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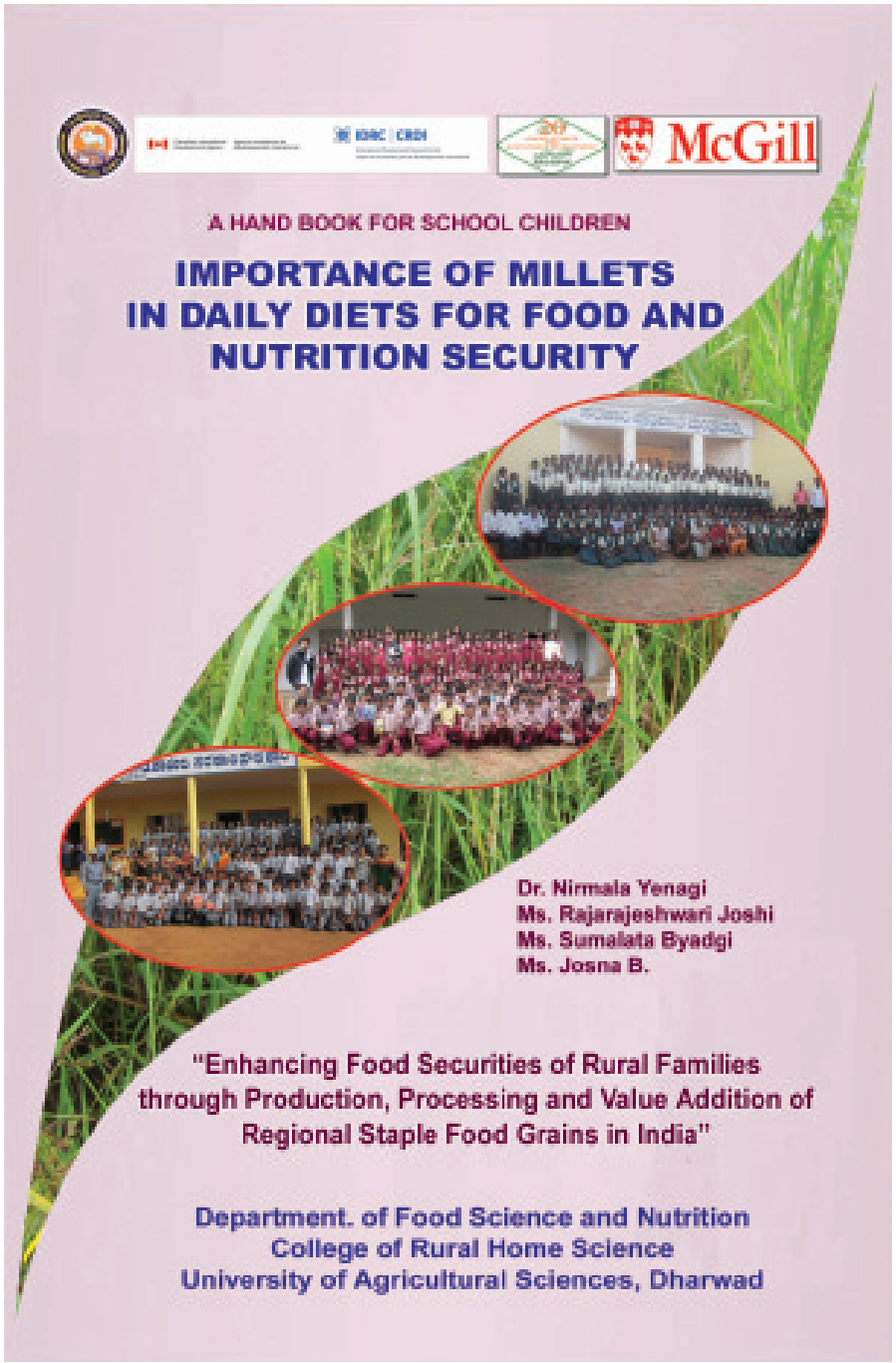

