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Food Technology

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VASANTRAO NAIK MARATHWADA KRISHI VIDYAPEETH, PARBHANI

Title	-	**Study on consumer awareness regarding food label**
Researcher	-	Dudhate, Ayodhya U.
Research Guide	-	Nalwade Vijaya M.
Department	-	Food Technology
Subject	-	Foods and Nutrition
Degree	-	M.Tech
Thesis No.	-	1706
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033112
Abstract	-	

The present study was undertaken to study the consumers awareness regarding food label. Two hundred consumers from four different professions such as doctor, lawyer, businessman and professor 50 in each group were selected by purposive random sample technique from Parbhani city. The information on age, education, type of family, monthly family income, buying behaviour of consumers, frequency of purchasing various foods, consumers awareness about nutrition information and health claims disclosed on food label were collected by using pre-planned structured questionnaire and by interview method.

Results inferred that decision of purchase of cereals and pulses was mostly taken by wives in the families of doctors and professors. Whereas other family members in lawyers and businessmen families. Similar trend was also noticed in purchase of spices, ready to eat foods and commercial available foods. Importance for the quality of product was given by all the selected consumers. Statistical analysis indicated that significantly more per cent of doctors had awareness about MRP, standard marks, list of ingredients, manufacturing and expiry date than that of businessmen. Majority consumers acquired nutrition information written on food label through T.V., internet and newspaper. Results indicated that the information regarding nutrient content such as calories, protein, fat, vitamin and minerals was mostly read by businessmen. Whereas carbohydrate, protein and sodium content mostly read by professors. Significantly more per cent of doctors found to be reading cholesterol content of product. On the other hand, more per cent of professors had awareness about fiber and sodium content. Results showed that less than 50 per cent selected consumers were aware about these nutrients. Results in regard to various health claims written on food label indicated that significantly more number of lawyers had awareness about suitability of product for diabetes mellitus, high cholesterol and heart problem than that of businessmen. In

nut shell, it can be said that there is a need to educate consumers in regard to information of nutrient content and health claims written on food label. Consumers should be made aware of relation between healthy diet and its implication on health and disease. The nutritional label should be made more consumers friendly. So that it will be helpful for the consumers in making rational food choices.

Title	-	**Effect of nutritional status of pregnant women on outcome of pregnancy**
Researcher	-	Kumbhar, Megha Vaijanath
Research Guide	-	Farqooui, H. F.
Department	-	Food Technology
Subject	-	Foods and Nutrition
Degree	-	M.Tech
Thesis No.	-	1707
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033115
Abstract	-	

The present study entitled "Effect of nutritional status of pregnant women on outcome of pregnancy" was carried out in Parbhani city. For the study sixty pregnant women in their III rd trimester were purposively selected. A pre planned questionnaire containing the general information of the pregnant women, complications during pregnancy, anthropometric measurements, biochemical examination i.e. haemoglobin content and blood group of pregnant women was also collected. The questionnaire also contained the information about meal pattern and food consumption of the pregnant women.

Mean nutrient intake was compared with RDA, it indicated that there was significant difference in the studied nutrient except for thiamin, riboflavin and vitamin C. The mean intake of energy, protein, calcium, iron, ß carotene, niacin and folic acid were significantly less than the RDAs while the intake of fat was significantly more than RDAs.

The different factors affecting the outcome of pregnancy were parity, haemoglobin level, BMI and education of the mother on weight and length of the newborn. Parity of the mother was not having correlation with the weight and length of the newborn. The positive correlation was found with the increasing haemoglobin level with the weight and length of the newborn. There was no correlation with the BMI of mother and weight and length of newborn. It is evident that as the education level is increasing the weight and length of newborn is also increasing but it was found that there is no significant difference.

Finally it can be concluded from the above results that pregnant women of Parbhani city were undernourished. As the haemoglobin level was increasing the weight and length of the newborn was also increasing. The diet of the pregnant women was deficient in amount as well as in nutrient content.

It is suggested that pregnant women should be given nutrition knowledge to take the required food and nutrients so that their health will be good and good result of pregnancies will be seen.

Title	-	**Studies on extraction of leaf protein concentrate and its utilization in weaning food**
Researcher	-	Meda, Rohit Nagaraj
Research Guide	-	Kshirsagar, R.B.
Department	-	Food Technology
Subject	-	Food Engineering
Degree	-	M.Tech
Thesis No.	-	1710
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033138
Abstract	-	

Protein deficiency and protein calorie malnutrition (PCM) is one of the major nutritional problems in the developing world. As a novel source to combat malnutrition, leaf protein concentrate was prepared and was incorporated in weaning food. Three different leaves: *Amaranthushybridus, Moringaoleifera* and *Leucaenaleucocephala* (Subabul) were utilized for leaf protein concentrate (LPC) preparation. AMS (Amaranth, Moringa and Subabul) mix consisting of LPC from each leaf at the ratio of 1:1:1 was further studied. Proximate analysis of AMS mix showed protein content as 36.48 per cent and moisture content as 8 per cent. Weaning food was prepared using wheat, mung bean and rice to which LPC mix was incorporated. On the basis of sensory evaluation, sample with 2 per cent LPC mix was selected. Nutritional analysis of the weaning food showed protein content as 19.26 per cent and ash content as 2.6 per cent. Thus formulation of weaning food with LPC makes the food more nutritious thereby alleviating the problem of malnutrition.

Among the selected leaves, Amaranth leaves recorded higher protein content than Moringa and subabul and also found to be rich in minerals. And hence the extracted LPC of amaranth, subabul and moringa were used in combination of 1:1:1 proportion for preparation of weaning food. The addition of AMS (LPC) at 2 per cent in standardized recipe of weaning food improves the nutritional qualities and organoleptic properties of weaning food. The amino acid profile of AMS (LPC) and prepared weaning food recorded considerable amounts of amino acids indicates its excellent nutritional qualities. The prepared weaning food with AMS (LPC) at 2 per cent significantly reduces the viscosity which proves its suitability for weaning food.

The cost of production of AMS (LPC) based weaning food was affordable and comparable to the commercial existed market sample.

A good quality LPC having protein of about 30-65 per cent with good amino acid profile and mineral composition can be used in any foods as supplementation for protein .The prepared weaning food had protein content of about 14-16 per cent and provide 371 Kcal of energy per 100 grams of the sample. The fortification of LPC helps in increasing the protein content and mineral composition. It is also concluded that the amino acid profile of the LPC was good thus adding value to the final weaning food product.

The developed technology of preparation of weaning food with 2 per cent AMS (LPC) was simple and techno economic feasible. The prepared weaning food was high in calories, low density and viscosity with good realistic properties.

