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# Review on Minor Millets and Their Value-Added Products

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***Abstract :****Millet is an important food source in many developing countries because of its ability to grown in adverse weather condition.Properties of minor millet nutritional composition, health benefits and their processing of minor millets such as dehulling, milling, composite flour and fermentation are reported in this review. There are lack of nutrition insecurity for all age groups we collected information latest products which can consumed by all people several minor millets and products are traditional fermented millet beverages, non-fermented beverages, alcoholic beverages, pasta, noodles and extruded products*

***Keywords:*** *Minor millets, Processing technology, Products, Health benefits*

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## I. Introduction

Millet cereal crop originated from china, Asia and Africa .(Li & Brutnell, 2011)Millet are one of ancient nourishment for human beings.Millet is a cereal crop plant belonging toGrass graminae family(FAOSTAT & Production, 2016).Millet is collective term used for small shape grains that form diverse group mention as well as maize and sorghum as coarse cereals. Millet is a crop and it is important to human diet (O'Connell, Kneale, Tasevska, & Kuhnle, 2012). It can also reveal through stable isotope manifest widely influence the botanical evidence, even if they prove to sporadiac with only a some studies express that millet made a significant contribution to chronicle European diets (Abu-Ghannam & Balboa, 2018; Mal, Padulosi, & Ravi, 2010).The processing of cereal grains has evolved over the years and a substantial range of commodities are produced globally. Primary and secondary processing of cereals results in a wide range of waste material entrapping resources that could be converted into useful products. Economically, the cereal by-products streams to obtain high added-value compounds is primarily focused on pharmaceutical and cosmetic applications, followed by food and feed uses, elaboration of biomaterials, chemicals and combustibles, and energyproduction. The applications of high added-value compounds that could be valorized from cereal by-products by employing biotechnological approaches such as the production of microbial enzymes (P. Arora, Sehgal, & Kawatra, 2003)By-products resulting from secondary processing of cerealsas in the case of brewing are also presented and their possible applications to the food and the health care industries are discussed. While comparing to wheat and other crops millets are rich in calcium, dietary fibre, protein content, fats, energy density (Badi, Pedersen, Monowar, & Eggum, 1990).millets possess certain content in anti-nutrient factors , polyphenols, and antioxidant property content are present(Amadou, Gounga, & Le, 2013; Chandrasekara, Naczk, & Shahidi, 2012).Millet containsdifferent types of fatty acid contained. It has an important role in their starch hydrolysis rates(Kim, Sohn, & Lee, 2009). Millets having low starch hydrolysis rate increase in the protein digestibility. Millets contains various health benefits such as diabetics, obesity, and hyperlipidaemia (Mamatha, Begum, & Begum, 2003). Millets derived food products contains less glycemic index have been shown to reduce the insulin intake(Augustin et.al.,2015,Solomon etal.,2010).The germ layer of millet contain high lipid content , if so it can be one of major factor for increase rancidity, thus it precede to a loss in shelf life period and its sensory properties(Thompson, 2000).millets are grown under scorching condition, it can carry on with destitute soil condition and resistant to pest.There are different types of products which have been derived from the millets such as products from bakery, products from traditional products, extruded products and other products

## II. Types of Minor Millets

**Finger Millet :**Finger millet was first originated from Africa In world ranking finger millet got the 4$^{th}$ position comparing with other millets(Shukla & Srivastava, 2014). India stands 6$^{th}$ position in finger millet production. It has fabricated that the position of basic food in east and central Africa and in India. It can be grown various temperature and soil conditions (Gopalan, Rama Sastri, & Balasubramanian, 1980)It mainly grown in the regions of Karnataka, Andhra Pradesh, and other parts of northern parts of India(Vijayakumar & Mohankumar, 2011)This yield is impervious to drought state and pests.Finger Millets was developed in Africa from Africana likely in the Ethiopian region. It was introduced to India perhaps more than 3000 years ago(Goswami, MR, Gupta, & Vishwakarma, 2015). It is a tropically, grown from low-lying areas. This is the furthermost widely

grown small millet in India and Africa and can be very productive recognised five races(P. Singh & Raghuvanshi, 2012).