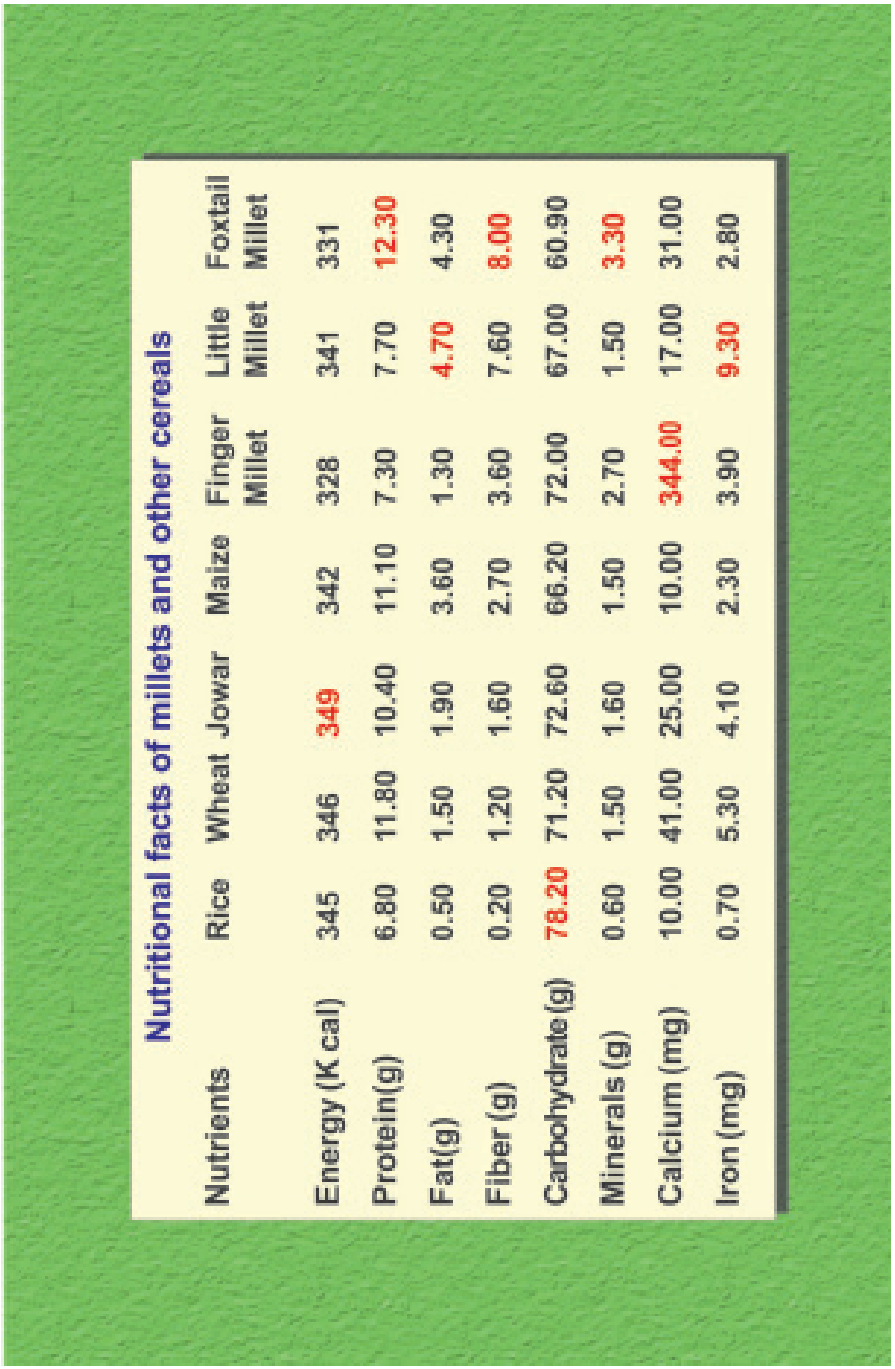

Nutritional facts of millets and other cereals

Nutrients	Rice	Wheat	Jowar	Maize	Finger Millet	Little Millet	Foxtail Millet
Energy (K cal)	345	346	349	342	328	341	331
Protein(g)	6.80	11.80	10.40	11.10	7.30	7.70	12.30
Fat(g)	0.50	1.50	1.90	3.60	1.30	4.70	4.30
Fiber (g)	0.20	1.20	1.60	2.70	3.60	7.60	8.00
Carbohydrate (g)	78.20	71.20	72.60	66.20	72.00	67.00	60.90
Minerals (g)	0.60	1.50	1.60	1.50	2.70	1.50	3.30
Calcium (mg)	10.00	41.00	25.00	10.00	344.00	17.00	31.00
Iron (mg)	0.70	5.30	4.10	2.30	3.90	9.30	2.80

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Nutrition awareness programme on Food and Nutrition Security to School Children











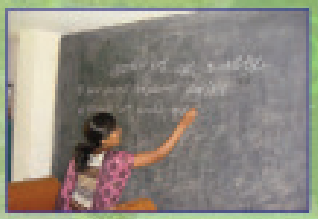

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IDRC 106414

A HAND BOOK FOR SCHOOL CHILDREN

IMPORTANCE OF MILLETS IN DAILY DIETS FOR FOOD AND NUTRITION SECURITY

Dr. Nirmala Yenagi
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Ms. Sumalata Byadgi
Ms. Josna B.

Enhancing Food Security of Rural Families through Production, Processing and Value Addition of Regional Staple Food Grains in India

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A Hand Book for School Children: Importance of Millets in Daily Diets for Food and Nutrition Security

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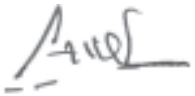
Foreword

In present era, people are more attracted towards the ready to eat and fast foods. The very purpose of consuming the foods have been forgotten. The food that we consume in our day-to-day life need to be balanced. It should be a blend of all nutrients that promote healthy living. But majority of them lack the knowledge w.r.t the nutrients that the food contains. They hardly know the fact that the foods they consume are meeting their body requirements for nutrients. Hence a majority of Indian population, especially the children are suffering from malnutrition.

One of the most important causes for malnutrition is lack of knowledge regarding the balanced foods and nutrition. Hence the awareness programmes on the same should continuously reach the local people, especially the children as they represent the major sector of the society and they develop their food habits during their early years of life.

This booklet, apart from giving information on balanced diet, also aims at providing knowledge about the importance and use of nutritious small millets in our diet. The inclination of people towards the ready-to-eat and fast foods has made them to discard these nutritious millets from their food basket. Hence the “Handbook on nutrition for school children” aims at reintroducing the small millets into their daily diet to promote healthy living. This book is undoubtedly useful for school children.

My hearty congratulations to Dr. Nirmala Yenagi, Principal Investigator of CIFSRF Millet project for bringing out this book and the Canadian International Food Security Research fund for financing the publication.



Dr. R.R.Hanchinal
Vice Chancellor, UAS, Dharwad

From Authors Pen

For healthy living, a person needs balanced and nutritious food. The combination of cereals, pulses, fruits, vegetables, milk and milk products, sugar, jaggery, oil and oil seeds provides balanced diet. Majority of them consume the food just to satisfy their hunger and taste needs and the awareness/knowledge regarding the nutrient contents of the food is very less. Hence malnutrition and under-nutrition are widely prevalent in rural and urban areas of the country, especially among the vulnerable section of the population namely children below 5 years of age, school-going children, expectant and lactating mothers. While weakness, micro-nutrient deficiencies, protein-energy malnutrition is common among rural population, consumption of high-calorie foods among urban people has invited various diseases like diabetes, heart and cancer related diseases. In this context, the awareness programmes on consumption of nutritious/balanced foods need to reach common people. The conduct of nutrition awareness programmes for school children and rural women needs priority. Children develop their eating habits at early stages of life and once habituated it is difficult to change in later period of life. Hence there is a need to append the existing approaches of Government like school feeding programmes and access to food through public distribution system with the nutrition awareness programmes. The education programmes enhance the knowledge of children thereby making them to understand broad contemporary of food and nutrition issues to select diet that is good for their general health. In this context, the nutrition education booklet is developed. This book highlights the nutritional, therapeutic, processing methods and importance of millets in our day-to-day life. Pilot study on distribution of this booklet among 151 school children revealed and increase in their knowledge level as well as childen showed interest towards the consumption of nutritious millet foods.