Title	-	**Studies on utilization of adulasa (*Adhatoda vasica*) leaf extract as antidiabatic in carbonated rts beverage**
Researcher	-	Gedam, Antariksh Markand
Research Guide	-	Kshirsagar, R.B.
Department	-	Food Technology
Subject	-	Food Engineering
Degree	-	M.Tech
Thesis No.	-	1711
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033140
Abstract	-	

Efforts have been made to prepare dried extracts (solid extract) and extract (aqueous extract) from adulasa leaf. Physicochemical properties of prepared extracts were evaluated. On the basis of their extractable values and alkaloid content (0.30 per cent) adulasa dried extracts were added at 0.25, 0.35 and 0.45 per cent for preparation of adulasa dried extracts based carbonated *RTS* beverage. Adulasa was found to be rich in alkaloids. The acceptability of prepared beverage was organoleptically evaluated. The test score indicated that among the carbonated beverages, the beverage with 0.35 per cent adulasa dried extracts with sucralose (0.2 per cent) as sweeteners was accepted by panel members. TSS of the carbonated beverage was decreased with addition of sucralose further increases with increase in proportion of adulasa dried extracts. Selected carbonated beverage found to be rich alkaloid content (210mg/200ml) and was organoleptically accepted. The costs of production of prepared beverages were also affordable as that of market sample. Hence it is finally concluded that processing technology used for preparation of ADE based pineapple carbonated RTS beverages is techno economically viable which will beneficial to the diabetic consumer with regards to its anti-diabetic activity and nutritional status. It is an excellent beverage over presently available artificial and synthetic beverages with an additional anti-diabetic function.

Title	-	**Studies on development of technology for production of fresh turmeric (Salem) candy and soup**
Researcher	-	Pawar, Pankaj Gautam
Research Guide	-	Kshirsagar, R.B.
Department	-	Food Technology
Subject	-	Food Engineering
Degree	-	M.Tech
Thesis No.	-	1712
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033143
Abstract	-	

The physical characteristics of fresh turmeric rhizome of Salem variety observed to be yellowish brown in colour and analysis of curcumin content of rhizome. Various pre treatments are given to raw turmeric improved the quality of candy. Good quality turmeric candy and soup prepared with respect to superior organoleptic attributes can be prepared with Blanched with 2 percent alum, a good quality turmeric candy can be prepared with addition of 10 percent lemon and ginger juice respectively. The prepared candy was found to be the organoletically acceptable and also retain 4 percent of curcumine content in candy. The shelf-life of the candy in storage period was up to the 6 month without any evidence of microbial growth at ambient temperature in the research study, turmeric pulp added soup process was standardized the 20 percent addition of turmeric pulp yielded a good quality soup with respect to organoleptic quality. The prepared soup can be stored up to 4 days and 8 days at ambient and refrigerated condition respectively. The cost of production of candy and soup was comparatively cheaper than the existing fruit candies and soups in the markets with an additional benefit of turmeric as a nutraceutically health benefits.

Hence the developed processing technology for preparation of turmeric candy and soup is techno economically viable which will give more remunerable returns to the cultivars and also beneficial to the consumers with regards to new innovative product having nutraceutical and therapeutic value. This technology for preparation of turmeric candy and soup may open new avenues for better marketing and utilization of this important cash crop. However some studies have been carried out for scale up of this technology of preparation of turmeric candy and soup.

Title	-	**Studies on utilization of gudmar *(Gymnema sylvestre)* leaf extract as antidiabetic in fennel rts beverage**
Researcher	-	Sharma, Dipak
Research Guide	-	Sawate, A.R.
Department	-	Food Technology
Subject	-	Food Engineering
Degree	-	M.Tech
Thesis No.	-	1713
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033145
Abstract	-	

Gudmar is a plant species renowned as a 'Miracle fruit'. It is regarded as one of the plants with potent anti-diabetic properties and being used in folk, ayurvedic and homeopathic systems of medicine. In view of the anti-diabetic effect of gudmar (*Gymnema sylvestre*), it can be used in the treatment of diabetes mellitus will cause less or no side effects and therefore the present investigation has been undertaken to prepare extract of gudmar leaf and to utilize it in fennel RTS beverage. In the present study aqueous extract (water extractable extract) and dried extract (dried in vaccum evaportor) were prepared. Gudmar dried extract was selected depending on its higher gymnemic acid content and water soluble and insoluble fraction values. Gudmar dried extract was incorporated in fennel RTS beverages. The prepared product was analyzed for organoleptic and physico-chemical characteristics. The changes of addition of extract were also analyzed. Depending on organoleptic characteristics, selected beverage was stored at ambient and refrigerated temperature to assess their shelf life and changes in chemical characteristics were noted. Total energy of beverage was calculated and an assessment of techno economical feasibility was also done.

The total yield of gudmar leaf extract was higher in aqueous extraction comparatively than ethanolic extraction however the gymnemic acid content was found to be slightly higher in ethanolic extraction. A good quality gudmar dried extract based fennel RTS beverage can be prepared by using 1.0 per cent gudmar dried extract with 0.2 g sucralose. The prepared RTS beverage was found to be organoleptically acceptable with considerable gymnemic acid content.

The developed fennel RTS beverage is rich in gymnemic acid content i.e. 219.9 mg which fulfil the daily recommended dose of gymnemic acid 38 to 251 mg/day. Gudmar dried extract

based fennel RTS beverage can be stored at ambient and refrigerated condition 60 days and 120 days respectively without affecting its sensorial quality attributes. There was not much more changes observed in retention of gymnemic acid content during storage period in fennel RTS beverage. The cost of production of prepared beverage was also affordable as that of market sample. The developed processing technology for preparation of gudmar dried extract based fennel RTS beverage is techno economically viable which will beneficial to the diabetic patients with regards to its antidiabetic activity and nutritional status specially mineral contents.

Title	-	**Characterization, classification, evaluation and physiography of soils of zari-naam river watershed (part-1) of parbhani district by using gis, gps and remote sensing**
Researcher	-	Wagh, Pankaj Madhukar
Research Guide	-	Patil, V.D.
Department	-	Food Technology
Subject	-	Soil Science and Agricultural Chemistry
Degree	-	M.Sc
Thesis No.	-	1714
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033149

Abstract -

The present investigation "Characterization, Classification, Evaluation and Physiography of Soils of Zari-Naam River Watershed (Part-1) of Parbhani District By Using GIS, GPS and Remote Sensing" was carried out during the year 2015-16. The total Length of watershed was 4.2 km and it is divided into Seven compartment and three Parts viz. Part I, Part II and Parts III. These three parts were surveyed and fifty representative soil samples were drawn by grid survey using topographic map, remote sensing imagery and GPS. These 50 soil samples were drawn to study the soil properties and nutrient status. Further three representative soil profiles were excavated on the basis of soil depth and behavior of cracks. The water samples were collected for water quality and water budget of Naam River Watershed was assessed . The thematic maps of all important soil parameters were generated.

The results emerged out from the present investigation revealed that soils of Naam River Watershed (part-1) are Typic Haplusterts and Vertic Haplusterts. These soils are brown to black in colour and clayey in texture. These are slightly to moderately alkaline in nature, safe in total soluble salt concentration, calcareous to highly calcareous and low in organic carbon. Typic Haplusterts have higher alkalinity than Vertic Haplusterts.

Out of 50 soil samples only one sample was placed under very low category, 42 samples as low and 07 samples are medium in available N content. Available phosphorus content found to be very low in one sample, where as 47 samples found low and 02 samples are medium. The available potassium content was high in 12 samples and 38 samples found to be very high in K. The available sulphur content of 45 soil samples are deficient and 05 soil samples found to be sufficient. These soils are found to be low in DTPA-Fe and Zn content, and rich in available copper and manganese.

Water samples of Naam River Watershed were moderately alkaline. Safe for irrigation but need moderate leaching. The SAR and RSC values of water samples were safe and suitable for irrigation.

Two pedons of Naam River Watershed representing Typic Haplusterts and Vertic Haplusterts. This pedon are highly to moderately suitable for growing the crops. With little modification in pH. These soils support soybean, mug, jowar, Tur and cotton.