**Proso Millet:** Proso Millet is also an ancient crop. It was credibly domesticated in central and Eastern Asia, and was cultivated land inEurope in Neolithic times (Parameswaran & Sadasivam, 1994). It was well known to the Romans, and became the common millet. This is fundamentally a crop of the temperate regions but is also grown fully grown in the sub tropics, and on high ground in tropical winters.

**Foxtail Millet**:Foxtail millet is yet another ancient crop, probably domesticated to the Chinese as early as 2,700 BC .It is fundamentally a crop of the sub-tropical and temperate zones. The main production order are in Japan, China, India and Eastern Europe(Doust, Kellogg, Devos, & Bennetzen, 2009)noted that more than 12 rather variable groups of cultivars have been recognised.

**Little Millet :**Little Millet is fully-fledged to a limited extend in India, up to attitudes of 2,100 mm. It occurs wild in northern India and South Eastern Asia. It will yield some grain and useful focussed under very poor conditions(Vijayalakshmi & Radha, 2006).

**Barnyard Millet:** japanese barnyard millet china was domesticated in Japan some 4,000 years ago. It belongs essentially to the temperate zone. Barnyard was domesticated in India where it remains an important cereal in some areas. It has also been chronicled from the Central African Republic, Tanzania and Malawi. The two species have different chromosome members (2n = 54 and 2n = 36 respectively) and hybrids between them are sterile. The wild form is wide spread as a tropical weed.(Rao, 1994)

**KodoMillet**: Kodo millet is grown as a cereal in India only; although the wild grass is a wide spread tropical weed. The crop has been grown for at least 3000 years, could not find any clear racial differentiation. Wild weeds and cultivated types merged in all the characters studied kodo millet is said to be poisonous after rain. This could be due to a fungal infection. Winnowed clear healthy grain seems to pose no health problems (Hegde & Chandra, 2005).

## III. Nutritional Composition Of Minor Millets

Millets are peculiar among the cereals because of their richness in in calcium dietary fibre Polyphenols and protein Millets generally (M. P. Devi & Sangeetha, 2013)contain significant amounts of essential amino acids particularly the sulphur containing amino acids (methionine and cysteine) they are also higher in fat content than maize, rice and sorghum (Yenagi, Joshi, Byadgi, & Josna, 2013). In general cereals proteinsletting in millets are limited in lysine and tryptophan content and vary with cultivated.(Cole & Eastoe, 1988). However most cereals contain the essential amino acids as well as vitamins and minerals (Devi et al, 2011; FAO, 2009).

Everybody is aware of his/her day-to-day diet and so are the dietinventionexpansioncrewsall over the place the world determined to affordmisplacedfragments to health problem. So nutrition is at the foremost of the diet of people(Mahadevappa & Raina, 1978)Millet grains are nutritionally comparable and even superior to major cereals with respect to protein energy, vitamins and minerals Millets are the rich source (Amadou et al., 2013)of minerals, nutraceuticals and higher dietary fibres than rice or wheat and contains of collectivepopulation and immobile wheat and rice production, millets can be aauspicious alternative in explaining the tricky of food insecurity and malnutrition .(Pradeep & Guha, 2011)

