



ISO-9001:2008

MICROBIAL PROCESS FOR DEGOSSYPOLIZATION AND NUTRITIVE ENRICHMENT OF COTTONSEED CAKE



भा.कृ.अनु.प.- केंद्रीय कपास प्रौद्योगिकी अनुसंधान संस्थान

ICAR - Central Institute for Research on Cotton Technology (ICAR-CIRCOT)

D.A.R.E., Ministry of Agriculture & Farmers Welfare, Govt. of India

Adenwala Road, Matunga, Mumbai- 400019 (MH) INDIA

INTRODUCTION

Cottonseed cake (CSC) is rich in protein and well known feed for ruminants. CSC contains 20 to 25% protein, 30 to 35 % fibre and 3-4% ash. However, the use of CSC for non-ruminants feed is highly limited due to the presence of toxic compound called gossypol and low level of essential aminoacid, lysine. Gossypol is a binaphthyl dialdehyde and present in two forms viz., free and bound. CSC contains 0.2 to 0.5 % free gossypol and 1 to 2 % bound gossypol. The epsilon group of lysine reacts with free gossypol and forms bound gossypol. The presence of free gossypol in animal diet is more toxic to non-ruminants than ruminant animals. The toxicity of free gossypol to animals includes growth depression, reproductive diseases and internal organ abnormalities and in higher concentration may even cause death. There is a possibility of conversion of bound gossypol into free gossypol in the digestive tract of non-ruminants. Hence, the prerequisite for CSC to be used as non-ruminants protein supplement is reduced concentration of free and bound gossypol and improved lysine content.

SCOPE OF THE TECHNOLOGY

Value-addition by means of gossypol reduction and nutritive quality improvement to cottonseed extractions such as Undecorticated and Decorticated CSC and De-oiled cake for its use in ruminants and non-ruminants feed industries.

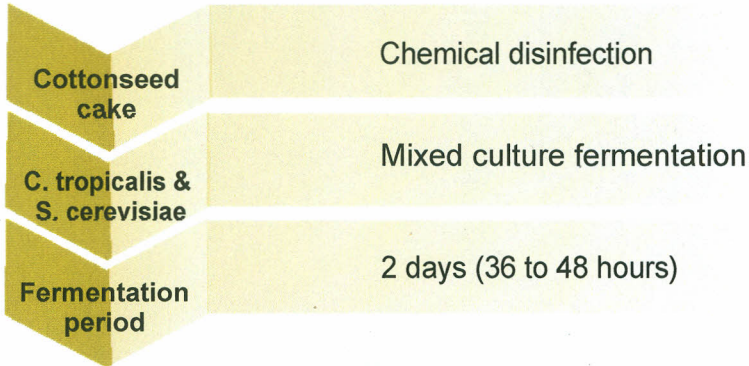
CIRCOT PROCESS

At CIRCOT, a novel process was developed for gossypol reduction and nutritive quality enrichment in CSC using solid state fermentation. The fermented CSC showed improved nutritive quality parameters. The free gossypol, bound gossypol, crude protein, crude fibre and lysine contents in initial and fermented CSC were (2200, 360 mg/kg), (2100, 770 mg/100g), (20, 33.5 %), (35, 25%) and (0.4, 0.8 %) respectively. The gossypol level in the fermented cake meets the standards as prescribed by food and drug administration and protein advisory group, USA. The feed conversion ratio was found to be effective in the treatment up to 40 % replacement of soybean meal with fermented CSC in the diet of both broilers and layers. The results were ascertained with large scale industrial trials taken up to six tonnes of CSC (Fig.1). This technology was filed for a provisional patent (1477/MUM/2014 dated 28-04-14) on "A novel process for gossypol reduction and nutritive quality improvement in CSC for its use in non-ruminants feed"

HIGHLIGHT OF THE PROCESS

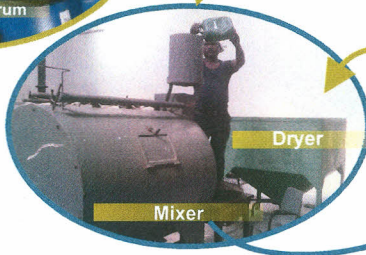
- 80 % free gossypol reduction
- 60% bound gossypol reduction
- Improved protein content
- Enriched lysine content
- Eco-friendly process
- Zero effluent discharge

ABOUT THE PROCESS



ECONOMICS

Capital investment	Rs. 15.00 lakhs
Fermented cake production/year	250 tonnes per year
Selling price	Rs. 25,000 per tonne
Products	Nutritive enriched CSC
Pay-back period	1 year
Running cost	Rs. 44 lakhs per annum (cost of raw material, microbial cultures, labour and over heads)



**ICAR-Central
Institute for Research
on Cotton
Technology**

**DARE, Ministry of
Agriculture and Farmers
Welfare, Govt. of India
Adenwala Road, Matunga,
Mumbai - 400019 (MS) India**

Telephone : 022-24143718

Fax : 022-2413 0835 / 24157239

Mob. : 9702878249

Email : abicircot@gmail.com

Website : www.circot.res.in



Compiled by:

**Dr. V. Mageshwaran, Dr. Sujata Saxena, Er. A. K. Bharimalla
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