Title	-	**Studies on development of probiotic chocolate**
Researcher	-	Kharat, Varsha Tanaji
Research Guide	-	Deshpande, H.W.
Department	-	Food Technology
Subject	-	Food and Industrial Microbiology
Degree	-	M.Tech
Thesis No.	-	1716
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033242
Abstract	-	

The popularity of chocolate around the world combined with high level of health related awareness of the contemporary consumer, imposed the idea of enriching chocolate with probiotic bacterial strains. The main objective of this work was to obtain a potentially probiotic chocolate by using microencapsulated *Lactobacillus* strains. The *Lactobacillus* strains were encapsulated as micro-beads by using sodium alginate and guar gum and these beads were incorporated into chocolate suspension. This probiotic milk chocolate displayed the same sensory properties as the reference, probiotic-free chocolate. The number of live bacterial cells was maintained at the functional level of 107 - 109 Cfu/g after keeping for 4 weeks at 40 C. Neither the texture nor the total and volatile acidity of chocolate masses were changed by addition of the microencapsulated *Lactobacillus* cells. The organoleptic evaluation during storage study suggests that the product can be kept for one month under refrigerated storage (4ºC) without deterioration in taste and flavor. Also considering the high viable cell count (109cfu/ml) even after 4 weeks of storage. The process of preparation of probiotic chocolate can be techno-economically feasible, justifies the suitability of chocolate as a carrier for in microencapsulated mixture of probiotic *Lactobacillus acidophilus* and *Lactobacillus bulgaricus*. Chocolate is willingly consumed by children and teenagers. The supplementation of this product with encapsulated live probiotic cells can enrich their snacks.

Title	-	**Studies on exploration of psyllium husk as prebiotic for the preparation of traditional fermented foods (Buttermilk & Shrikhand)**
Researcher	-	Deepika, Shree . K
Research Guide	-	Deshpande, H.W.
Department	-	Food Technology
Subject	-	Food and Industrial Microbiology
Degree	-	M.Tech
Thesis No.	-	1717
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033243
Abstract	-	

India is world's largest milk producer, accounting for more than 20% of world's total milk production, is the world's largest consumer of dairy products. The total amount of milk produced has tripled from 23 million tons back in 1973 - 95 million ton in 2008 production level of 143.3 million metric ton (MMT) in 2014-2015 but the projected demand for milk by 2021-22 estimated at 180 million metric ton (MMT) which implies that milk production would have to be doubled (Anon., 2015).

In the light of the scientific data generated in the present investigation, it can be concluded that the probiotic *Shrikhand* sample B prepared with 0.75 percent Psyllium was found to be organoleptically more acceptable compared to other variations of Psyllium addition.

Further, it can also be concluded that the lactic acid fermentation of the *Shrikhand* by LAB strains (*Lactobacillus bulgaricus* and *Lactobacillus acidophilus)* helped in improving the flavor of the *shrikhand* by providing the sour taste to the product which may be due to the action of strains.The hardness, cohesiveness, gumminess and springiness of probiotic *shrikhand* increased as the addition of Psyllium husk increased. The 0.75 percent addition of Psyllium husk and 1 percent equal proportion of *Lactobacillus acidophilus* and *Lactobacillus bulgaricus* cultures probiotic *shrikhand* gave a chemical, textural and sensorial score high.The organoleptic evaluation during storage study suggests that the product can be kept for one month under refrigerated storage (4ºC) without deterioration in sensory characteristics. Also considering the high viable cell count (10^8cfu/ml) even after 4 weeks of storage and techno-economically feasibility, it justifies the suitability of Psyllium added probiotic *Shrikhand* for commercial exploitation.

The probiotic Buttermilk can be prepared by utilizing curd, ground spices, Corriander leaves, salt and Psyllium husk using equal amount of 1 percent starter culture of LAB *viz. L. acidophilus and L. bulgaricus*. Acidity, pH, Viscosity and viable probiotic count in probiotic Buttermilk samples are dependent on level of Psyllium addition. Good quality dairy probiotic buttermilk can be prepared by using 0.4g of Psyllium with 2 percent starter culture and 8 hrs fermentation period for curd having better overall sensory acceptability with storage for 6 days under refrigerated storage (4ºC).The process of preparation of probiotic Buttermilk can be techno economically feasible, justifies the suitability of incorporation of Psyllium husk in probiotic based health or functional food for commercial exploitation.Therefore there is a need to elaborate health benefits of psyllium husk in terms of its nutritional quality to emanate the public health disorders and make food products at household level.

Title	-	**Studies on development of low calorie herbal beverage (RTS) by using artificial sweetener**
Researcher	-	Syed Sabahuddin, Syed Aliuddin
Research Guide	-	Taur, A.T.
Department	-	Food Technology
Subject	-	Food Engineering
Degree	-	M.Tech
Thesis No.	-	1718
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033244
Abstract	-	

The investigation was carried out for preparation of low calorie herbal beverage (RTS) by using different artificial sweetener. The experiment was carried out in Completely Randomized Design with addition of aspartame (0.2%), sucralose (0.15%) and stevia (0.1%). The artificial sweetener with sucrose (50%) were added to aonla juice (10%), basil leaves juice (5%) and ginger juice (1%) for the preparation of herbal beverage. The acidity in aonla, basil leaves and ginger were obtained as 1.75, 0.08 and 0.7% respectively, also the values of physic-chemical characteristics of beverage. The aonla, basil leaves and ginger and prepared beverage were analysed for chemical composition. Sample T_2 was found to be contained 0.37% acidity, pH 3.93, ascorbic acid 36.16 mg/100g and TSS was maintained at 7.5^0Bx. The sample T_2 prepared by using 50% sucrose + 0.15 sucralose was organoleptically accepted over the other sample.

Title	-	**Studies on utilization of hadjod (cissus quadrangularis) stem powder as a nutraceutical in bread**
Researcher	-	Nawghare, Chandrakant G.
Research Guide	-	Taur, A.T.
Department	-	Food Technology
Subject	-	Food Engineering
Degree	-	M.Tech
Thesis No.	-	1722
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033248
Abstract	-	

Hadjod (*Cissus quadrangularis)* is one of the most common species scattered all over India particularly in tropical regions. *C. quadrangularis* belongs to the family Vitaceae, which is a perennial plant commonly known as Veldt Grape or Devils backbone. It is known to be an ancient medicinal plant, with optimal healing in white tissue area of the body (tendon, ligament, etc.) The stem of *C. quadrangularis* is also an important medicinal plant in Ayurveda as alterative, anthelmintic, dyspeptic, digestive, tonic, analgesic in eye and ear diseases, in the treatment of irregular menstruation and asthma, in complaints of the back and spine. It has been prescribed in the ancient Ayurvedic texts as a general tonic and analgesic, with specific bone fracture healing properties. *Cissus quadrangularis* is used for obesity, diabetes, a cluster of heart disease risk factors called "metabolic syndrome, scurvy, cancer, upset stomach, hemorrhoids, peptic ulcer disease (PUD), painful menstrual periods, asthma, and pain. It is also used in body building supplements as an alternative to anabolic steroids.

The hadjod stem powder was incorporated into refined wheat flour for the preparation of bread. The control sample of bread (T_0) was prepared by using only refined wheat flour (100 per cent). The hadjod stem powder was incorporated into refined wheat flour for the preparation of bread. The control sample of bread (T_0) was prepared by using only refined wheat flour (100 per cent).