The quality of protein is mainly a function acids. Finger millets contains 44.7% essentialamino acids of the total amino acid content.(Mbithi-Mwikya, Ooghe, Van Camp, Ngundi, & Huyghebaert, 2000) which is higher than the 33.9% essential amino acids in FAO reference protein (FAO, 1991). The characteristicson of the proteins of millet grains shows that prolamin fraction constitute the chiefstorage region(Siwela, Taylor, de Milliano, & Duodu, 2010). Protein of the grain and lysine is the most limiting amino acid followed by cysteine but millets are rather high in methionine. (Monteiro, Sudharshana, & Ramachandra, 1988) Among the millets pearl millet (Bajara) has the highest content of macronutrientsand micro nutrientssuch as iron, zinc mg, P ,folic acid and ribo flavin, significantly rich in resistant starch soluble and insoluble dietary fibres (Antony et al, 2006) Finger Millet seed coat is an edible material and contains good proportion of fibre, minerals and phyto chemicals(Platel, Eipeson, & Srinivasan, 2010). The seed coat matter forms a by-product of millet milling, matting and can be utilised as composite flour in biscuit preparation (Krishnan et al, 2011). Finger millet (ragi) is an extra ordinary source of calcium, Kodo millet and little millet are also reported to have 37% to 38% of dietary fibre which is the highest among the cereals and though low in fat content, it is high in Poly Unsaturated Fatty Acid (Hadimani & Malleshi, 1993).It is also rich in essential amino acids like lysine, threonine, valine sulphur containing amino acids and the ratio of leucine to isoleucine (Andlauer & Furst, 1998)Kodo millet has the highest free radical quenching activity followed by great millet (Chandrashekar, 2010)Sorghum is remarkably high in antioxidant activities followed by millets. Millets are valued for their high content of vitamin B, Folic acid, Phosphorus, iron and potassium. Finger millet contains 16 times more calcium than maize.(Srivastava & Singh, 2003) The niacin content in millets higher than all other cereals. In addition, Millets are gluten-free, easy to digest and are a great source of antioxidants and might have anti-carcinogenic properties

(Dykes and Rooney 2006). Minor millets contains certain combinations which helps in curing type 2 diabetics.(Shobhana et al., 2003; Viswanath, Urooj, & Malleshi, 2009)reported that there were more poly phenols in the husk-enriched fraction of finger millet than in the whole flour (2.6%). Gallic acid pre-dominated in both husk and whole flour fractions. While syringic acid was more in extracts from whole flour. Husk polyphenols were more effective antioxidants than those from the whole flour. Finger millet shows relatively higher than cereals carbohydrate (72%) comprises of starch as the main constituent and the non-starchy polysaccharides which amounts to 15-20% of the seed matter as an unavailable carbohydrate dietary fibre contents and complements which are the health benefits of the millet (Devi et al, 2011). Millets are noble sources of magnesium and phosphorus. Magnesium has the ability to help diminish the effects of migraine and heart attacks.(Dias-Martins, Pessanha, Pacheco, Rodrigues, & Carvalho, 2018).While phosphorus is an essential components of adenosine triphosphate a herald to energy in the body(Badi et al., 1990).

Table no: 3.1. Nutritional composition of minor millets

| Grain | Protein(g) | Fat (g) | Fiber (g) | CHO (g) | Minerals(g) | Iron (mg) | Calcium (mg) |
|---|---|---|---|---|---|---|---|
| Foxtail millet | 12.3 | 4.3 | 8.0 | 60.9 | 3.3 | 2.8 | 31 |
| Finger millet | 7.3 | 1.3 | 3.6 | 72.0 | 2.7 | 3.9 | 344 |
| Kodo millet | 11.0 | 3.6 | 10.0 | 66.6 | 1.9 | 0.5 | 27 |
| Little millet | 7.7 | 4.7 | 7.6 | 67 | 1.7 | 9.3 | 17 |
| Proso millet | 12.5 | 1.1 | 5.2 | 70.4 | 1.9 | 2.9 | 8 |
| Barnyard millet | 6.2 | 4.8 | 13.6 | 65.7 | 3.7 | 18.6 | 22 |

## IV. Processing of Minor Millets

Technology used for changing the grain into appetizing form and thereby attractive quality is known as processing of cereals and millets plays important role during its usage as food millet grains are hard seed coat grains, their processing starts with the task of removal of husk.(Rodrigues, Mandalika, Jamdar, & Sharma, 2014)

### 4.1 Dehulling

Centrifugal sheller can be used to dehullingthe small millets. The fraction of husk in minor millet and small millet varied from 1.5 to 29.3%. Soaking of millet grain in 300m (w/v) 0.2 N.HCL for 15hr and washout, which helps in removal of the hull outermost part of the seed coat. Then grains are scarified in laboratory scarificationfor 1-3 minutes can remove 8.10-15.84% hull (K. P. Singh, 2010). Decortication decreases the total mineral innards but increases the bio-accessibility of calcium, iron and zinc by (15-26 and 24g/100 gm)respectively (Krishnan, Dharmaraj, & Malleshi, 2012)