This book aims at introducing the importance of balanced diet and nutritious millets among the farming community through educating the children. The farming community should re include these millets in their diets, which facilitates towards enhancing the food and nutrition security among the rural families.

My heartfelt gratitude to Dr. Uma Kulkarni for making the corrections and all project staff who have contributed directly or indirectly in bringing out this book. I also thank Mr. Md.Rafik Shaikh for typesetting and designing of coverpage.

Dr. (Smt) Nirmala B. Yenagi

CONTENT

Importance of Food

Any solid or liquid edible item that digests and nurtures the body after consumption is called food.

Major functions of food

- To give strength to the body and its different organs which are incessantly active.
- To help the body to grow and to protect the emaciated parts of the body.
- To protect the body from diseases and external atmosphere.
- To provide social and psychological security

a) Energy giving foods and nutrients

Carbohydrates, fats and proteins give energy to the body. These nutrients are present in cereals, pulses, oil seeds, roots, sugar, jaggery, ghee, butter and oil.

Oil and oily foods provide more energy to the body. Sugar and jaggery are instant sources of energy while cereals, pulses and millets release energy gradually to the body.

b)Body building foods and nutrients

Proteins, vitamins and minerals are helpful for the growth of the body, for keeping the body intact and for repairing the emaciated parts of the body. These nutrients help in synthesis of blood and increase resistance power to fight against diseases.

Milk, egg, meat, fish, pulses and oil seeds are rich in these nutrients

c) Protective foods and nutrients

The protective foods are rich in vitamins, minerals, fiber and water. They are helpful in enhancing the beauty of the body in terms of bright eyes, soft skin, dark and shining hair, strong jaws, beautiful teeth and strong body. Protective foods also provide resistance power to the body.

Green leafy vegetables, yellow coloured fruits and vegetables, citric fruits and other vegetables are rich sources of these nutrients.

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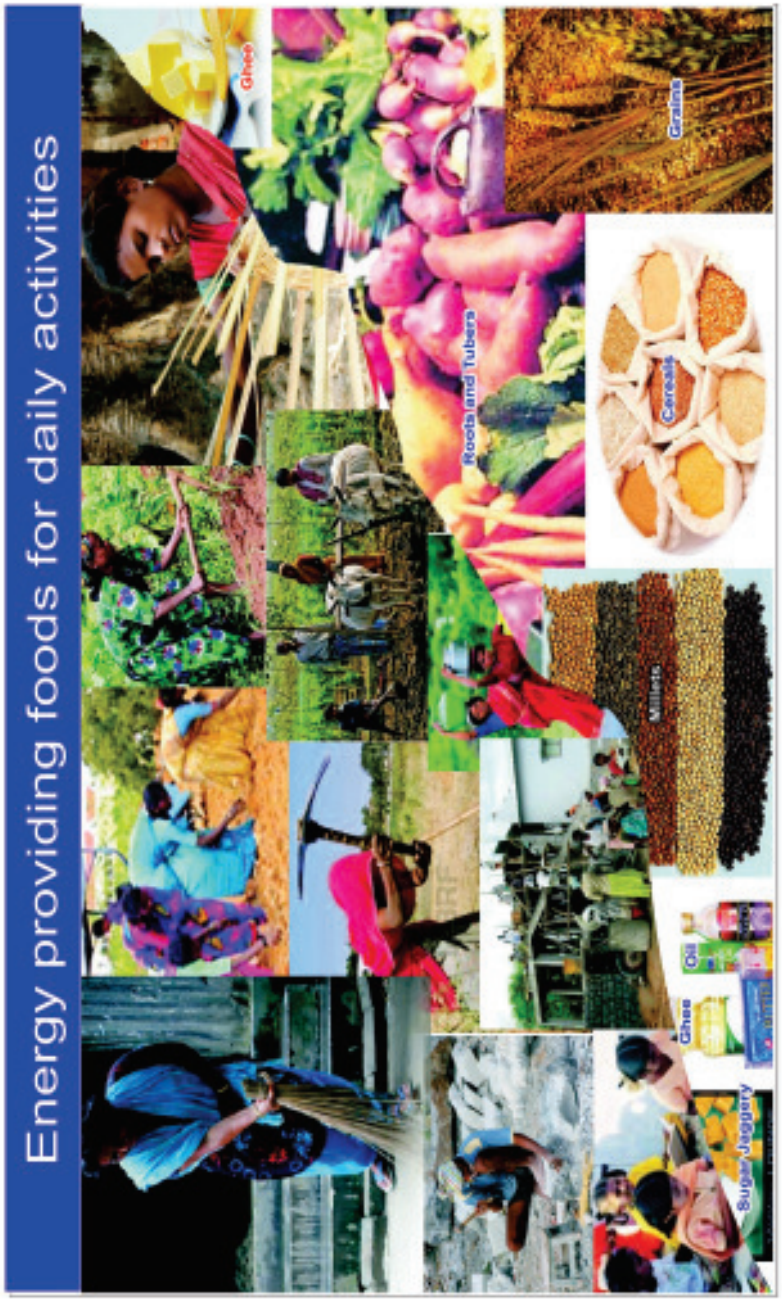
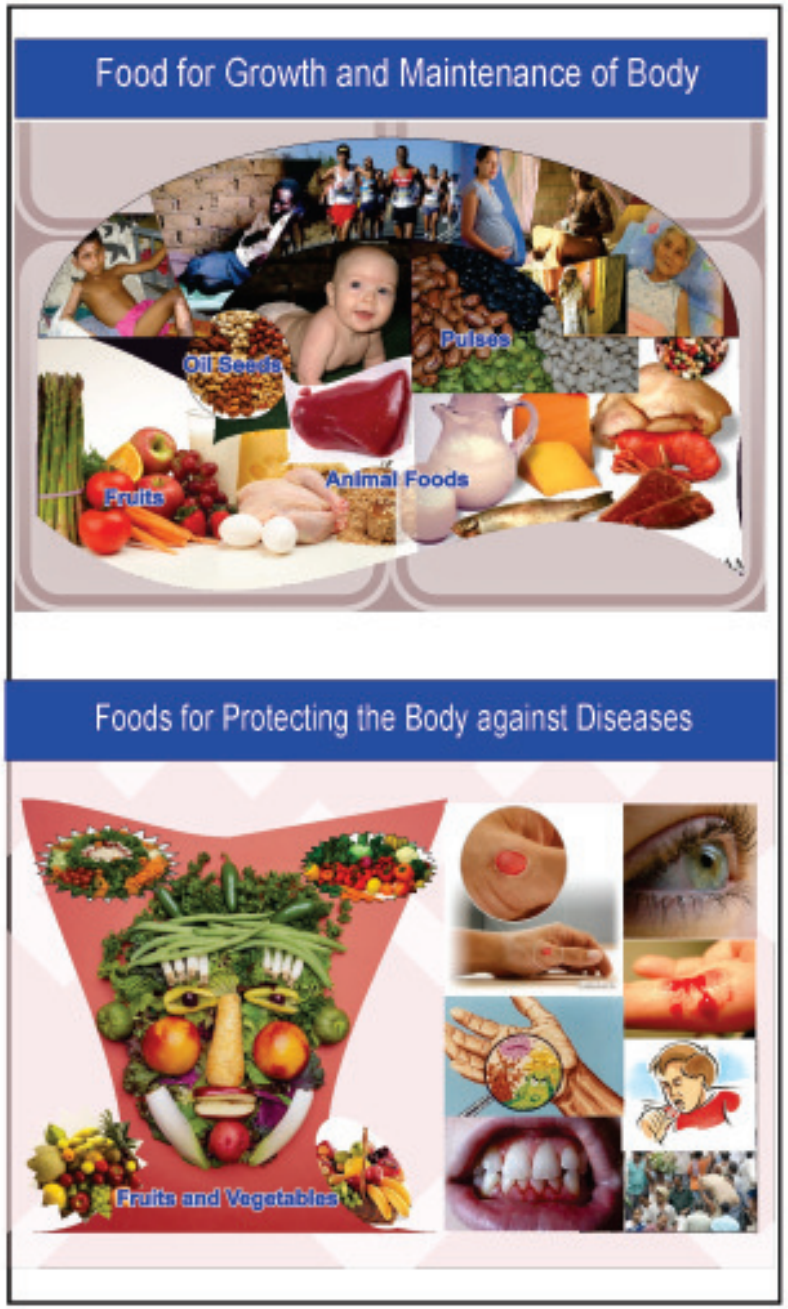

