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**BIOCHEMICAL ANALYSIS OF CASTOR CAKE**

**Ashok Kumar Srivastava\*, Alka Srivastava, Rashmi Mohan Mathur, Rachna Prakash,  
Shashi Agrawal**

\* Department of Chemistry D.A.V. College Kanpur

Department of Chemistry D.G. College Kanpur

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**ABSTRACT**

The present paper deals with study of variation of oil, protein, sugar and minerals present in castor cake. Besides it being used as an excellent source of organic fertilizers containing 6.5 % Nitrogen, 2.6 % Phosphorus pentoxide and 1% Potash. Castor cake offers a good scope as an animal and poultry feed after detoxification.

**INTRODUCTION**

At global level , India ranks first both in area of cultivation and production of castor seeds which accounts for nearly 68 % and 76 % respectively . The other major castor producing countries China , Brazil and Russia<sup>1,2,3</sup>. Castor Cake, also known as Castor Pomace , is obtained after commercial extraction of oil and contains up to 2-6 % oil in addition to other nutrients. Cake is rich source of protein the content of which varies from 25-35 % . Although rich source of protein, it can not be used as such as protein supplement for animal and human consumption .This is mainly due to the presence of extremely toxic lectin ricin and much less toxic alkaloid , ricinine and very powerful heat stable allergens known as CB-IA<sup>4,5</sup>. The toxic factors in Castor beans have been reviewed by Hanumantha Rao<sup>6</sup>. It is a glycoprotein with A and B Polypeptide chains linked by disulphide bonds .Ricinine (.3% of meal) is a relatively harmless alkaloid and is known for its insecticidal activity <sup>7</sup>.

Castor cake proteins are composed of globulins (60%) , albumin, ricin(16%), proteases, allergens (4%) in addition to glutolins and conjugated proteins .Cake protein is rich in glutamic acid (5.2%) and used to prepare sodium glutamate which is a good appetizer with meat like flavour<sup>8,9</sup>.

**MATERIALS AND METHODS**

Seeds samples of 12 castor varieties were collected from oilseed section, Department of Genetics and Plant Breeding, C.S. Azad University of Agriculture and Technology, Kanpur at oilseed research farm of the University located at Kalyanpur, Kanpur

<sup>1</sup>Hegde D.M. , Sujatha M. and Singh N.B.(2003) Castor in India Directorate of Oilseeds Research , Hyderabad.

<sup>2</sup> Hanumantha Rao C. and Chakraworty S.K. (1997) Indian Society of Oil Seed Research, Hyderabad. p-257.

<sup>3</sup> Kulkarni L.G. and Ramanumrthy G.V.(1977) Castor , Indian Council of Agriculture Research, New Delhi . p-2-6.

<sup>4</sup> Gaedener H.K. , Daquin E.L. , Koltum S.P. (1960) Detoxification and deallergenation of Castor beans , J.Amer.Oil Chem.Soc. V: 37 . p-142.

<sup>5</sup> Weiss E.A.(1971) Castor , Sesame and Safflower, Leonard Hill London. p-86.

<sup>6</sup> Hanumantha Rao , K(1970) Toxic factors and their detoxification in Castor J.Food.Sc.Tech.Vol.7 page-82.

<sup>7</sup> Trease G.E. and Evans W.C. (1978) In : Pharmacognosy (11<sup>th</sup> edn.) Bailliere Tindall, London page - 316

<sup>8</sup> Gandhi V.M. , Cherian K.M. and Mulky M.J.(1994) Detoxification of Castor Seed meal by interaction with sal seed meal , J.Amer.Oil Chem Soc., V-71, p-827.

<sup>9</sup> Srinivas C.V.S. and Nagraj (1999) Factors influencing ricinin.

**Preparation of castor cake-** Kernels of the seeds were separated from seed coat manually by breaking seed coat of whole seeds with the help of light hammer. Oil contents of kernels was estimated by Soxhlet method using n-Hexane as solvent. After extraction of oil remaining portion is known as castor cake.

**Detoxification Of Castor Cake:** - Castor cake was detoxified by method given in J. Amer .Oil .Chem .Soc and J.Oil Tech Association<sup>10</sup> .

**Determination of Protein Content, Methionine Content and Tryptophan Content:** - The nitrogen percent of castor cake sample of different castor varieties was determined by micro kjeldahl method as reported in AOAC<sup>11,12</sup> . Methionine content of castor cake was determined by spectrophotometric method by the procedure reported by Horn et al<sup>13</sup> .Tryptophan content of castor cake was determined by spectrophotometric method following the procedure reported by Spies and Chambers.

## RESULTS AND DISCUSSIONS

Variability in Protein, Methionine and Tryptophan Contents in castor cake of castor varieties.

S.no	Varieties	Protein %	Methionine	Tryptophan %
1.	KC-14	39.7	1.10	1.5
2.	KC-24	39.0	1.60	1.2
3.	KC-34	39.1	1.00	1.0
4.	KC-38	39.2	0.90	1.2
5.	KC-1	39.9	1.80	1.8
6.	KC-391231	39.0	1.30	1.7
7.	GCH-4	38.2	1.70	1.2
8.	DCH-177	38.9	1.20	1.1
9.	KC-25	39.0	1.90	1.3
10.	KC-93121	38.9	1.10	1.8
11.	KC-93123	39.0	1.00	1.2
12.	KC-9	39.0	1.30	1.5

Results on protein , Methionine and tryptophan content showed wide and significant variation from 38.2%-39.7% , 90 - 1.90 and 1.0-1.8 respectively .Variety KC-1 ranks first, Variety KC-14 ranks second and Variety KC-38 ranks third.

## CITE AN ARTICLE

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<sup>10</sup> AOAC (1965) Official and Tentative methods of Analysis Association Of Official Agricultural Chemists 10<sup>th</sup> ed. p-744.

<sup>11</sup> Horn M.J. Jones D.B. and Blum A.E. (1946) J.Biol.Che. 166.

<sup>12</sup> Spies J.R. and Chamber D.G.(1949) Chemical determination of tryptophan in protein, Anal.Chem.Vol-21 p.1240.

<sup>13</sup> Srivastava A. , Mathur R.M., Prakash R. and Agarwal S. (2016) Studies on Ricinus Enzyme isolated from Castor seeds Oriental Journal of Chemistry Vol.32 p 1235-1247.