### 4.2. Milling

In milling, the milling efficiency and shelling index are the important parameters that influence the head yield and further processing. The quality of milling efficiency of little millet,kodo and kutki is 83.38, 76.43 and 74.10% respectively. Whereas their respective head yields after polishing are 71.5, 56.25 and 54.57% (Fellows, 2017)

### 4.3 Composite Flour

Although millets are nutritionally greater to cereals but their use is non wide spread(Sakhare, Inamdar, Soumya, Indrani, & Rao, 2014). One possible way of extending their utilization could be by blending them with wheat flour after suitable processing(Devisetti, Yadahally, & Bhattacharya, 2014),On addition of Millet flour

there would be changes in physic-chemical nutritional and functional characteristics. In developed countries many convenient products including extruded products are generally consumed(Sangita & Sarita, 2000). Extruded products include spaghetti, macaroni. Vermicelli and noodles pasta etc. The products are made using refined drum wheat flours or semolina as their main ingredient many enquiryworkforces have endeavoured to produce composite millet flours by trading conventional cereal flours to some degree in making the traditional foods, ready to use or RTE food products or in the production of pasta. prepared composite flours of foxtail barnyard and finger millet with wheat flour by 10-30% millet flour and observed that addition of millet flour to wheat flour increased the concentration of protein, fat and ash but lessened the carbohydrates(Kumar, Pushpadass, Franklin, Simha, & Nath, 2016)formulated two millet – wheat composite flours, CFI and CF2 based on the rheological and textural properties of dough using response surface methodology(Saleh, Zhang, Chen, & Shen, 2013; J. R. Taylor & Emmambux, 2008)reported that the soaking technique improves the bio availability of nutrients such as minerals. The milling of cereal caryopses also bases for micro structure to occur. Exposure to air is a process that reservations grains and various essential features of grains undergo changes during exposure to air due to the forfeiture water from the inner structure and the surrounding surface. It was observed that physical characteristics of food may be altered during drying which are caused by changes in food micro structure (Laxmi, Chaturvedi, & Richa, 2015) reported the micro structures of undeveloped bananas whose shape become lopsided in comparison to each cultivar.

**4.4 Fermentation**

Fermentation process in which incorporation of several strain for aerobic respiration to soaked material for few hours at specific temperature, pressure,and wetness condition. It enhance the nutritional quality, shelf life of the product.It contain only low amount of antinutrient factor and reduce food toxicity during consumption(Muyanja, Narvhus, Treimo, & Langsrud, 2003) .

## V. Products From Minor Millets

Arange of food products with numerous local names are made from minor millet; which are well explained by (McDonough, Rooney, & Serna-Saldivar, 2000).

The major types of foods are:

a. Porridges either thick or thin which are common in Africa.
b. Flat bread, either unfermented by Asians or fermented by Ethiopians in Sudans.
c. Snacks from blends with legume flours.
d. Non-fermented or fermented beverages in Africa.

All these products are made from either loutishly or finely ground millet flour usually with detachment and deduction of the bran. Ethnic foods like muddehappalaand fermented breakfast food-paddu and novel foods such as biscuits, chakali and laddos. Technological structures of ethnic and novel foods of millets different stages of processing time taken for grinding, baking of Paddu,

