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ORIGINAL ARTICLE

ADULTRATION OF THE PULSES IN COASTAL REGION OF ANDHRA PRADESH

B. V. Sudheer[1], M. K. Lakshmidevi[2], D. V. Krishna Rao[3]

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ABSTRACT: The pulses are the one of the major food item in the Indian diet. The adulterants added to the pulses may be incidental, industrial or metallic components. The goal of the present study was to determine whether the pulses in this region are adulterated or not, if adulterated what are the substances that can be added to the pulses. The pulses samples brought to the Regional Public health Laboratory are tested for common substances that can be added to the pulses as adulterants. During the year April 2013 to March 2014, 765 food samples were received, among them 77(10.065%) samples are pulses. Out of the 77 samples 11samples (14.28%) were adulterated with intentional adulterants. of which 5.197% with extraneous matter and 1.29% with damaged grains and 7.792% contain harmful colors.

KEYWORDS: K–Kesaridal, M- Metanil yellow T-Tartazenic dye A-Adultration.

INTRODUCTION: Pulses are adulterated with Sand, marble chips, stones, filth , khesari dal or other pulses , Metanil yellow, Soluble coal tar dye. These adulterants are deleterious to Human Health. The Present study conducted to know the adulteration of pulses in our region.

METHODS & MATERIALS: The pulses brought to the laboratory voluntarily by the Traders, consumers, food inspectors for analyses of the food material for the food safety. The materials were tested for the following using the following test methods.

Sl. No.	Tested for	Procedure followed
1	Moisture	Ovan drying method
2	Foreign matter, fifth	Physical examination
3	Other edible grains	Physical examination
4	Damaged grains	Physical examination
5	Weevil led grains	Physical examination
6	Kesari dhal	Physical examination
7	Synthetic colours (Metanil yellow/ Tartrazine dye)	Paper Chromatography

RESULTS:

Total No. of Food samples tested in the year 2013-2014	Total No. of Pulses samples tested in the year 2013-2014	percentage
765	77	10.065%

Table 1: Percentage of Pulses samples tested

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Common name	Other names	Scientific Name	No. of samples	Percentage
Red Gram Dal	ARHAR / Masur dal	Cajanus Cajal/ Leril esculanta moench/Leril Culinaris medik/ Ervem lens Linn.	30	38.96%
Black Gram Dal	URD	Phaseous mungo Linn	23	29.67%
Green Gram Dal	Moong Dal	Phaseolous aurues roxb/ Phaselous Radiatus Roxb	3	3.896%
Bengal Gram Dal	Chana Dal	Cicer aritnum Linn	21	27.27%

Table 2: Distribution of pulses tested

	No. of Samples	No. samples Adulteration detected	Percentage % of adulteration
1. Moisture	77	Nil	0%
2. Extraneous matter (Foreign matter)	77	4	5.194%
3. Other Edible grains(Kasari dal)	77	Nil	0%
4. Damaged grains	77	1	1.29%
5. Weevilled grains	77	Nil	0%
6. Synthetic colour (Metallic yellow /Tartagenic dye)	77	6	7.792%

Table 3: Results of the Samples with percentage of Adulteration

DISCUSSION: Pulses are annual leguminous crops that include lentils, beans, chick peas and yellow peas. Pulse crops are high in protein, antioxidants and fiber and low in fat and energy, all these factors contribute to the reduction of CVD and Type 2 Diabetes mellitus risk.[1] Pulses are the major dietary source for the Vitamin D in Vegetarians.[2]

Adulteration is deliberate contamination of food material with low quality, cheap and non-edible or toxic substances. The prohibited substances are either added or partly or wholly substituted. In India normally the contamination /adulteration in food is done either for financial gain or due to carelessness and lack in proper hygienic condition of processing, storing, transportation and marketing. This ultimately results that the consumer is either cheated or often become the victim of diseases. Food adulteration can lead to slow poisoning and various kinds of diseases, which can even result in death. Adulteration makes the food items used in our daily life unsafe and unhygienic for use. The Adulterates added are:

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Type	Substances Added
Intentional Adulterants	Sand, marble chips, stones, mud, other fifth, Talc, Chalk powder, Water, mineral oil and harmful colour.
Incidental adulterants	Pesticide residues, droppings of rodents, larva in food.
Metallic Contaminants	Arsenic from pesticides, Lead from water, effluent from chemical industries, tin from Cans,

Table 4: Food safety & Standards for pulses as per act 2006, Rules 2011.[3]

In the present retrospective study it is noted among the 765 food samples 77 (10.065%) samples were the pulses (Table.1) The samples tested are Red gram dhal 38.96%, Black gram dal 29.87%, Bengal Gram dal 27.27%, Green gram dal 3.896%, (Table.2) Among them 14.28% of the samples are adulterated (Table.3) as per the food safety act 2006 (Table.4)

	Red Gram ARHAR	**Black Gram URD**	**Bengal Gram CHANNA**	**Greengram MOONG**
1. Moisture	Not more than 14% by weight		Not more than 16% by weight	Not more than 14% by weight
2. a) Foreign matter- Extraneous matter	Not more than 1%. By weight by which not more than 0.25%. By wt. shall be mineral matter and not more than 0.10% .By wt. shall be impurities of animal origin.			
b) Kesaridhal seeds	Not to be added.			
3. Other Edible grains	Not more than 3%	Not more than 4%		
4. Damaged Grains	Not more than 5%			
5. Metalic yellow	Not to be added			
6. Tartaric dye.				

