sprayed on it and 10ml suspension of three different isolated were added on it. Then tray was incubated at room temperature for 5 days. During incubation period after every 5 hours interval water was spread on it to maintain an osmotic content.

Detection of Feather Degradation:- After a selection well isolated colony was transferred into nutrient broth. Then a three feather selected which weight were noted, selected colony inoculated in peptone broth and after incubation of 5 day measure the weight loss of feathers.

RESULTS AND DISCUSSION

The Soil sample collected from near poultry farm area these soil sample was spread on nutrient agar medium three different type colony isolated there colony character, Gram staining, biochemical characterization study was done

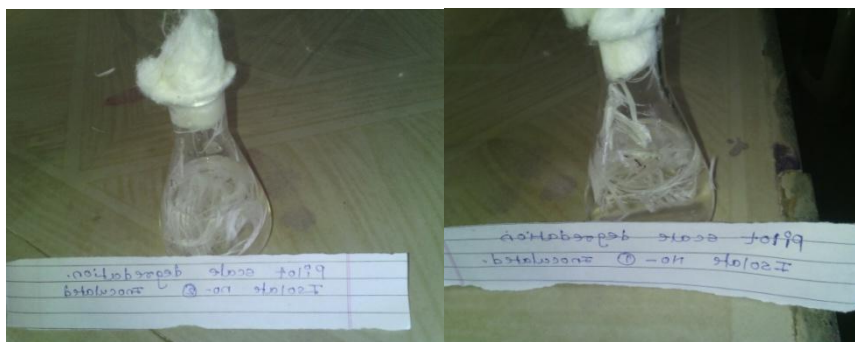


These bacteria identified on VITEK-2 in this machine at a onetime 64 biochemical test was done.

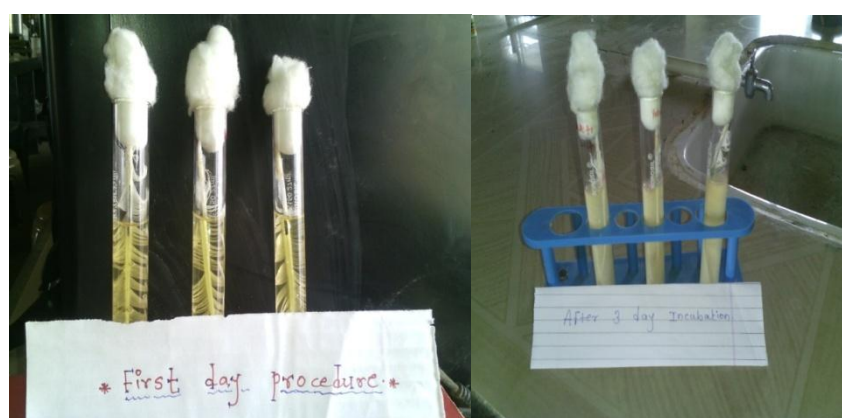
Biochemical Tests Results

Name of Biochemical tests	Isolate I	Isolate II	Isolate III
Fructose	A, G	A	A
Lactose	A	A, G	A
Starch	-	-	-
Casein	+	+	+
Gelatin	-	-	+
Caseinase	+	+	+
Catalase	-	-	-
Indole production	-	-	-
Methyl Red	-	-	-
Voges proscauer test	-	-	-

Pilot scale degradation



Degradation process



100 gm hammer milled feather were transferred to sterile tray. Uniform bed were prepared 0.5N NaCl solution was sprayed on it and 10ml suspension of isolate no. II was added on it. Then tray was incubated at room temperature for 5 days. During incubation period after every 5 hours interval water was spread on it to maintain an osmotic content from these process, we can prepare feather compost these feather compost is useful in agricultural field.

Isolate No.	Feather	Weight of Feather before Degradation	Weight Of Feather After Degradation	Weight Loss
Isolate I	Feather-1	0.130 gm	0.108 gm	0.022 gm
Isolate II	Feather-2	0.230 gm	0.150 gm	0.10 gm
Isolate III	Feather-3	0.150 gm	0.121 gm	0.02 gm

Detection of results after incubation period

A isolate II have a maximum potential to produce keratinase enzyme at room temperature for 3 days incubation. The Isolate II is confirm identified on VITEK-2 autoanalyzer. Optimum pH and temperature is 7.2 and 26⁰C suspectively.

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Patient Name: RAHUL SHELKE
Location: Lab ID: KS101015
Organism Quantity: Selected Organism: *Serratia marcescens*
Source: UNKNOWN
Patient ID: KS101015
Physician: WALCHAND COLLEGE
Isolate Number: 1
Collected: Oct 10, 2015

Comments:

Identification Information
Selected Organism: *Serratia marcescens*
Analysis Time: 3.50 hours
Status: Final
Probability: 98%
Bionumber: 6127713455156330

Analysis Messages

Biochemical Details																	
2	APPA	-	3	ADO	+	4	PyrA	+	5	IARL	+	7	dCEL	-	9	BGAL	-
10	H2S	-	11	BNAG	+	12	AGLTp	-	13	dGLU	+	14	GGT	+	15	OFF	+
17	BGLU	+	18	dMAL	+	19	dMAN	+	20	dMNE	+	21	BXYL	-	22	BALap	-
23	ProK	+	26	LIP	+	27	PLIE	-	29	TyrA	-	31	URE	-	32	BSOR	+
33	SAG	+	34	dTAG	-	35	dTRE	+	36	CIT	+	37	MNT	-	38	SKS	+
40	ILATr	+	41	AGLU	-	42	SUCT	-	43	NAGA	+	44	AGAL	-	45	PHOS	+
46	GlyA	-	47	ODC	+	48	LDC	+	53	IHISa	+	56	CMT	+	57	BGUR	-
58	O129R	+	59	GGAA	+	61	IMLTa	-	62	ELLM	-	64	ILATa	-			

Identification of Isolate II on VITEK-2

CONCLUSION

Our study has been covered the major problem about the disposal & recycling of feather & also there ancient recycling method. By attempting this study we reduce the problem of feather disposal & reduce the pollution of environment and also from these waste we can synthesize feather compost. In this result also shows Isolate II (*Serratia marcescens*) it has highest capacity to degrade feather.

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