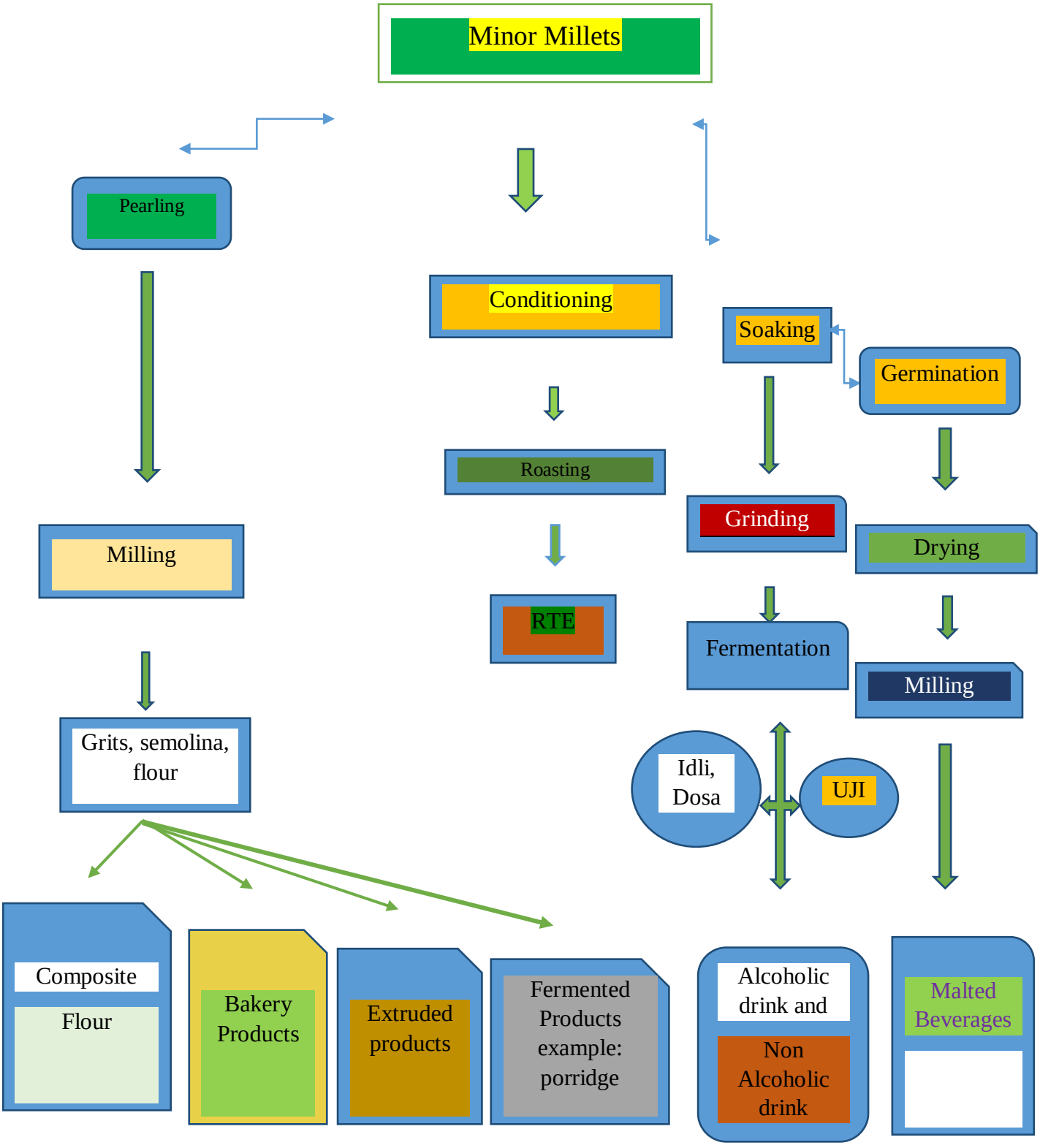


Fig 5.1 Schematic representation of minor millet value added products.

**5.1.1.Traditional Fermented Foods And Beverages From Minor Millets**

In Africa and India, minor millets are use to produce a wide variety of traditional local foods, such as porridges, alcoholic beverages (opaque beer or Dogon millet beer, chibukushake,mbeg, Merissa) and non-alchoholic drink (pombe, pito, Boza, kdnunzaki, busheramahewa, oskikundu.(Ifon, 1980)(Ilango & Antony, 2014)Most of these products are produced in household or in small production units consumed in the main meals.

**5.1.2.Fura**: Ita short span food product .It has dropletshape obtained from cooking a mixture of fermented and non-fermented (Fellows, 2017) millet flour and spices is widely consumed in Nigeria (Odhav, Obilana, & Jideani, 2014).Depending in the region, it is consumed with youngest mashed in water before consumption as porridge (Kayitesi, de Kock, Minnaar, & Duodu, 2012)

**5.1.3.Porridges** : (ben-saalgu, uji, ugali, oko, bogobe, koko, and kambukoozh) may be prepared from pearl millet flour as fermented or unfermented food product being the foremostconsumed minor millet value added products Different types of porridges may be prepared (Kayitesi, Duodu, Minnaar, & de Kock, 2010)by cooking flour in boiling water convoyed by vibrant stirring.

