ISSN: 2278-4632
Vol-10 Issue-6 No. 6 June 2020

WASTE MANAGEMENT UTILITY: DEVELOPMENT OF RICEBRAN LADDU

S.V.Sumalatha* Dr.M.Niharika**
*Student, Dept. of. Home science, Sri Padmavati womens University, Tirupati, Andhra Pradesh.
E-Mail: sumasreeram06@gmail.com
** Assistant professor(Contract), Dept. of. Home science, Sri Padmavati womens University, Tirupati, Andhra Pradesh.
E-Mail: niharika.bamli@gmail.com

ABSTRACT

Rice bran, a by-product of rice milling industry is rich in micronutrients like oryzanols, tocopherols, tocotrienols, phytosterols and dietary fibers. The high nutritional profile of rice bran has not been utilized due to problems associated with lipase enzyme, which reduces the quality of rice bran and makes it unfit for human consumption. After the stabilization of lipase enzyme, it is possible to derive highly nutritious value-added products of rice bran. Due to the presence of antioxidants, it helps in lowering plasma cholesterol, decreasing serum cholesterol, decreasing cholesterol absorption and decreasing platelet aggregation. It has also been used to cure hyperlipidemia, menopause disorders and to increase the muscle mass. The most widely accepted product of rice bran is its oil that has exceptional properties as compared to other vegetable oils. Based on the incredible benefits of rice bran towards health in human, the present study was under taking to develop health products

INTRODUCTION :

Waste management utility is the utilization of the food waste that is lost during any of the 4 stages of food supply chain. i.e, Producers, Processors, Retailers, Consumers

Most of the food waste comes from the food processing. These lost food may go to landfills or put back into the food supply chain (waste management utilization) or be put to other non food productive uses. The food waste occurring in the food industry and in subsistence agriculture, the amounts of food wastes are known. Regardless, the variety of factors that contribute to the food waste(biological/environmental) would limit the usefulness and reliability of general figures.

ISSN: 2278-4632
Vol-10 Issue-6 No. 6 June 2020

TYPES OF WASTES:

- Agricultural waste
- Biodegradable waste
- Biomedical waste
- Chemical waste
- Consumable waste
- Inorganic waste
- Food waste
- Recyclable waste

DIFFERENT WASTES IN FOOD INDUSTRY:

1. DAIRY INDUSTRY: Whey
2. WHEAT FLOUR INDUSTRY : Wheat germ, Wheat bran
3. MEAT INDUSTRY : Skin, Blood, Feathers
4. FRUITS AND VEGETABLE INDUSTRY : Peel, pulp, stones
5. RICE MILL : Rice bran

WASTE MANAGEMENT UTILISATION OF RICE BRAN :

Utilisation of rice bran in 2 ways. They are

I. It is utilized as a livestock feed
II. It is used in preparation of different food products.

RICE BRAN :

Rice is the most important cereal product in Asia and is an overwhelming staple food in most populations of this region. It forms an important part of diet of many people in the country. Much of the nutritional value of rice lies in its germ and bran which has been discarded during milling process in the traditional times. Milling of paddy yields 70% of rice(endosperm) as the major product and by-products consisting of 20% rice husk, 8% rice bran and 2% rice germ.

During de-husking and milling of the paddy, the brownish portion of rice taken out in the form of fine grain, is the RICE BRAN. The bran is the hard outer layer of rice consisting of aleurone and pericarp. Rice bran contains an array of micronutrients like

ISSN: 2278-4632
Vol-10 Issue-6 No. 6 June 2020

oryzanols, tocopherols, tocotrienols, phytosterols which comprises of vitamin E and exhibit significant antioxidant activity.

Composition of the rice bran differs with the variety of rice, geographical conditions and processing methods. Rice bran , the outer layer of the rice grain, accounts for 8-10% of the total weight of the grain; however, it contains most of the nutrients: carbohydrates(34-62%) , lipids (15-20%) , protein(11-15%) , crude fibre (7-11%) and ash (7-10%). In particular, rice lipids and bioactive components are concentr1ated in rice bran.