Table 5

Filth and Foreign Matter: Filth and extraneous material including any objectionable substances in foods these include:

i. Inorganic mater consisting of metallic pieces, sand, gravel, dirt, pebbles, stones, lumps of earth, clay and mud, animal filth.
ii. Organic matter consists of husk, straws, weed seeds and other inedible grains.

B) Poisonous, toxic, and /or harmful seeds- mean any seed which is present in quantities above permissible limit may have damaging or dangerous effect on health. Ex. Kesaridhal seeds in pulses.

3. Other edible grains means any edible grains (Including oil seeds) other than the one which is under consideration.
4. Damaged grains means kernels or pieces of kernels that are sprouted or internally damaged as a result of heat, microbe, moisture or whether, viz., ergot affected grain and kernel burnt grains.
5. Weevil led grains means kernels that are partially or wholly bored by insects injurious to grains but does not include germ eaten grains and egg spotted grains.
6. kesari dal (Lathyrus sativus).

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L. sativus pulse is considered as an inexpensive legume, which does not require much irrigational inputs.

Lathyrus sativus forms a staple food for the low-income group population in several parts of Central India. Its continued consumption in appreciable quantities for a period of 2-3 months causes progressive spastic paralysis of lower limbs, which is commonly referred to as lathyrism.[4]

The disease can be Categorized in 4 Stages of Spastic Paralysis:

i. Nonstick stage: in mild cases, victims walk with short steps and jerky movements
ii. One stick stage: in advanced cases, victims walk with bent knees, raising of heels and with the support of one stick;
iii. Two stick stage: the victims show scissoring and crossed gait and are able to walk with the help of two sticks
iv. Crawler stage: in the advanced stage of disease, the victims are forced to crawl on palms and knees as they cannot walk even with the support of two sticks.

The disease has been responsible for crippling several thousand people. (The etiological agent for neurolathyrism was found to be an unusual amino acid, beta oxaly amino alanine (BOAA).

In India, majority of the states have imposed restrictions on its cultivation/ sale excluding West Bengal, Bihar and Madhya Pradesh.

However, it was observed that some of the predisposing factors like ascorbic acid deficiency and low levels of manganese exposure could be instrumental in producing lathyrism.

Efforts to propagate genetically engineered low toxin varieties of L. sativus by Indian Council of Agriculture Research (ICAR) are in progress. Once the toxin is removed, lathyrus has all the potential to offer not only affordable pulse for the vast section of the society but also an extraordinarily environmentally tolerant, pest resistant, low irrigational need, hardy crop which is otherwise quite rich in high protein, economical and acceptable taste. But at present it is evident that the consumption of L. Sativus would result in paralysis.[5]

Synthetic Colours: Pulses are adulterated with Toxic chemical such as metanil yellow and Tartazinc dye for adding the color to old stocks of pulses to improve their color appearance.

The test results are compared with the standards .The test results showed that 14.285% (11 out of 77 samples) showing adulteration. In our study it shows that the adding of synthetic colour 7.792% is common fallowed by adding of extraneous matter (5.194%) and damaged grains (1.29%)

The Harmful effects of these adulterated substances on the human are:

Sl. No	Adulterant	Purpose of adding the Adulterants	Diseases or Health Effects
1	Sand, marble chips, stones, filth	For financial gains	Affect the digestive tract
2	Khesari dal stones	For financial gains	Crippling spastic paraplegia paralysis of the limbs
3	Metanil yellow	Added to old stocks of pulses to enhance color	• Carcinogenic and causes stomach disorders. It also causes testicular degeneration in the male if consumed for long

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4	Soluble coal tar dye	Used to enhance quality and make the pulses look clean	• Is highly injurious to health

Table 6

The present study shows that there is no adulteration of moisture and kersaridhal. But Extraneous matter (Foreign matter) 5.194% and damaged grains 1.29% and synthetic colours of 7.792% are adulterated.

As familiar saying "Corruption is universal and not confined to India", the adulteration is also universal not confined to one region in India. It is present all the regions of India with difference in measure. Hence knowledge of the adulteration is needed for the consumers particularly on food items.[6]

CONCLUSION: As the adulteration is universal and not pertaining to one region and the food frauds literally constitute a high tech industry because of enormous economic gains inherent in adulteration. Interestingly costlier the food product, more incentive is available for evolving appropriate methods to mimic the original product with cheap alternatives. So it is time to pledge "stop buying adulterated pulses." Buy pulses and other food items only from approved sources. Ensure that the storage space is clean. If health is wealth and if you believe that a healthy mind rests in a healthy body, start consuming unadulterated pulses.

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AUTHORS:

1. B. V. Sudheer
2. M. K. Lakshmidevi
3. D. V. Krishna Rao

PARTICULARS OF CONTRIBUTORS:

1. Faculty Member in Medicine & Civil Surgeon Bacteriologist, Department of Medicine, Guntur Medical College.
2. Junior Scientific Analyser, Guntur Medical College.
3. Junior Analyst, Guntur Medical College.

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NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:
Dr. B. V. Sudheer,
A2, Kanishka Apartments,
JKC Nager, 1st Lane,
Guntur- 522006,
Andhra Pradesh, India.
E-mail: bvsudheer56@yahoo.com

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