**5.1.4.Flat Breads:**It is very widespreadpancake – like gluten-fire products that can be made with unfermented minor millet flour with warm water like to chapatti, fermented process is required for the manufacturing of flat bread. The ingestion of this product is common in Saudi Arabia(Towo, Svanberg, & Ndossi, 2003)These flat breads can be cooked on hot plate or clay griddle or wood fire stove and served at meals, depending on the region, with hot pickle alimentary paste is a staple food of the North African cuisines and also known as semolina. This couscous is popularly consumed with vegetables or yoghurt(J. R. N. Taylor, Schober, & Bean, 2006)Ladoo and Dakuwe prepared small sweets from searedminor millet grain flours that are consumed in India and Nigeria. Minor millet flour has great impending for developing popular products in other parts of the globe such as ready – to- eat snacks(Subramanian & Viswanathan, 2003).

Finger millet flour was done in a dough mixer with a capacity of 50 kg for 6 minutes water of mixed flour mixture was put in to the extruder for pellets development. The pellets were then processed to the gelatinization slot to form the dough paste. The paste was then passed through an extruder to extrude the paste into two sheets and they were then sent to the noodles were sterilized at $100^0$ C cut it to 4 inches length pieces and sent to a dryer dried noodles product was packed in laminated bags.(Begum, Vijayakumari Begum, Pandy, & Shivaleela, 2003)

The process of fermenting malting and brewing increase nutritive value. Fermenting without prior malting, hydrolyses starch, softens flour particles and lowers the PH, which helps bleach the flour and slightly intensifications protein digestibility. (Hansen, 2002) malting (germination) begins the process of mobilising seed reserves both starch and protein and initiating shoot and root growth(Etokakpan, 1992). The vitamin content of the grain is value-added products and their levels of lipids, phytates and oxalates are lowered (Onyango et al., 2005)

**5.1.5.Brewing**– Beers are vital nutritional adjustments to the diets of people who are principally cereal dependent, as the malting and brewing processes increases bioavailability and vitamin contents. High temperature use during the phases of brewing are important in controlling the commotion of the enzymes and organisms (McDonough et al., 2000). Two types of beer are made, a sour opaque alcoholic beverage that is still fermenting when consumed and a clear sweet.

**5.2. Non fermented millet food and beverages from minor millets**

**5.2.1. Dambu:**Dambu is a streamed grained dumpling made from millet, maize or sorghum. Dambu is produced both at home and commercially. Most dambu producers use a traditional method including a kindling mortar and pestle to dehull and mill the grain. Moistened millet flour is blended with seasonings and steamed 30 min. The abrasive particles are interspersed into fermented milk and sugar may be supplementary to taste.

**5.2.2. Masvusvu**: Masvusvu is a treacly beverage traditionally made from malted finger millet. Masvusvu is unfermented mangisi. A concoction of water and malted millet meal is separated heated in an earthenware jar and stirred slowly at intervals for 80 min until near boiling. The slurry mixture thickens and the light-brown invention is ingested as either a food or beverage(Choi et al., 2005)

**5.2.3.Roti**: It is made out of finger millet roti ,which is an unraised flat bread made from ragi flour. The preparation of roti consist of mixing the ragi flour, Hewed onions, chilly, coriander leaves peeved coconut and salt equal proportion in a bowl awater is added slowly until a dough pellet is moulded(Mosha & Svanberg, 1983). The dough is into two parts and cooked on a griddle. The dough is mixed meticulously by into round on the griddle a few drops of oil are added and then the griddle is placed over a medium flame. The roti is covered with a lid. Cooked for 4-5 min. and then flipped to equable the other side for another 2-3 minutes(Chandrasekhar, Bhooma, & Reddy, 1988)

**5.2.4. Mahewu**: Mahewu is also known as Mahewu is a popular non-alcoholic fermented beverage consumed in southern Africa. Mahewu is also made from minor millets in countries such as Zimbawe(Villarreal-Morales, Montañez-Saenz, Aguilar-González, & Rodriguez-Herrera, 2018)