Fatty acids such as palmitate(21-26%), linoleate(31-33%) and oleate (37-42%) are predominant in rice bran. Significant quantities of bioactive compounds such as oryzanol, tocopherol, tocotrienol and alpha-sitosterol which help in preventing the damage of body tissue and oxidative damage of DNA. The as well as dietary fibres such as alpha-glucan, pectin and gum have been found in rice bran. Specifically, gamma-oryzanol, the main antioxidant present in rice bran, has a 10 times higher antioxidant activity than tocopherol, while tocotrienol has 40-60 times greater antioxidant activity than tocopherol. However the proportions of these phytochemicals vary with the rice cultivar. In addition, rice bran contains 4-hydroxy-3-methoxycinnamic acid(FA), which has photoprotective and antioxidative effects.

Stabilizing rice bran:

Until recently, rice bran as a source of value-added food product was under-utilized due to lipase enzyme which is endogenously present or produced as a result of microbial activity which is activated during the milling process . These lipases hydrolyze the oil into glycerol and free fatty acids which give the product a rancid smell and bitter taste that renders the bran unsuitable for consumption. Under normal milling conditions rice bran will degrade in approximately six hours into an unpalatable material making it unsuitable as human food. Because of the problem with rancidity, most rice bran is used as a high protein feed additive for animals or as fertilizer or fuel . Since oxidative changes affect the oil quality adversely and are not very rapid in their manifestation, stabilization becomes a pre-requisite. These efforts are aimed at destruction or inhibition of lipase–the enzyme that causes development of free fatty acid (FFA). This is done so as to reduce oil losses which are directly proportional to the FFA content . Rice bran can be stabilized by a variety of methods like cold storage, sun-drying, steaming and expelling.

ISSN: 2278-4632
Vol-10 Issue-6 No. 6 June 2020

Chemical stabilizers like sodium metabisulphate can also be used. Properly processed extrusion stabilized rice bran from rough rice can be safely stored for up to one year at ≤22°C in gas-permeable packaging. But the maximum safe storage life for par-boiled rice bran is estimated at less than 3-4 months .

Renusharma(2015) studied on Rice bran and its benefits. Due to the presence of significant levels of micronutrients such as oryzanol, tocotrienol and phytosterols and of their unique properties it is used for the production of value added products in nutraceuticals and in pharmaceuticals & also in functional foods. The incorporation of dietary fibre into the functional food have reported to decrease the risk of coronary heart disease, reduction of blood cholesterol levels and improvement of insulin sensitivity. Many nutraceuticals have been developed from rice bran which have hypolipidemia, anti-tumor, anti-oxidant, ergogenic supplement by body builders and atheletes.. It also prevents high blood pressure, hyperlipidemia and hypoglycemia. Food supplemented with rice bran also lead to reduced bone loss in women suffering from postmenopausal osteoporosis.

Nagendra Prasad MN (2011) conducted studies on health benefits of rice bran.Rice bran is used as a food additive, consumption of dietary fibre present in cereals have shown to reduce the risk of coronary heart disease mortality by reducing blood pressue, lowering blood cholesterol levels. Derivatives from the the stabilized rice bran are rich in beta-sitosterols which inhibit the growth and induce apoptosis in breast cancer cells. The oryzanol component acts as a protective agent against UV light induced lipid peroxidation and hence can be used as a potent sunscreen agent. The ferulic acid and its esters present in gamma oryzanol stimulate hair growth and prevent skin ageing and also helps in skin repair. The nutraceuticals developed from the soluble and fiber fractions of rice bran control both type 1 and type 2 diabetes.The minor components in rice bran i.e gamma oryzanol is known to have high antioxidant property against free radicals.

OTHER INGREDIENTS:

FLAX SEEDS are rich in omega 3 fatty acids, dietary fibre and lignans.Flax seeds are known to have antibacterial property, antiviral property, anti-inflammatory property.It lowers the LDL cholesterol, reduces the risk of cancer and cardiovascular diseases, boosts immune system, helps to reduce inflammation in body, maintaining healthy reproductive system, it promotes weight loss.

ISSN: 2278-4632
Vol-10 Issue-6 No. 6 June 2020

Bernacchia et.al., (2014) conducted studies on chemical composition and health benefits of flax seeds. Consumption of flaxseed for the high content in omega-3, omega-6 rich oil, α-linolenic acid, lignans, high quality proteins and fibers, compounds which are biologically active in the prevention of some chronic diseases such as many types of cancer, diabetes, cardiovascular diseases and cerebrovascular stroke.