Energy providing foods for daily activities
Ghee
Grains
Roots and Tubers
Cereals
Millets
Oil
Ghee
Sugar, Jaggery


Food for Growth and Maintenance of Body
Oil Seeds
Pulses
Fruits
Animal Foods
Foods for Protecting the Body against Diseases
Fruits and Vegetables

Balanced Diet and Health

Food that contains cereals, pulses, green and yellow coloured vegetables, fruits, milk and milk products, sugar or jaggery and fat (oil) is said to be balanced food. A combination of these provides required amount of carbohydrate, protein, fat, vitamins and minerals to a healthy person.

A proper combination of different food items in our daily diet that provides the required quantities of nutrients to our body is said to be a balanced diet and such a diet helps to keep our health in a good condition.

Guidelines for food intake

- Use cereals and millets sufficiently.
- Consume fruits and vegetables generously.
- Non vegetarian food, milk and milk products should be consumed moderately.
- Consumption of oil, fat, sugar, jaggery and ghee should be limited.

An overview of Indian food habits and nutrition security

- Malnutrition in India is caused due to ignorance with respect to nutritious foods, negligence of locally available nutritious foods and improper cooking methods.
- Malnutrition is predominantly found among pregnant women, lactating mothers, adolescent girls and small children.
- This problem is more prevalent amongst economically and socially backward communities. It is evident that malnourished pregnant women give birth to premature babies, with low birth weight. An increased percentage

of infant mortality is also the result of malnutrition. About 40% of the children between 1-5 years of age are victims of child mortality due to malnutrition.

- Due to malnutrition, children loose their resistance power and there by become vulnerable to many diseases.
- The food of malnourished children is found to be calorie deficient. About 30-35% of children and more than 50% of mothers suffer from anaemia due to iron deficiency.
- This wide spread problem of malnutrition can be countered, if every housewife manages to procure healthy food for her family in the prevailing economic condition.

***


Balanced Diet
Oil, Sugar & Preserved Food
4
Meat, Fish, Egg, Milk and Beans
3
Fruits & Vegetables
2
Cereals
1
1. Eat Adequately
2. Eat Liberally
3. Eat Moderately
4. Eat Sparingly
A diet that contains adequate amounts of all the necessary nutrients for healthy growth and activity is
BALANCED DIET


An overview of Food and Nutrition Security in India
Malnutrition is more prevalent among Pregnant women, lactating mothers, Adolescents & School going children
ANAEMIA IN INDIA
70%
55%
24%
Children
Women
Men

Minor Millet Crops

The minor millets are gaining momentum viz. finger millet, little millet, foxtail millet, proso millet, kodo millet and barnyard millet and are so called because of their small size. These millets are popularly known to be food and fodder crops besides being characterized as rain fed crops.

In India finger millet is popularly grown in the states of Andra Pradesh, Tamilnadu, Orissa, Maharashtra, Bihar and Uttar Pradesh. Foxtail millet is popular in Karnataka, Andra Pradesh and Tamilnadu. Little millet which is drought proof and a short duration crop is cultivated in Madhya Pradesh, Tamilnadu, Andhra Pradesh and many parts of Karnataka. Kodo millet is a rare crop cultivated in Rajasthan, Northern part of Uttar Pradesh, southern part of Tamilnadu, eastern part of West Bengal and in few areas of Madhya Pradesh, Andhra Pradesh and Karnataka. Barn yard millet is mainly cultivated in Uttar Pradesh and Himalayan ranges. Proso millet is popular in Bihar, Andhra Pradesh, Uttar Pradesh, Maharashtra, Tamilnadu and some parts of Karnataka.