**5.2.5.(Kunn: zaki –kunn** –Zaki is a traditional fermented non-alcoholic beverage widely consumed in northern Nigeria(Franz et al., 2014)

**5.2.6.Bushera**: It is a common traditional non-alcoholic beverage in western highlands of Uganda. For sweet Bushera, fermentation is allowed to proceed for a short period of time(Dalu & Feresu, 1996)

**5.2.7.Malwa** : Malwa is a non-alcoholic fermented beverage produced from finger millet consumed at house hold level in the north-east regions of Uganda(Mokoena, Mutanda, & Olaniran, 2016)

**5.3.Alcoholic Beverages**

Traditional minor millet alcoholic beverages are produces across Africa in Bulgaria, Turkey and in China.

**Boza**: boza is a somewhat different types of traditional smoky beer.(Goode & Arendt, 2003).

**Wine** : Today the wine is made from glutinous rice more willingly than finger millet, but the traditional process of fabrication is still used in rural areas(Choi et al., 2005)

**Spirit** : China is noted for its very popular traditional millet commonly calledBaiju spirits have a minimum alcohol content of 38% (v/v)

**5.4.Puffed/Popped and Flaked Millets**

Puffing or popping of food grain is an old traditional practice of cooking grains to be used as snack or breakfast cereal. Popped millets consumed widely in India several African countries. During popping grains are endangered to high temperature for ashort period of time. Popping and puffing of millets are achieved using drying up. This can be done by either sand roasting (Mishra et al, 2014) heating in a hot pan under a steady fire. (AIGAL, 2014)Due to the thermal gradient, the moisture privileged the grains vaporizes and tries to escape through the microspores which causes the grain to either pop or become puffed as a consequence of development of the prudish endosperm. (Mishra et al, 2014). The physicalproperties such as bulk density, kernel size and factor like salt or sugar used in popping affect popping volume and ratio (Ushakumari, Latha, & Malleshi, 2004) prepared expanded finger millet as ready to eat product using HTST mechanism. The micro structure of puffed starch granules becomes orbicular(Farooq, Mohsin, Liu, & Zhang, 2013) and that of popped and extruded product a honey comb likeedifice(Wadikar, Premavalli, Satyanarayanaswamy, & Bawa, 2007)prepared puffed grains of poles apart varieties of finger millet by stipulating grains for a 2 hours. Now a daysfresh air puffing machines have been developed which can be cast-off for mass fabrication of puffed or popped millet grains (P. Singh & Srivastava, 2006)

**5.5. Pasta And Noodles From Minor Millets**

Pasta are made from the flours of grains. Noodles are the pasta products also known as suitability foods primed through cold extrusion system which become hard and brittle after drying(He, Zhang, Wang, Li, & Han, 2015). The cooking of these noodles is few minutes pasta was dig up in dolly pasta machine, (Devaraju, Begum, & Vidhya, 2006)Proso millet and wheat flour assortment with appreciable shelf life Noodles are one of the most preferred food items among all age groups having longer shelf life and good commercial eminence(Sakhare et al., 2014)(Lucisano, Cappa, Fongaro, & Mariotti, 2012).

**5.6.Baked Products From Minor Millets**

The use of millets in bakery products bequeath not only be overlooker in terms of fibre contents micro nutrients but also create a good potential for millets value added products (Verma & Patel, 2013). There are several shortening can be used during baking operation for the firm texture.(K. Singh, Mishra, & Mishra, 2012).Finger millet and foxtail millet flour can be incorporated in bakery items like biscuits, nan-khatai, chocolate, Chinese, cakes, muffins etc(Desai, Kulkarni, Sahoo, Ranveer, & Dandge, 2010) The chocolate cup cake, get cake, masala cake, carrot cake, soup sticks, rusk and muffins prepared with finger millet have good appearance texture, flavour and overall acceptability scores(Begum et al., 2003). Challenges have been made to improve the nutritional quality of cakes with respect to the minerals and fiber content by supplementing with malted finger millet flour (Desai et al, 2010).The combination of minor millet flour in their desirable quantity can be used preparation of cake and their icing agents,(Kamaraddi & Shanthakumar, 2003)