Bread has become one of the most widely consumed non-indigenous food item in India. Fresh bread is characterized by a soft and elastic crumb, a brownish crust, a pleasant aroma and a moist mouth feel.. Baking is an important step of bread preparation.

Bread is an important staple food and the most widely consumed bakery product. Recently, consumers' awareness of the need to eat functional foods- foods which contain ingredients that provide additional health benefits beyond the basic nutritional requirements is increasing

. The bread prepared using refined wheat flour incorporated with hadjod stem powder was rich in protein, dietary fiber and minerals as compared to the wheat flour bread. The control sample of bread was organoleptically acceptable similar with 2 per cent hadjod stem powder incorporated bread. Hence, up to 4 per cent hadjod stem powder can be successfully incorporated in the bread to improve the sensory and nutritional attributes and nutraceutical component. The amount of alkaloids, falvonoids, tannin, saponin, phenol and total glycoside and protein percentage in stem powder has high. The presence of these phytochemicals/nutraceutical in (*Cissus quadrangularis)* is the good source of medicinal value. It could be concluded that the nutrient rich good quality refined wheat bread can be prepared with incorporated of hadjod stem powder and the product was techno-economically feasible and can be commercially exploited. As bread is a staple food for many countries. Therefore, it is concluded that hadjod stem powder can be used to replace refined wheat flour in product development to achieve the objectives of reducing the cost of cereal based stable foods and developing health enhancing bread for the consumers.

Title	-	**Development of technology for production of mid-day meal premix by using multigrain**
Researcher	-	Shinde, Devyani Digambar
Research Guide	-	Syed, H.M.
Department	-	Food Technology
Subject	-	Foods Chemistry and Nutrition
Degree	-	M.Tech
Thesis No.	-	1725
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033253
Abstract	-	

Multigrain Mid-Day Meal premix is an astonishing breakfast meal, that is packed with minerals, vitamins, an amazing amount of protein, energy, carbohydrates and dietary fibre. The different formulations of Multigrain Mid-Day Meal Premix were prepared (F_1, F_2, F_3 and F_4). The different formulations contained varying amount of proteins, carbohydrates, fats, vitamins, minerals and fibre. Multigrain premix (F_1) (Wheat 70%, Rice 10% legumes 2.5% each, soya mince 12.5%) was the best formulated multigrain premix which provides 17.41% protein, 2.02% fat, 8.27% fibre and 62.62% carbohydrates. Also the sensory properties were determined using 9-point hedonic scale and all the formulations obtained satisfactory scores. Hence, it can be concluded that this Multigrain Mid-Day Meal premix in addition to being delicious is a rich source of essential nutrients necessary to mitigate malnutrition from India.

Title	-	**Development of technology for production of flavoured mayonnaise**
Researcher	-	Gaikwad, Manisha P.
Research Guide	-	Syed, H.M.
Department	-	Food Technology
Subject	-	Foods Chemistry and Nutrition
Degree	-	M.Tech
Thesis No.	-	1726
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033255

Abstract -

This study was conducted to evaluate the addition of skim milk powder to replace egg yolk in preparation of mayonnaise i,e eggless mayonnaise. Flavoured mayonnaise was prepared from soybean oil with the level varied 55-70% skim milk powder and 40-65% oil. Flavoured mayonnaise made from 55% skim milk powder and 40% oil was found best. The flavoured mayonnaise formulated with different concentration of stabilizer that are xanthan gum and guar gum. The best flavoured mayonnaise content 55% skim milk powder, 40% oil, water 35%, sugar 3%, salt 1.5%, citric acid 1%, cardamom flavoured 1%, sodium benzoate 0.3%, xanthan gum 0.2%, maltodextrin 0.2% and EDTA 0.2%. In selected flavoured mayonnaise sample content the physico chemical properties of colour 7.8, hardness 27.5, density 4.46, refractive index 1.4746, specific gravity 0.926, total solid 65.7, carbohydrate 49.54, fat 38.64, protein 34.51, moisture 35.3, acidity 0.42, ash 0.32, pH 3.54, acid value 0.56 and peroxide value 6.5.

Title	-	**Studies on production of partially defatted soybean flour and its utilization in Chapati**
Researcher	-	Syed Zubair, Syed Turab
Research Guide	-	Satwadhar, P.N.
Department	-	Food Technology
Subject	-	Food Trade and Business Management
Degree	-	M.Tech
Thesis No.	-	1737
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033321
Abstract	-	

Protein Energy Malnutrition (PEM) continues to be the major nutritional problem resulting from under nutrition that affects children in most of the developing world. The most recent estimates show that more than one billion people worldwide are undernourished (FAO, 2009). Protein malnutrition is a serious problem in India due to cereal based dietary pattern. Soybean (*Glycine max*) is a good source of protein about 40 percent. Soybean contains about 20 percent oil. The defatted soybean cake is good source of protein which account for more than 50 percent protein. For combating problem of malnutrition these protein rich material can be incorporated with cereal based food products such as bread, biscuit, *chapati.* Study was comprised of two parts, standardization of recipe to prepare *chapati* fortified with partially defatted soybean flour and effect of different packaging material on keeping quality and sensory quality of *chapati.* Partially defatted soybean flour can be prepared by soaking soybean seed with sodium bicarbonate solution, then dried under cabinet drier. The decortication was carried out and oil was expelled by passing through ghani. The left over cake were dried and grind to obtain fine powder. The deoiling of soybean results in increasing ash, fiber protein, calcium, manganese, phosphorus and iron whereas decrease in carbohydrate and zinc content of partially defatted soybean cake. The partially defatted soybean flour was used for preparation of *chapati. Chapati* was prepared by mixing composite flour of whole wheat flour and partially defatted soybean flour in different proportion with water. The partially defatted soybean flour were fortified in different proportion such as 0, 20, 30 and 40 percent with whole wheat flour and coded as T0, T1, T2 and T3 respectively.. The prepared *chapaties* were packed in packaging material and effect of partially defatted soybean flour on quality characteristics of *chapati* was evaluated. Physical parameter such as weight and thickness were increased and diameters get decreased.

Chemical parameter such as moisture, fate, protein, fiber and ash were increased while carbohydrate was decreased. The overall acceptability of treatment T2 was found more as compare to other treatments. Mineral such as calcium, phosphorus, manganese, iron was increased while zinc was decreased with increasing proportion of dafatted soybean flour. *chapati* were packed in LDPE and LDPE with aluminum foil and founded that weight loss is more in unwrapped *chapati* as compare to LDPE and LDPE with aluminum foil. During storage growth of microbes found less in package with LDPE with aluminum foil as compare to only LDPE packaging. Hardness of *chapati* were increased and extensibility get decreased with increased level of defatted soybean flour. In the light of scientific data of the present investigation it is concluded that soybean is containing macronutrient and micronutrient and its fortification with different food item results in increasing the nutritional quality of food products. The *chapati* sample T2 containing 70 percent whole wheat flour and 30 percent partially defatted soybean flour was most desirable in terms of sensory and nutritional quality. It is also concluded that *chapati* can be stored up to three day by using LDPE with aluminum foil as suitable packaging material as compare to LDPE only because aluminum foil have good barrier properties against moisture, water vapor, etc.