Unique features of minor millet cultivation

- Minor millets viz. finger millet (ragi), little millet and foxtail millets cultivation is restricted to particular regions.
- Millets are grown depending on their suitability to the weather and soil status of that region.
- Can be cultivated on unfertile lands.
- Can be grown even on lands with shallow top soil.
- Minor millets need less chemical fertilizers to increase productivity.
- These crops are pests and disease resistant.
- Growing millets is a unique food system and hence play a protective role in India's future food and cultivation.
- Millets with these unique characteristics, if consumed after processing, enhances taste and quality.

***

Nutri Millets in Food

There are different types of minor millets viz. finger millet, little millet, foxtail millet, proso millet, kodo millet and barnyard millet. Like other cereals, minor millets also supply a significant amount of energy to the body. Around 70 to 80% of energy supplied to the body is from cereals and millets. Since these cereals form a major portion of our daily diet about 50% of the protein required for the body is supplied by these cereals.

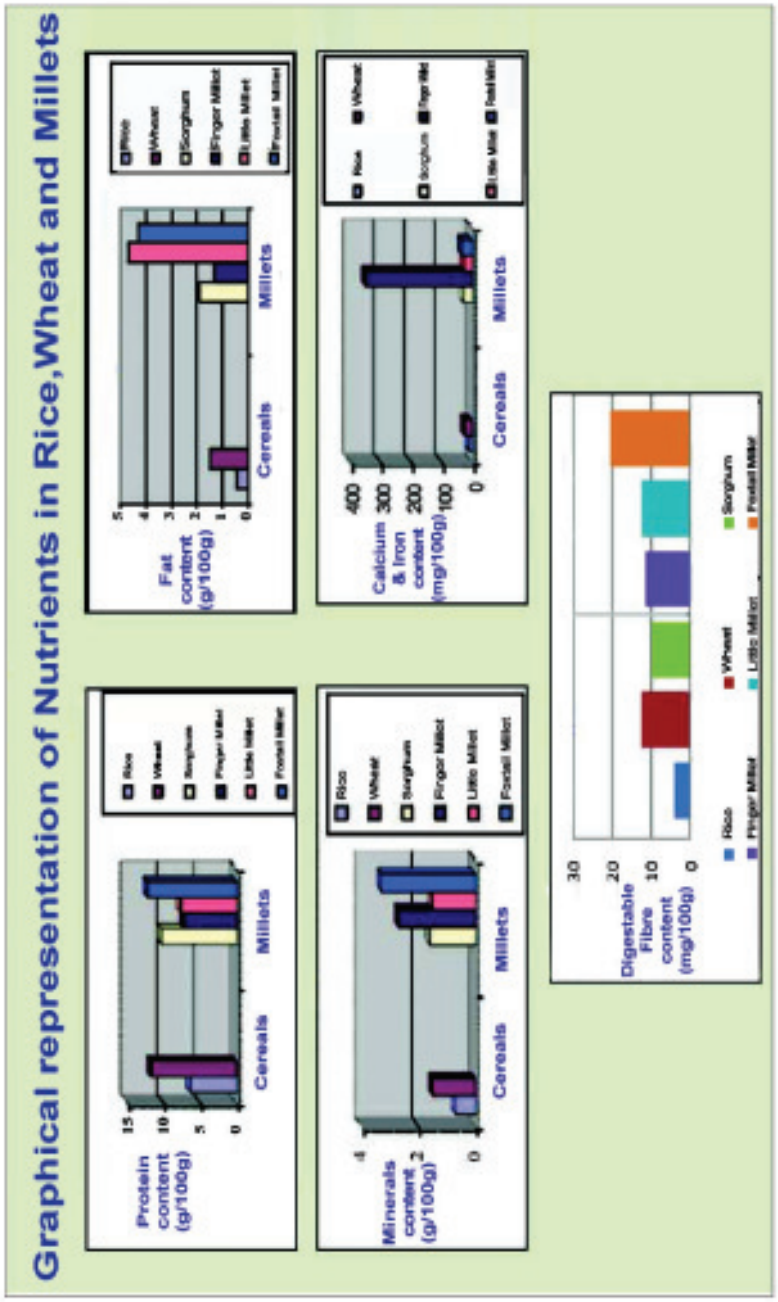
Millets contain more digestive fiber compared to rice and wheat. This enhances slow release of energy, thereby increasing physical efficiency. Millets also contain considerable amount of fat which is needed for the body. They are rich sources of 'B' vitamin and minerals which help in the process of digestion of food that yields energy to perform different activities in the body. Absence of such micro nutrients in processed foods results in insufficient supply of energy, thereby reducing physical efficiency.

Compared to rice and wheat, millets contain higher proportion of minerals. Finger millet contains 30 times more calcium while other millets posses 2 time more calcium than rice and wheat. Little millet and foxtail millets are rich in iron.

Thus Minor millets can form solution for people suffering from malnutrition in India.

***


Different Millets
Little Millet
(Panicum sumatrense)
Finger Millet
(Eleusine coracana)
Barnyard Millet
(Echinochloa frumentacea)
Foxtail Millet
(Setaria italica)


Graphical representation of Nutrients in Rice,Wheat and Millets
Protein content (g/100g)
Fat content (g/100g)
Calcium & Iron content (mg/100g)
Minerals content (g/100g)
Digestable Fibre content (mg/100g)
Cereals
Millets
Rice
Wheat
Sorghum
Finger Millet
Little Millet
Foxtail Millet

Therapeutic Value of Millets in the Management of Life Style Disorders

Urban public suffer from various diseases and disorders like diabetes, hypertension (BP), cancer, cardiovascular diseases etc. Thousands of rupees are spent to maintain their health and visit to hospital has become a routine job.

Not only the person affected suffers, the members of the family also need to take care of them. In these situations, the foods in our kitchen act as remedies. All the above said diseases can be managed effectively with minor millets as they possess therapeutic qualities.

The presence of slowly digestible carbohydrates and high dietary fibre in minor millets has enhanced the therapeutic quality of food. The toxins produced in intestine are thrown out of the body, constipation and related diseases can be prevented, help in maintaining the body in good health status. To prevent constipation, consumption of little millet rice with curds is in practice.