WATERMELON SEEDS are good source of vit B i.e thiamine, niacin, folic acid is more suitable for pregnant mothers because to prevent birth defects, magnesium and iron rich. It control diabetes and hypertension, sharpening memory, control blood pressure, reduce the blood cholesterol, healing coronary heart disease. It havelisin that forms the collagen in the body that makes skin healthy and prevents from early ageing.

Rekha et al., (2016) studied the proximate composition of dried watermelon seed by standard analytical techniques. They found that the mean nutritional content of the samples were 68.4% protein, 6.4% moisture, 1.2% crude fibre, 47.1% fat, 2.6% ash and 25.8% carbohydrate.

Rodriguez et al., (2006) reported that antioxidants are known to quench free radicals, thus are essential components of anti-ageing formulations. Antioxidants also offer protection against damage to tissues due to the detrimental effects of environmental and other agents and encourage collagen growth by combating the harmful effects of free radicals. Consumption of the seeds reduces may reduce the chances of getting cardiovascular diseases and cancers due to the appreciable amount of total phenols found in the seeds and its antioxidant activity.

JAGGERY is made from unrefined sugar, It is loaded with antioxidants and minerals like zinc, selenium, which help prevent free radicals and rich in iron prevents anemia.It acts as a detox, as it helps cleanse the liver by flushing out the nasty toxins from the body, helps in maintaining blood pressure, preventing joint and bone problems such as arthritis, treating and preventing many skin problems such as acne and pimples, boost the total amount of haemoglobin in blood.

Rice bran contains number of micronutrients like oryzanols, tocopherols, tocotrienols, phytosterols and dietary fibers which reveals its uses for various therapeutic purposes. It lowers the cholesterol levels, reduce the risk of cardiovascular disease and also this product is rich in omega-3 fatty acids, reducing the blood pressure and also improve the

ISSN: 2278-4632
Vol-10 Issue-6 No. 6 June 2020

insulin sensitivity. The gamma oryzanol present in rice bran which helps in stimulate hair growth and also helps in anti-ageing. Based on the incredible benefits of these rice bran towards health of human, the present study was under taking to develop and prepared rice bran product.

MATERIALS AND METHODS

Rice bran contains number of micronutrients like oryzanols, tocopherols, tocotrienols, phytosterols and dietary fibers which reveals its uses for various therapeutic purposes. It lowers the cholesterol levels, reduce the risk of cardiovascular disease and also this product is rich in omega-3 fatty acids, reducing the blood pressure and also improve the insulin sensitivity. Based on the incredible benefits of these rice bran towards health of human, the present study was under taking to develop and prepared rice bran product.The present study was aimed to develop rice bran laddu with the incorporation of flax seeds, watermelon seeds. In present study, an attempt has been made to standardize "Ricebran laddu". The ingredients flax seeds, watermelon seeds and jaggery.

Preparation of powder:

Roast the flax seeds and watermelon seeds separately. Add roasted flax seeds and watermelon seeds into the mixer jar and and jaggery together and make them into powder form. Sieve the mixture uniformly and keep aside.

Standardization of ingredients:-

The formulated product has been standardised by repeated trails in the laboratory and by checking the organoleptic characteristics through semi trained panel members. The final product was prepared by incorporating changes suggested by the panel members.

Variations;-

Various trials were worked out to develop rice bran laddu.

TABLE NO -1 COMPOSITION OF DIFFERENT INGREDIENTS

INGREDIENTS	Variation 1	Variation 2	Variation 3
Rice bran	30 g	30g	30g
Jaggery	20g	30g	-

ISSN: 2278-4632
Vol-10 Issue-6 No. 6 June 2020

Flax seeds	-	10g	-
Watermelon seeds	-	10g	-
Almonds	-	-	20g
Dates	-	-	20g

Standardisation of product:

The product was standardized & the ingredients used were given below:

Ingredients	Quantities
Rice bran	30g
Flax seeds	10g
Watermelon seeds	10g
Jaggery	30g

Procedure:

- Roast flax seeds and watermelon seeds separately and keep aside.
- Now grind roasted flax seeds, water melon seeds and jaggery together and keep aside
- Roast the rice bran with ghee until the raw flavor is vanished.
- Now add both the mixtures and heat for few minutes.
- Now make into laddus.