Title	-	**Studies on development and standerdization of custard apple rabri and basundi**
Researcher	-	Gite, Ashwini
Research Guide	-	Satwadhar, P.N.
Department	-	Food Technology
Subject	-	
Degree	-	M.Tech
Thesis No.	-	1756
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033466
Abstract	-	

The present study was carried out on "Studies on development and standerdization of custard apple rabri and basundi" the research was conducted in college of food technology,VNMKV , Parbhnai during the year of 2016-2017. Extraction of custard apple pulp was carried out manually and pulp is preserved by using of 0.1 % potassium metabisulphite and stored at -20^{o}C temperature. Physico-morphological properties custard apple were studied and it was found that the weight of greenish yellow colored custard apple fruit was about 169g, with the average length of 5.5cm and breadth of 4.3cm. The no of seeds were 25, the total weight of peel and seed is 82.85 g and weight of pulp 86.10 g. The per cent of waste index was 45.35. The chemical composition of custard apple were studied. It was found that pulp contains 73.5per cent moisture, 0.7 per cent ash, 0.3 per cent crude fat, 1.6 per cent protein, 1.3 per cent crude fibre, 17.4 per cent total sugar and 22.6 per cent carbohydrate. The custard apple pulp has 0.2 per cent acidity. The TSS of custard apple pulp is 24.8^{0}Bx. The mineral composition of custard apple studied. It was found that calcium, phosphorus, manganese, iron and zinc content of custard apple were pulp (mg/100g) as 24.70, 38.9, 0.8, 3.1, 0.93 and 0.17 mg/100g.

Rabri and Basundi was prepared from Buffalo milk (standardized at 6 % fat) with constant level of sugar (6 % by weight of milk) and different level of custard apple pulp (0, 20, 30, 40, and 50) . It was observed that the overall acceptability score for custard apple rabri treatments $R_{0,}$ $R_{1,}$ $R_{2,}$ $R_{3,}$ and R_4 were 8.0, 8.1, 8.4, 7.2 and 6.5 respectively and for custard apple basundi treatments $B_{0,}$ $B_{1,}$ $B_{2,}$ B_3 and $B_{4,}$ were 7.9, 8.0, 8.3, 7.3 and 6.8 respectively. The highest score for overall acceptability was found to be 8.4 and 8.3 for 30% custard apple pulp in rabri and basundi respectively. Proximate composition of custard apple

rabri and basundi was carried out. Custard apple rabri contains 35.56% moisture content, 1.96% ash, 14.6% fat, 8.7% protein, 62.63% total solids,0.4% acidity, 39.18% carbohydrate were custard apple basundi contains 53.90% moisture, 1.56% ash, 10.85% fat 46.11% total solid, 26.19% carbohydrate, 26.02% total sugar, and 0.42 % acidity.

The efforts have been made to study the microbial qualities and storage study of custard apple rabri and basundi were studied for TPC, yeast and mould and coliform count. Results revealed that TPC in rabri and basundi sample containing 30% custard apple pulp was ranges between 4.489×10^{-5} to 15.822×10^{-5} and 5.328×10^{-3} to 16.23×10^{-3}, respectively during storage period of 0 to 15 days. Yeast and mould count was observed in this sample at 15^{th} day of storage, 1.333CFU/g in selected rabri sample and 0.421CFU/g in basundi sample. In the present investigation there was no coliform were observed in both the samples. 100g of custard apple rabri and basundi provided energy about 322.92 kcal 232.41 kcal respectively. Cost of 1kg of rabri and basundi is Rs.209.99 and 165.80 respectively So, the commercial exploitation of the custard apple rabri and basundi can be done**.**

Title	-	**Evaluation of Nutritional status of rural adolescent girls (16-18 years)**
Researcher	-	Borkar, Dipali Narayanrao
Research Guide	-	Khan, T.N.
Department	-	Food Technology
Subject	-	Food and Nutrition
Degree	-	M.Tech
Thesis No.	-	1757
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033468

Abstract -

The present study was undertaken to assess the nutritional status of rural adolescent girls (16-18 years) of Parbhani. A total number of 300 rural adolescent girls from different school were selected. The nutritional status was assessed by recording anthropometric measurements by determining the food and nutrient intake and by estimating hemoglobin content in the blood (g/dl).

The results of the study showed that majority of the selected adolescent girls were belonging to the nuclear family (255). Maximum numbers of families have low income (79%). The mean values of BMI revealed that a large proportion (55.33%) of rural adolescent girls were normal (BMI18.50-24.99). The prevelance of chronic energy deficiency based on BMI (grade I, II and III) was 25.66 per cent, 9.33 per cent and 8 per cent respectively. Only 5 girls were found to be overweight and none of the girls were found to be obese. Maximum (44.95) per cent of girls belonging to low socio economic status were having the BMI <18.5 followed by middle and high socio economic status. The association between socio – economic status and Body Mass Index was statistically significant.

The results of the heamoglobin content showed that 69 per cent of the rural adolescent girls were found moderate anemic where as 28 per cent girls were mild anemic and 3 per cent were severe anemic. None of the girls were having normal heamoglobin content.

The intake of all nutrients by the selected rural adolescent girls was less than Recommended Dietary Allowances (RDA) except thiamin, Fat and calcium which was found to be more than Recommended Dietary Allowances.

Title	-	**Studies on process standardization and quality assessment of cowpea (Vigna Unguiculata L. Walp) puffed snacks**
Researcher	-	Kamble, Pallavi Shrikrushna
Research Guide	-	Pawar, V.S.
Department	-	Food Technology
Subject	-	Food Chemistry and Nutrition
Degree	-	M.Tech
Thesis No.	-	1780
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033624
Abstract	-	

The present investigation had been carried out on local cowpea verity, they were graded, sorted according to the seed dimension,1000 seed weight, bulk density, true density, hardness, and subjected to soaking, conditioning, and then puffing in the Department of Food Chemistry and Nutrition. From the evaluation we found local market variety was hard Pusa barsati as compare to other hence Pusa phalguni was selected variety. After puffing sensory results of sand roasting was higher than microwave oven, it indicated that superior method was sand roasting. From that result the selected in sand roasting with salt treatment was **T_3** in 4% salt with soaking conditioning time (30:300min). While scored highest for baking soda treatment of **S_2** in 2% baking soda with soaking and conditioning time (5:30min).The puffing quality evaluated for selected method sand roasting with highest expansion volume in **T_3** selected salt treated in 4% salt with soaking and conditioning time (30:300min) contains **1.20,** Puffing yield **75%** and Bulk density **0.62g/cm^3**. In the baking soda treatment S_2 in 2% baking soda with soaking and conditioning time (5:30min) had highest expansion volume **1.12,** puffing yield **76%** and bulk density **0.67g/cm^3**.The sample **T_0** which was prepared without soaking and conditioning was found to be highest protein content (**18.20**%) and Carbohydrates (**62.90**%) in treatment T_3 in 4% salt with soaking and conditioning time (30:300min). while for the baking soda treatment S_2 in 2% baking soda with soaking and conditioning time (5:3min) found highest carbohydrates (**63.20%)** as compare to other treatments. it indicated improved value of carbohydrates and proteins. With storage temperature those were packed in different packing materials low density polyethylene (LDPE) and high density polyethylene (HDPE) with storage temperature 7.5ºC. They were examined for 90 days. The observation was started from on first day, after 30 days, 60 days and last after 90 days. On last day of observation there were few changes in color of those

product were packed in low density polyethylene (LDPE) in comparison with product packed high density polyethylene (HDPE) but the product was accepted reason of not much changes in taste. Hence from those packaging materials high density polyethylene (HDPE) was selected**.** The puffed cowpea was coated with salt and baking soda they both acted as microbial agent hence storage life was increased it made cowpea product shelf stable.