**5.7.Extruded Product**

Extrusion cooking is a HTST cooking process, which could be used for treating of starchy as well as proteinaceous materials. The use of extrusion cooking has distinguishable gains like resourcefulness high productivity, high product quality increase in in-vitro protein digestibility(Dahlin & Lorenz, 1993). Millet founded extruded snack foods are prepared using twin-screw extruder from Kodo millet flour blend (Geetha, Mishra, & Srivastav, 2014). Millet based several extruded product from milk powder which can be used for several purposes (M. P. Devi & Sangeetha, 2013)The minor millets that are mixture of powdered form can be inserted to twin screw extruder puff like product will be attained.(P. B. Devi, Vijayabharathi, Sathyabama, Malleshi, & Priyadarisini, 2014).Minor millet blend for manufacturing the products with desired

quality(Sudisha, Kumar, Amruthesh, Niranjana, & Shetty, 2011). Microwave cold extruded puffed barnyard millet based ready to eat fasting foods with comparable sensory quality was developed by (Jaybhaye, Pardeshi, Vengaiah, & Srivastav, 2014)

## VI. Health Benefits of Minor Millets

Pearl millet grains have several functional properties due to their high fiber content fatty acid composition and phyto chemical compounds (Annor, Marcone, Corredig, Bertoft, & Seetharaman, 2015)Pearl millet helps to reduce the risk of heart diseases, inflammatory bowel disease and atherosclerosis (Chandrasekara & Shahidi, 2011; Nnam, 2000)reported that the consumption of millet on the glucose metabolism of diabetic, may be useful to correct hyperglycemia caused by type 2 diabetes(GAITAN et al., 1989). However the hypoglycaemia nature of millets can be significantly affected by the type of processing applied to them, hence the adoption of processes that maintain low starch hydrolysisshould be encouraged (S. Arora, Jood, & Khetarpaul, 2011).There are particularexplorationfor proceeding for the amount of peptides, proteins and phenolic acids found in millet particles may be promising in the prevention and treatment of cancer observed that proso millet grains also have anti proliferative activity in vitro against human liver cancer cells. It was initiate that millet bran-derived peroxidise from foxtail millet has a potential therapeutic use to treat rectal colon cancer, due to its resilient inhibitory power on preventing cancer cells from growing in in vitro and in vivo tests (El Shazali, Nahid, Salma, & Elfadil, 2011)

Millet is more than just an interesting alternative to the more common grains. The grain is also rich in phytochemicals including phytic acids which is believed to lower cholesterol and phytate, which is allied with abridged cancer risk (Campelo, Teixeira Neto, & da ROCHA, 1999). These health benefits have been fairly attributed to the wide variety of potential chemo preventive substances called phyto chemicals including antioxidants present in high amounts in foods such as millets (1zadi et al, 2012). Proso millet also improved, 2012). Proso millet also improved glycemicreactions and plasma levels standardises in the body (Alexandratos, 2006)

Finger millet seed is used to treat dysentery. In southern Africa, the Juice of a mixture of finger millet leaves is used in the action against leprosy (Scalbert, Manach, Morand, Rémésy, & Jiménez, 2005). The aerial parts of treatment of influenza and pneumonia in Brazil. The roots for the treatment of for the treatment of Urinary infection. Millets are safe for people suffering from gluten allergy and disease from gluten allergy and celiac disease. Consumption of food sources with fiber to promote the life (Mbithi-Mwikya et al., 2002)

## VII. Conclusion

With the increasing need for the world to feed its growing population, it is imperative to explore food crops such as millets that are grown locally and consumed by low income households in developing nations(Dunwell, 2014).Application of industrial processing technologies using modern equipment and optimized conditions will enhance the production of high quality and diversified food products at a commercial scale. This will improve the productivity of millet and substantially contribute and drive economic development and food security in Africa. The whole meal-based finger millet products may be desirable due to the protective role of germ coat matter that have health enhancing benefits (Wadikar, Vasudish, Premavalli, & Bawa, 2006)

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