Sensory Evaluation of product by panel judges:-

Nine point hedonic scales was chosen to test acceptability. Hedonic rating scale was the test where judges express their evaluation scores according to the scores given for each sensory attributes on the score card provided. Separate column was given to write the remarks, based on which modifications were made in the product. Sample scored card was given in the annexure. For each trail the product was subjected to sensory evaluation to the panel members by giving instructions before evaluation. The score cards were given for each trial separately.

RESULTS AND DISCUSSION:

ISSN: 2278-4632
Vol-10 Issue-6 No. 6 June 2020

Rice bran is used as a main ingredient for the development of a product because of its nutritional information. The ferulic acid and its esters present in gamma oryzanol stimulate hair growth and prevent skin ageing and also helps in skin repair. The nutraceuticals developed from the soluble and fiber fractions of rice bran control both type 1 and type 2 diabetes. The minor components in rice bran i.e gamma oryzanol is known to have high antioxidant property against free radicals.

Mean and SD values as obtained for the different attributes of Rice bran laddu

Table no-2 Organoleptic evaluations of developed Rice bran laddu

S.NO	Attributes	Rice bran laddu Mean ± SD scores		
		Variation 1	Variation 2	Variation 3
1	Appearance	6.50±0.527	7.70±0.675	5.70±0.675
2	Colour	6.50±0.527	8.10±0.738	5.60±0.516
3	Flavour	6.30±0.483	8.50±0.527	5.40±0.516
4	Texture	6.40±0.516	8.40±0.516	6.80±0.516
5	Taste	6.30±0.483	7.80±0.422	5.60±0.516
6	Overall acceptability	6.30±0.483	7.70±0.483	5.40±0.516

The average score for each attribute the product were calculated. The appearance, colour, flavour, texture, taste and overall acceptability of the variation -2 is higher than other two variations.

TABLE NO 3 : NUTRITIVE VALUES OF RICE BRAN LADDU (Variation 2)

Ingredients	Amount (gms)	Energy (K cal)	CHO (gm)	Protein (gm)	Fat (gm)	Vit A (IU)	Vit B (mg)	Vit C (mg)	Ca (mg)
Rice bran	30g	117.9	14.52	4.05	4.86	0	0.81	0	20.1
Flax seeds	10g	1	46.6	3.2	0.1	0	0.28	0.1	42.8
Watermelon seeds	10g	8	2.7	0.1	0	2	-	2.5	0.2
Jaggery	30g	114.9	28.5	0	0.03	50.4	0.006	0.15	24.06
TOTAL		241.8	92.32	7.47	4.99	52.4	1.096	2.75	87.16

ISSN: 2278-4632
Vol-10 Issue-6 No. 6 June 2020

It is evident from the above table no 3 the data shows that the nutrient composition of rice bran laddu (variation 2). The data from the above table shows that the, Energy-241.8(K cal), carbohydrates-92.32(g), Protein-7.49(g), Fat-4.99(g), Vit A 52.4 (IU), Vit B 1.096(mg), Vit C 2.75(mg),Calcium 87.16(mg).

Depicts organoleptic evaluations and mean scores for the developed rice bran laddu. There are several steps involved in a new product development among which taste panel stage is most. In taste panel stage various attributes of the product like appearance, colour, flavour, texture, taste and overall acceptability.

The attributes evaluated by panel members for nutritious bar using Hedonic rating scale (9 point) include : 9-Like Extremely, 8-Like Very Much, 7-Like Moderately, 6-Like Slightly, 5-Neither Like Nor Dislike, 4-Dislike Slightly, 3-Dislike Moderately, 2-Dislike Very Much, 1-Dislike Extremely