Title	-	**Studies on development of technology for production of mix fruit bar**
Researcher	-	Pawase, Prashant Anil
Research Guide	-	Satwadhar, P.N.
Department	-	Food Technology
Subject	-	Food Trade and Business Management
Degree	-	M.Tech
Thesis No.	-	17122
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033834
Abstract	-	

The present investigation entitled "Studies on development of technology for production of mix fruit bar" was carried out in the department of Food Trade and Business Management. The objective of research was to find out the possibility of enhancing the organoleptic characteristic and new product development. The fruit bar was prepared and standardised based on sensory evaluation. The product was dried in cabinet dryer at $65^0 \pm 5^0$c.After standardizing these parameter the best product obtained was evaluated for its chemical characteristic and textural properties with respect to shear stress, tensile force and stickiness. The storage study of mix fruit bar was carried out for 60 days in low density polyethylene, high density polyethylene, aluminium foil pouch and PET jar and product was regularly evaluated for its sensory attributes.

The physical parameter indicate that the waste index in mango fruit was highest (33.9 percent) followed by papaya (21.9percent) and negligible in fig fruit (2 percent). Pulp content was highest in fig (98 percent) than papaya (78.1 percent) and mango (66.1percent). The moisture content was within the range (82-89 percent) in all the fruits. Mango fruit was highest in TSS, total carbohydrate, acid content followed by fig and papaya fruit. The fibre content was almost equal in all fruits.

The mix fruit bar was prepared using combination of fig mango and fig papaya fruit where fig pulp was admixed in to mango and papaya at 10, 20, 30, 40, and 50 per cent by adjusting the sugar 32 per cent and acid 1.0 per cent. The best desirable combination of fig: mango was (30: 70) percent whereas in fig papaya mix fruit bar the best desirable ratio was 20:80 (fig: papaya). The higher percentage of fig pulp in to mango or papaya pulp was not desirable from organoleptic point of view.

However, in mix fruit bar total carbohydrate, protein and fat was almost equal moisture content was higher in fig mango mix fruit bar. Fibre content was higher in fig papaya mix fruit bar. In mix fruit fig mango and fig papaya bar shear stress increase with increase in fig pulp per cent in mix. Whereas the tensile force in fig: mango mix fruit bar was increased with increase in fig per cent in the mix but tensile force decrease with increase in to fig papaya mix. The results pertaining to the stickiness indicated that in mix fruit bar stickiness increased progressively with increase mango or papaya pulp in combined mixture.

Title	-	**Studies on standardization and quality evaluation of indian heritage food- sandga**
Researcher	-	Musale, Shubhada Vijaykumar
Research Guide	-	More, D.R.
Department	-	Food Technology
Subject	-	Farm Trade and Business Management
Degree	-	M.Tech
Thesis No.	-	17164
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034042
Abstract	-	

Maharashtra is the western state of India. Traditional food adjuncts of Maharashtra include *sandge*. *Sandge* is the pulses dried product which is used to make the vegetable or curry. Studies were undertaken of physicochemical properties of sandge made from pulses like Bengal gram, green gram, black gram with the addition of spices and it is prepared in the four different combination using ash gourd T1, T2, T3, T4 (10%, 20%, 30%, 40%) respectively. Various physicochemical properties such as moisture content, crude fat, ash, protein, crude fibre was to be investigated. The chemical evaluation of Sandga showed that moisture content was increased from 5.2 (Tc) to 8.2 (T4), fat content was decreased from 3.16 (Tc) to 2.51 (T4), protein content was increased from 24.5(Tc) to 26.81(T4), ash content was decreased from 3.8(Tc) to 2.6(T4), crude fibre content was increased from 3(Tc) to 4.5 (T4) and carbohydrate content was decreased from 60.34(Tc) to 55.38 (T4) with increasing incorporation levels of ash gourd. Pulses are the good source of Proteins and minerals and improve the nutritional and sensory quality of the *Sandge* with addition of Ash gourd.

Title	-	**Studies on preparation and nutritional quality of sorghum-finger millet chakli**
Researcher	-	Patekar, Sharda Digambar
Research Guide	-	More, D.R.
Department	-	Food Technology
Subject	-	Farm Trade and Business Management
Degree	-	M.Tech
Thesis No.	-	17165
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034045
Abstract	-	

Traditional foods play an important role in local identity, consumer behavior, the transfer of cultural heritage for future generations, and the interaction of this heritage with the rest of the world. "*Chakli"* is one of the traditional fried snacks that can be produced using different combination of ingredients. Cereal *chakli* is popular product and at present they are mostly made from gram, rice etc. By suitable processing it might be feasible to produce *Chakli* from sorghum. Considering the physico-chemical and nutritional composition of sorghum variety Maldandi (M35-1) was found best among the other genotypes and upto 40% incorporation with malted finger millet. The present investigation was planned with an objective to incorporate malted finger millet flour at different levels to *Chakli* by the Standardization of recipe and study its effect on nutritional composition, sensory and storage characteristics. The results indicated that Protein content varies in the ranged from (11.20-14.75%). The range of fat content was found (26.49 to 30.13%) in *Chakli* formulations. The mineral composition of *Chakli* has calcium content (322.30-342.02), phosphorus was observed (144.05-158.01), and iron content (1.93-2.53)mg/100g of product. The most acceptable fortified *Chakli* was analyzed for shelf life study. The different formulations of sorghum: finger millet in the ratio of 10:40 (S_1), 20:30 (S_2) and 30:20 (S3) and (S_4) 40:10 and the (S_0) control are prepared. The *Chakli* was found significantly improved nutritional value. Hence the prepared *Chakli* may become nutritionally balanced and have nutraceutical properties.

Title	-	**Studies on physico-chemical and nutritional properties of millets and it's utilization in indian heritage food- kharodi**
Researcher	-	Dudhate, Amruta Keshavrao
Research Guide	-	More, D.R.
Department	-	Food Technology
Subject	-	Farm Trade and Business Management
Degree	-	M.Tech
Thesis No.	-	17167
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034050
Abstract	-	

Pearl millet is a highly nourishing food and nutritionally superior to other major cereals with respect to energy, protein, vitamins and minerals. *Kharodi* is the product earlier prepared with pearl millet now newly developed product can be fortified with millets like finger millet and sorghum in addition with spices. It was found that *Kharodi* made from the different formulation of composite flour (pearl millet, finger millet, sorghum) control $T_{0,}$ T_1, T_2, T_3 and T_4 among these samples T_2 was significantly superior than other sample as judged by panel members. Addition of finger millet and sorghum that increases the mineral content like calcium, iron, zinc and phosphorous of final product also increases the sensory attributes and nutritional value of final product and stored throughout the whole year. The more amount of iron content which helps the person suffering from anemia disease.