The fat content in minor millets not only provides energy but also aids in controlling the cholesterol synthesis in the body.

Compared to rice and wheat, minor millets contain little high amount of anti nutritional factors. But these anti nutritional factors are plant based phyto chemicals that possess therapeutic qualities and hence are recommended by doctors for various diseases. Diabetics need to control their blood sugar, hypertension as well as cholesterol level and that is why doctors recommend minor millets for these problems.

Minor millets play an important role in curing stomach and intestinal problems.

If consumed regularly the phyto chemical components and special nutrients present in minor millets help in preventing many diseases.

***

Significance of Minor Millets in Traditional Foods

It is a known fact that a variety of food items can be prepared with minor millets.

Depending upon the regions and the taste of people our elders used to prepare different foods like *Mudde, Roti, Dosa, Ambali, Ganji, Sandige* etc. Many farmers enjoy soft or thick Mudde along with curry prepared from a mixture of pulses and vegetables.

Mudde is prepared from fingermillet, sorghum, rice, wheat. Same flours are used for preparing plain or *spicy rotis*. '*Ragi ambli'* is a very popular food especially during summer. Apart from cooling the body, *ambli* also gives energy. Many are in the practice of consuming *ambli* along with curds or butter milk after lunch. Some consume it for breakfast. The practice of consuming *ambli* with curry and rice also exists in some places. Some prefer to drink it by mixing with milk and jaggery. During functions guests are treated with a glass of *ambli*. It can be consumed as fresh *ambli* or after 4-5 hours after preparation or on the next day of preparation. Finger millet (ragi) grains are consumed raw by applying chilli powder over it. Another delicacy of finger millet is slight roasting of ragi panicles. Separate the grains by rubbing the panicles between the palms. After adding fresh grated coconut, salt and chilli, it can be served as ready to eat snack. Some add jaggery to raw ragi grains and consume.

Cooked foxtail millet rice is a traditional food item relished along with milk or curds. Its flour is used for preparation of *chakli* (fried snack) and steamed cholestrum cakes. Foxtail millet *payasam* is a traditional delicacy. Use of this grain is compulsory during festivals like *Seege Hunnime, Ashtami Gouri, Ellu Amavasye, Deepavali, Nagarpanchami* etc. A traditional recipe called *Hurakki Holige* is usually prepared during these festivals. For *Nagarpanchami*, offering of *Tambitttu* (laddus made of foxtail millet flour and jaggery) to **nagamma goddess** is compulsory.

Little millet and foxtail millets are generally harvested in the month of September. *Akki huggi* and other sweet dishes are prepared with these freshly harvested grains and are offered to mother earth.

Millet *mudde* papads can be preserved throughout the year and relished at any time. *Roti's* prepared from freshly harvested little millet with spicy chutney is a favourite of farmers. Farm families have been preparing little millet based *dosa* and *Paddu* from years together.

Opinions of farmers regarding nutri millets

- Foods prepared from millets have high satiety value and the person consuming millet based food will not feel hungry for a long time.
- Millet based food items are tastier.
- Little millet and foxtail millets have a longer shelf life.
- Older the foxtail millet grains, tastier are their constituent recipes.

It is natural that people working on the fields feel more hungry. With the consumption of little millet, one does not feel hungry for 6 to 8 hours. The grain supplies both energy and health beneficial nutrients to the body.

***

Nutri Millets in Breakfast

A normal human being generally consumes food four times a day. Every day food is consumed in the form of breakfast, lunch, evening snacks and dinner. Taking breakfast is very important because this is the first food intake of the day after a gap of 8-10 hours and is necessary as it provides us energy to start our activities. Depending on the region and the taste of the people, menu of the breakfast varies *Idli, Dosa, Upma, Rice flakes, Churmuri (puffed rice), Chapathi* are different breakfast items.

Because of lack of planning, many people do not find time to have breakfast. Avoiding breakfast results in loss of efficiency, both physical and mental. People start losing interest in work. Children who do not take breakfast become inactive. Therefore it is advised to take breakfast compulsorily. The breakfast should be balanced and contain nutritious food.

- Breakfast should meet 1/3rd requirement of nutrients per day.
- The quality and quantity of food should be in accordance with the activities of a person.
- Farmers and industrial workers need to have heavy and nutritive food.
- Intake of balanced food keeps the body active, increases physical capacity, sharpens the brain and makes children energetic.

Utilisation of millets for breakfast:

The food that we consume during breakfast helps us to start our day-to-day activities efficiently. The body capacity decreases, if our intake of nutrients is less than 1/3rd of our requirement.

Millets are good sources of energy that is required for the proper functioning of our body. Millets not only contain

carbohydrates, but also micronutrients that stimulate the bodily activities.

High fibre content of millets makes the process of digestion slow, there by delaying the supply of energy to the body.

Foods prepared with nutritious millets are suitable for manual workers. Millets, having high satiety value are therefore suitable for farmers, labourers, factory workers, masons etc. Processed food is suitable to school children, teachers, white collar job holders and others requiring less bodily capacity.

***

Religious Fasting and Millet Consumption

Millets produced in North Karnataka and Tamilnadu have great demand in Maharashtra state, which has established a number of large scale millet processing units. Millet rice, prepared in the mills of Maharashtra is supplied to different parts of the country. Millets have a special demand in the states of Maharashtra, Gujarat, Rajasthan, Uttarpradesh, as millet rice is prescribed for use during the days of religious observances.

Significance of millets during religious observances:

- It enhances both energy and health
- Food items like millet based *Khichadi, Dosa, Payasam* etc. help people involved in heavy physical activities and to work for a longer time without much fatigue.
- Millets have high satiety value.
- Millet consumption also helps in controlling thirst.
- Constipation prevalent during religious fasting, can be cured by millet consumption
- Millet is good for health because of its slow digesting characteristic.

Being the rich source of vitamins, minerals & iron, little millet is instrumental in promoting health.

***

Methods of Processing Minor Millets

Technology used for converting the grain into edible form and thereby enhancing its quality is known as processing. Cereals and pulses can be processed in different ways and consumed. Minor millets can be consumed by processing them into rice, flour, sprouting, ready- to- eat popped grains and fermentation.