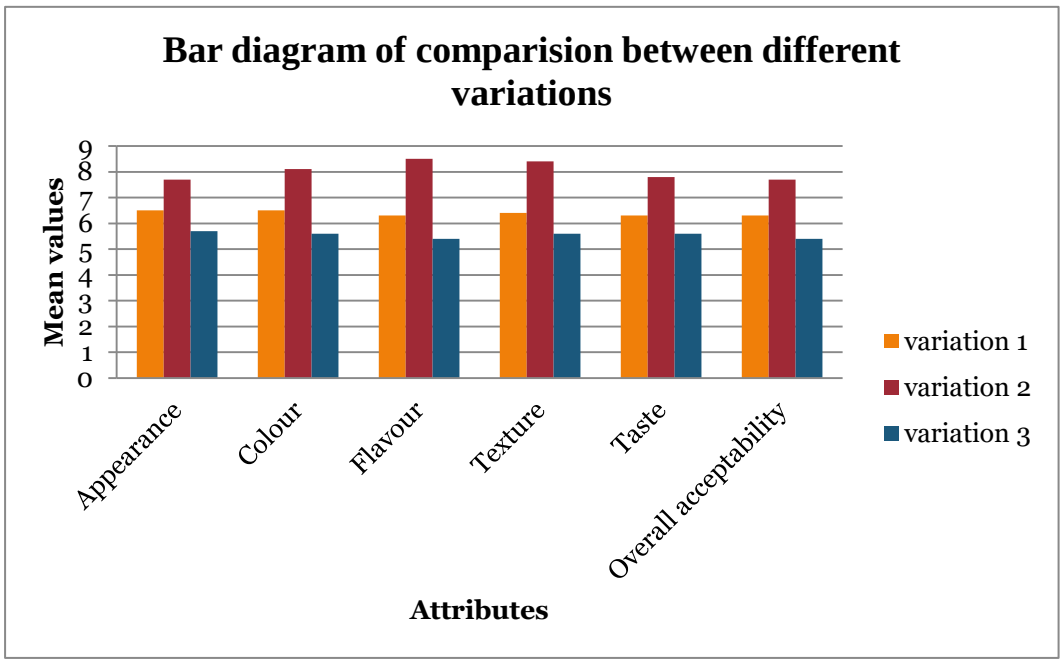

Fig no: 1 Bar diagram showing comparison between different variations

It was observed from that Fig-1 the average score for each attributes like appearance, colour, flavour, texture, taste and overall acceptability of the developed product variation-2 obtained a higher mean score in majority of the attributes.

CONCLUSION:

ISSN: 2278-4632
Vol-10 Issue-6 No. 6 June 2020

The study conclude that the rice bran which is a good source of vitamins and contains an array of micronutrients like oryzanols, tocopherols, tocotrienols, phytosterols which comprises of vitamin E and exhibit significant antioxidant activity. Flax seeds are rich in omega 3 fatty acids, dietary fibre and lignans. It lowers the LDL cholesterol, reduces the risk of cancer and cardiovascular diseases, boosts immune system. Water melon seeds are good source of vit B i.e thiamine, niacin, folic acid is more suitable for pregnant mothers because to prevent birth defects, magnesium and iron rich. It control diabetes and hypertension, sharpening memory. The rice bran laddu can be consumed after any meal that helps in proper digestion and acts as a best confectionary food. This product can be served to any age group people because it has many health benefits.

The present study suggested that people must need awareness on health benefits of rice bran, flax seeds, watermelon seeds and to understand that it may be easily incorporated in to our diet in order to decrease the nutritional deficiencies in the people.

REFERENCE:

- Bernacchia R*, Preti R and Vinci G (2014).Chemical Composition and Health Benefits of Flaxseed. Austin Journal of Nutrition and Food Sciences
- Nagendra Prasad MN et al(2011), HEALTH BENEFITS OF RICE BRAN, Journal of Nutrition and Food Science.
- Rekha, G., and Rose, A.L.(2016). Proximate Nutritional Analysis of Dried watermelon seed. International Journal of Engineering Research and General Science, Vol 4: 2091-2730.
- Renusharma et al (2015) *Int. Journal of Engineering Research and Applications.* Studies on rice bran and its benefits.
- Rodriguez E. B., Flavier, M. E., Rodriguez-Amaya D. B. and Amaya-Farfan J. (2006) Phytochemicals and functional foods.Current situation and prospect for developing countries Segurança Alimentar e Nutricional, Campinas, 13(1): 1-22.