Title	-	**Extraction and utilization of chia seed gel (salvia hispanica) in dairy and bakery product as a stabilizer and emulsifier**
Researcher	-	Chavan, Vitthal Ram
Research Guide	-	Gadhe, K.S.
Department	-	Food Technology
Subject	-	Food Science and Technology
Degree	-	M.Tech
Thesis No.	-	17180
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034066
Abstract	-	

'Chia' is a name of Spanish origin, which is used for several species of genus Salvia, usually for Salvia hispanica L. The genus Salvia L. belongs to the Lamiaceae family and shows about 900 species distributed worldwide, mainly in the areas of the Mediterranean, Southeast Africa and Central and South America (Delamare et al., 2007). Chia is known as super food as it contains highly concentrated amounts of essential fatty acids, dietary fibers, vitamins and antioxidants (Weber *et al.,* 1991). In one ounce (28 g) sample, chia seeds contain 9 per cent of daily value for protein, 13 per cent oil (57 per cent of which is ω -linolenic acid abbreviated as 3ALA) and 42 per cent dietary fiber. The seeds also contain the essential minerals, phosphorus, manganese, calcium, potassium and sodium (Anonymous, 2010). Data for oil extraction from Chia seed suggest that approximately 90 per cent of the oil is recoverable. 58 per cent of the extracted oil from chia is omega–3 linoleinic acid (C18:3). This is the highest bearing source of linoleinic acid known in plants (Ayerza, 1995).

Healthy oil profile of chia has been well established. Chia could also be a good source of gel. Chia gel is a polysaccharide based gel mainly consists of crude fiber and carbohydrate. Extracted chia seed gel has a great potential in food formulations as thickening agent, emulsifying agent and as a stabilizer. The extracted chia gel from chia seeds was analysed for proximate i.e. moisture, ash, protein, crude fiber, carbohydrate and oil. Chia gel was used to replace 5%, 10%, 15% and 20% of eggs in a control cake formulation. Analysis of variance conducted on the chemical, physical and sensory characteristics indicated a statistically significant effect when replacing egg with chia seed gel as an emulsifier. We concluded that the replacement of egg up to 5% by chia seed gel was organoleptically superior over other samples and technologically feasible in cupcakes, with no significant alterations on their quality characteristics.

Extracted chia seed gel has a great potential in food formulations as thickening agent, emulsifying agent and as a stabilizer. The extracted chia gel from chia seeds was analysed for proximate i.e. moisture, ash, protein, crude fiber, carbohydrate and oil. Chia gel was used to 0.1%, 0.2%, 0.3% and 0.4% as a stabilizer in ice cream formulation. Analysis of variance conducted on the chemical, physical and sensory characteristics indicated a statistically significant effect when utilizing chia seed gel as a stabilizer. We concluded that the use of 0.3% chia seed gel was organoleptically superior over other samples and technologically feasible in ice cream, with no significant alterations on their quality characteristics.

Title	-	**Development and quality evaluation of composite flour cookies**
Researcher	-	Kukade, A.G.
Research Guide	-	Pawar, V.S.
Department	-	Food Technology
Subject	-	Food Chemistry and Nutrition
Degree	-	M.Tech
Thesis No.	-	17189
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034106
Abstract	-	

Horse gram flour contains high quantity and quality of protein along with minerals and lowers saturated fat content and thus could be used to improve the nutritional value of bakery products.

During the present investigation attempts were made to use horse gram as a functional ingredient in formulation of bakery product. The bakery formulations contain hydrogenated shortening, which lowers the nutritional status due to presence of large amount of saturated fatty acids (SFA). The cookies can be used as a vehicle for desirable and essential fatty acids proteins and fibers supplementation by utilizing part of horse gram, pearl millet in place of refined wheat flour.

In present investigation, efforts were made to make guar gum incorporated cookies to evaluate the influence of guar gum on cookies quality and contents as a result of incorporation. Horse gram was substituted for refined wheat flour from 10% to 40% incorporation level. The substitution of refined wheat flour with horse gram (30%),pearl millet(20%) and incorporation of 0.3% guar gum was scored highest in terms of taste, flavor and overall acceptability. However the score for color and appearance, texture significantly decreased with increasing level of guar gum.

It was found that the diameter and spread ratio of cookies increased with increasing incorporation levels of guar gum. It was also observed that weight of cookies was increased upon incorporation. Chemical properties of cookies studied in this investigation revealed that increased in moisture, protein, crude fibre, ash and carbohydrate content were observed decreasing with increasing incorporation levels of guar gum whereas fat content was slightly constant.

Textural studies revealed that hardness of cookies were significantly increased with increasing incorporation levels of guar gum. Increased in hardness might be due to the increase in protein content of cookies. It was observed that cookies could be stored at ambient temperature for more than 90 days. The aluminum foil was most suitable on the basis of retention of sensory quality of cookies during storage followed by low density polyethylene.

Title	-	**Studies on isolation and characterization of some important nutraceutical components from Orange waste and its exploration in weaning food**
Researcher	-	Aleem Zaker, MD.
Research Guide	-	Sawate, A.R.
Department	-	Food Technology
Subject	-	Food Engineering
Degree	-	M.Tech
Thesis No.	-	17204
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034160

Abstract -

Childhood malnutrition is a common problem in India and other developing countries. India is home to 40 percent of the world's malnourished children and 35 percent of the developing world's low-birth-weight infants; every year 2.5 million children die in India, accounting for one in five deaths in the world. According to the National Family Health Survey of India, 48 per cent of children in India are malnourished. In the present investigation weaning food was prepared from locally available cereals and millets viz sorghum, rice, green gram and foxtail millet. Orange by-products (peel and pomace) were incorporated in prepared weaning food. Different properties of orange waste viz physiochemical, per cent yield of waste, phytonutrients content, total phenol, colour characteristics, mineral content, vitamin and dietary fiber content were analysed. The results revealed that orange waste (peel and pomace) are excellent source of protein (6.14 and 7.34 per cent), carbohydrate (80.27 and 78.62 per cent), ash (3.81 and 3.36 per cent). Phytonutrients detected in orange waste like alkaloids (3.1 and 1.31), flavonoid (29.8 and 45.4), tannin (1.02 and 0.73) and Saponin (4.9 and 11.0 per cent), total phenol (106 and 98.01), mineral content like potassium (1109 and 1191 mg/100g), calcium (501 and 274 mg/100g), phosphorus (203 and 273 mg/100g), magnesium (116 and 114 mg/100g) and iron (7.1 and 11.6 mg/100g), vitamin A (569 and 227 µg/100g), vitamin C (647 and 115.3 mg/100g) and vitamin E (0.81 and 0.62 mg/100g), total dietary fiber (29.5 and 26.5). Physicochemical and mineral content of cereals grain used were also analyzed. Results revealed that the used grains are excellent source of protein, carbohydrate etc. The recipe was formulated as 30 per cent sorghum flour, 20 per cent each rice, green gram and foxtail millet and 10 per cent skim milk powder. To this different levels of orange waste was incorporated and based on sensory evaluation sample containing 20 per cent of orange waste

was selected. Roasting and malting treatments were given to grains used, and malted sample was further analysed with market and control sample.

The prepared weaning food was analysed for proximate composition, mineral content, vitamins, phytonutrients, and results revealed that it is rich in protein (15.0 per cent), carbohydrate (71.11 per cent), dietary fibers (16.5 per cent), fat (4.02 per cent) and ash (2.9 per cent). Prepared weaning food was phytonutrients dense with alkaloids (4.71 per cent), flavonoids (24.86 per cent), tannin (0.93 per cent), saponin (3.80 per cent), polyphenol (85.45 mg/g). Mineral and vitamin content of prepared weaning food was potassium (950mg/100g), calcium (102mg/100g), phosphorus (71mg/100g), magnesium (75.2mg/100g) and iron (6.1mg/100g), vitamin A (195 µg/100g), vitamin C (372 mg/100g) and vitamin E (0.24 mg/100g), total dietary fiber (16.5). Hot and cold paste viscosity was analyzed for the developed weaning food and results showed that roasted sample is having higher viscosity than the malted sample. various functional properties viz density, bul density (0.41g/cm^3), water absorption capacity (124.18 per cent), oil absorption capacity (98.12 per cent), swelling capacity (18 per cent) etc were determined. The microbial analysis with respect to total plate count, yeast and mould count and Coliform count were performed for the storage period of 90 days and the results revealed that TPC was under the limit given by FSSAI, while yeast and mould, Coliform were absent. Total cost of production was determined and it was found that the formulated weaning food is quite cheap (243/kg), as compared to market sample (Cerelac) which is having price (706/kg). Thus it can be finally concluded that the formulated weaning food is nutrient dense, made from locally available raw materials, is affordable to low income group of people and thus can be helpful in eradication of serious problem of malnutrition.