People feel that the products prepared from rice and wheat are tastier. That's true too! But they would not relish the millet based products if asked to eat because the colour, taste and few chemical compounds present in millets affects the taste of the product.

Rice and flour of processed millets

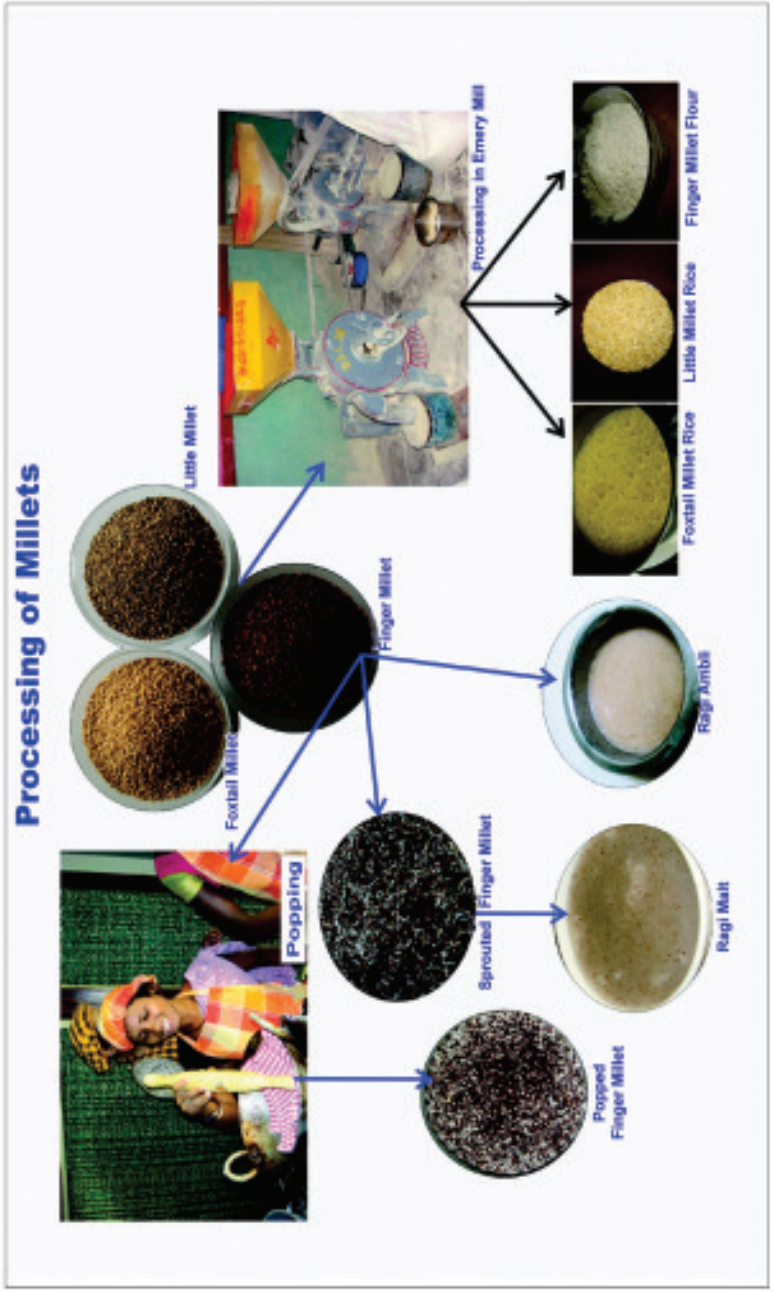
- Processing of cereals and millets plays significant role during its utilisation as food.
- It is a common practice to use little millet and foxtail millet in the form of rice after removing the outer husk. We can prepare (grits) semolina (rawa) or flour from rice.
- The products prepared from these processed grains are easily digestible and facilitate maximum supply of nutrients to the body.
- Proportion of anti nutrients is low in rice and flour
- Several nutritious recipes can be prepared with millet flour.
- Millet rice and flour are suitable for preparation of staple food items like *Rotti, Mudde,* Cooked rice, Porridge etc.
- Processed rice and flour can be utilised for preparation of value added products
- Finger millet and foxtail millet flour can be incorporated in bakery items like biscuits, cakes, muffins etc. which adds diversity to the taste of youngsters.

Sprouting

- Traditional health drink from finger millet, popularly known as 'Ragi Malt' is prepared from sprouted ragi. Also called as '*Vadda Ragi Hittu*' ragi malt is used as supplementary food to babies
- Food quality of finger millet is enhanced by sprouting finger millet.
- Food prepared from malt is easily digestible
- By sprouting, salts in finger millet are easily available to the body
- Water soluble vitamins will increase and the quantity of anti nutrients will decrease.
- Sprouted finger millet possesses maximum energy/ calorie and high density nutrients.
- With ragi malt-health drink, baby food and supplementary food can be prepared.
- Malt is suitable for the weak and ailing
- Women can prepare nutritious ragi malt at home with low cost.

Popping: Popping is a traditional practice. It is a ready food which can be prepared from any cereal or millets. When popped, the outer portion of the grain is not separated and therefore popped grain is considered as nutritious ready food. Popping does not reduce the quality of the nutrients. Flavour arising out of popping is appealing and people generally consume it with liking. A variety of recipes and supplementary foods can be prepared from popped grains.

Fermenting: Fermenting is a method of processing cereals and pulses. When the soaked grain is ground and kept for 6 to 8 hours or when any flour is mixed with curds or butter milk and kept for 6 to 8 hours, there is a growth of healthy bacteria which effects changes in the batter. The process is called fermentation.



- Recipes prepared from fermented products are sour to taste. Fermented food is easy to digest- because the growth of healthy bacteria weakens the anti nutrients and enhances the nutrient availability.
- Fermented products naturally release the micronutrients required for our body.
- *Ragi porridge, idli, dosa, paddu* etc. are the nutritious products prepared by fermentation. Fermented millet recipes will add to food diversity.