Title	-	**Studies on exploration and quality evaluation of moringa oleifera (leaf, flower and pod) as a nutraceuticals in health food**
Researcher	-	Kshirsagar, R.B.
Research Guide	-	Sawate, A.R.
Department	-	Food Technology
Subject	-	Food Engineering
Degree	-	Ph.D.
Thesis No.	-	17211
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034174
Abstract	-	

The present investigation focuses on exploration and quality evaluation of *Moringa oleifera* (leaf, flower and pod) as a nutraceuticals in health foods viz. energy food, multigrain bar and capsules. In the light of scientific results of the present investigation, it can be concluded that *Moringa oleifera* plant parts of the cultivar variety Koimtoor -1 are all have excellent nutritional and phytochemical profile. On the basis of quality parameters steam blanching treatment was found to be effective for preparation of cabinet dried powders of *Moringa oleifera* plant parts. The process of preparation of energy food and multigrain bar are standardized by varying different levels of *Moringa oleifera* combination powder. The addition of 20 per cent *Moringa oleifera* combination powder enriched energy food with malting process yielded a nutritious, low dense and high calorie product with good sensory attributes. Moreover the process for preparation of multigrain bar enriched with 10 per cent *Moringa oleifera* combination powder was found to be organoleptically overall acceptable and also reported higher macro and micro nutrients along with phytochemicals. The prepared *Moringa oleifera* plant part powder capsules are also act as an excellent super food and a dietary herbal food supplements. Hence, it is finally concluded that developed processing technology for preparation of *Moringa oleifera* based energy food, multigrain bar and capsules is having the nutraceutical and therapeutic values and therefore can be commercially exploited to address the problem of malnutrition in the developing countries.

Title	-	**Studies on development of functional wheat bread supplemented with stabilized rice bran**
Researcher	-	Sangle, Jagdish keshavrao
Research Guide	-	Sawate, A.R.
Department	-	Food Technology
Subject	-	Food Engineering
Degree	-	Ph.D.
Thesis No.	-	17213
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034187
Abstract	-	

In the present investigation, efforts have been made with an objective of studies on development of functional wheat bread supplemented with stabilized rice bran. Stabilization of rice bran was carried out using hot air oven method and autoclave method. The autoclave method resulted in better nutrient preservation than hot air oven method and appears to be a practical and rapid tool for heat stabilization of rice bran. The effect of different levels of stabilized rice bran on rheological characteristics of wheat flour dough were studied. The functional wheat bread supplemented with stabilized rice bran was analyzed for their physico-chemical, textural and sensory characteristics. The control sample of bread was organoleptically acceptable similar with 15 per cent rice bran supplemented bread. The bread prepared using wheat flour supplemented with stabilized rice bran was rich in protein, monounsaturated and polyunsaturated fatty acids, dietary fiber, minerals and vitamins as compared to the wheat flour bread. Hence, up to 15 per cent stabilized rice bran can be successfully incorporated in the bread to improve the sensory and nutritional quality attributes. The product was techno-economically feasible and can be commercially exploited. As, bread is a staple food for many countries. Therefore, it is concluded that stabilized rice bran can be used to replace wheat flour in product development to achieve the objectives of reducing the cost of cereal based stable foods and developing health enhancing functional bread for the consumers.

Title	-	**Isolation, modification and characterization of starch from sweet potato (Ipomoea batatas L) and its exploration in gulabjamun and ice-cream**
Researcher	-	Kale, R.V.
Research Guide	-	Shere, D.M.
Department	-	Food Technology
Subject	-	Food Science and Technology
Degree	-	M.Tech
Thesis No.	-	17219
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034211

Abstract -

The starch obtained by different treatments from sweet potato had unique characteristics. The optimization of isolation method on basis of yield and recovery, functional and morphological characterization for modification by using enzyme and hydrothermal treatment. The effect of different proportion of khoa: native and modified starches on expansion, organoleptic and textural characteristics of gulabjamun and Ice cream were studied.

The proximate composition of sweet potato tuber found moisture, protein, fat, ash, starch content was found to be 50.41±0.10, 2.13±0.07, 0.37±0.04 and 41.85±1.46. The yield of starch was ranged from 21.59 to 28.50%. The treatment T_1 found to have highest percent of yield and recovery. The functional properties of starches such as water absorption capacity (WAC) was in the range of 0.65-0.74 g/g, paste clarity of sweet potato starch ranged from 33.26 to 35.61%, swelling power of isolated starches at 60^0 ranges from 4.28 to 4.83 % and Solubility values were ranged from 2.19 - 2.37 % at 60^0c. The results obtained by scanning electron micrograph of starches showed of starch shape was varied from round polygonal, spherical and irregular shapes and the particle size was ranges from 10 to 25 μm. The pasting profile of starch from all treatment showed that the peak viscosity, break down, set back viscosity, peak time and peak temperature was found to be 3332.10 to 4679.302, 2051.289 to 2416.583, 891.070 to 1051.566 cp, 4.12 to 4.64min and 67.40 to 78.45^0C. The T_1 had lowest peak viscosity and average peak temperature. The functional properties such as water absorption of capacity, solubility and swelling power ranged from 0.42-1.39 g/g, 2.07 to 2.13 percent and 4.27-6.04 percent respectively.

The moisture content of HMT starches was in the range of 9.69-10.48 percent, protein content 0.13 to 0.15 percent, the amylose content was ranged from 17.56-18.48. There was

significant decreased in amylose content of enzyme modified starch as compare to hydrothermally modified starch, that increase the crystallinity of starch. The Gulabjamun after frying subjected to physical analysis such as geometric mean, sphericity and expansion ratio. The results showed that the sphericity and expansion ratio was in the range 0.962-0.978 and 1.269-1.324 for gulabjamun of native starch; 0.969-0.978 and 1.281-1.335 for gulabjamun of enzyme modified starch; 0.976-0.986 and 1.317 to 1.325 for gulabjamun of hydrothermally modified starch respectively. Texture profile analysis showed that the hardness and gumminess of gulabjamun containing different level of NS, EMS and HMS significantly affected with increased level. The per cent overrun of reduced fat ice cream for native starch, EMS and EMS was in the range of 39.14 to 50.86, 48.41 to 54.68 and 45.17 to 54.13 percent respectively. The percent titrable acidity of ice cream containing NS, EMS and HMS was varied between 0.204 to 0.2111, 0.206 to 0.211 and 0.205 to 0.209 respectively and it was lower than that of control sample. Both the products found was techno-economically feasible when compared with control samples. The morphology and pasting profile of starch that there was a partial hydrolysis of starch. The modified starches can be better utilized as a bulking agent in khoa based sweet and fat replacer in frozen dessert.