***

Processed Millet Food for Supplementary Feeding

Breast milk is considered to be the first and the fore most healthy food for a child till it is six months old. As the child starts growing, its requirement for nutrients also increases. Hence weaning is recommended after six months. Initially the child needs to be supplemented with liquid food and semi solid food later. As the child grows solid food may be started.

Millets in baby food:

Hygienic and low cost baby foods can be prepared at home too. Ragi malt is one such baby food. Tips for preparation of malt are as under,

Ingredients: Ragi 1 kg

Method:

- Wash cleaned ragi and soak it in water for 24 hours
- Drain the water, allow it to sprout.
- Sun dry sprouted ragi and remove the sprouts. Roast it in a pan on a low flame till it gives aroma and grind it to fine powder.
- Sieve it with a fine cloth
- Store it in an air tight container

Nutritious ragi malt:

Ingredients: Ragi 1 kg, Wheat 200 g, Green gram 200 g.

Proportion for mixing of flours after processing: Ragi flour 700 g. Wheat flour 150 g and Green gram flour 150 g.

Method of preparation: Soak Ragi, wheat and green gram separately for 6 hours. Drain the grains and tie them separately in clean clothes for germination. Green gram will germinate in 8-10 hours while wheat and ragi will take 48 hours to germinate.

Sun dry the sprouted grains separately. Rub the grains by hand, separate the sprouts, and roast the grains till it gives

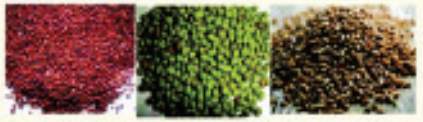
Millet Foods for Children

Children Health Information

Sl.No.	Children below 5 year	Percentage
1.	Mid lower body weight	48
2.	Severe body weight	16
3.	Under Nourished	20
4.	Stunned growth	48
5.	Supplementation of A Vitamin	66
6.	Use of Iodised salt	5

Children	Mortality Rate /1000 children
Below 10 days	34
Below 1 Year	50
Below 5 year	66

Nutritious Ragi Malt



Ingredients:
Ragi-1 Kg, Wheat - 200 g, Green Gram -20g

▼

Clean the grains by removing the stones and mud

▼

Wash thoroughly in water and remove the stones

▼

Soak the grains for one day seperately

▼

Drain the grains and tie them seperately in clean clothes for germination
(Ragi and Wheat - 2 days, Green Gram - 1 day)

▼

Sun dry the sprouted grains seperately

▼

Roast the grains seperately till it gives good aroma

▼

Then rub the roasted grains by hand and seperate the sprouts

▼

Grind the grains seperately in flour mill

▼

Proportion: Ragi flour-700g, Wheat flour-150g, Green Gram Flour -150g

▼

Mix the three flours in above said proportion and use

Ingredients	Rate (Rs.)
Ragi (1 Kg)	18.00
Milling	3.00
Total Cost	21.00

Total yield of Ragi Malt per Kg = 900 g Rs. 21.00
Ragi Malt per serving = 10 g Rs. 0.23

good aroma. Grind the grains, sieve the flours and mix them in the above said proportion. Store in air tight container.

Points to be noted while feeding the child with solid food: When any outside food is to be introduced to the child, feed one spoon and see whether the food suits the child. To start with, food should be given in liquid form, then semi solid and finally solid.

Preparation of solid food:

- Use clean utensils, tumblers, glasses, spoons etc. Wash your hands before you start preparing baby food.
- Drinking water or milk should be boiled and allowed to cool.
- Take specified quantity of baby food in a tumbler, add little water or milk and mix well. Avoid lumps.
- After using the 'solid food' close the lid of the container tightly.

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Value Addition to Processed Millets

Consumption of millets is decreasing day by day both in urban and rural areas as utilisation of rice and wheat have become a matter of prestige. Villagers are losing interest to use millets because of drudgery associated with the traditional millet processing methods. Moreover there is not much information available on millet cultivation methods. Also, publicity and awareness about this grain/crop among the public is lacking. People do not opt to consume millets even though they are aware of its importance.

Research in food technology and food processing has thrown light on a number of positive aspects of millets. Again, Universities of Agricultural Sciences are moving ahead in the direction of designing machines for processing millet. It is expected that the results of these research works will enhance the status of millets in the market.

Millets, characterised by high nutritive and therapeutic qualities can be utilised in preparation of a variety of value added products.

- Nutritious food items can be prepared with popped millets.
- *Ragi Hurihittu* mix is a traditional value added product which can be promoted in the market for its high calcium content.
- Millet vermicelli is a convenient food item.
- Ragi malt**:** Ragi malt can be served to children as calcium rich health drink and to babies as solid food.
- Diabetic Mix**:** Diabetic mix prepared from millets controls sugar
- Popular bakery items like biscuits and muffins can be prepared by incorporating millet flour to the extent of 50%. These products are as tasty as products made of wheat.

Education about millets to rural school children

Demonstration of Ragi Malt

- Fermented food items like *Idli, Dosa and Paddu* prepared from millet have great demand in hotels.
- Papad making is a home industry. Release of millet *mudde* papads in the market along with blackgram (urad) *papads*, will create a good market for home industry. Millet *mudde* papads prepared from fermented rice are known to be very tasty.
- Fried products like *chakli, nippattu, tengalu, kodubale* etc prepared from millet flour will appeal to the younger generation as novel snack items.

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Intercropping Millets with Pulses-A Step Towards Food and Nutrition Security

Cultivation of pulses either as intercrop or as relay crop in millet helps in maintaining land fertility. Further apart from facilitating crop diversity, practice of such a system enables higher economic gain.

Pigeon pea can be intercropped with little millet. Crops like sesame, castor, green gram, moth bean and gogu (*pundi*) can be grown as supplementary crops. During *kharif* season horse gram can be cultivated as relay crop after little millet. It is profitable and increases soil fertility. Intercropping or relay cropping pulses with little millet is certainly more profitable than cultivating millet as sole crop. Legumes help in protecting soil fertility as they drop leaves in a large quantity which get converted to organic fertilizer. Hence millets not only utilise the fertility of land but enhance the fertility in turn.

Combination of millets and pulses

Vegetarians meet their protein requirement by consuming pulses. Pulses are good sources of protein in our food. Though millets contain protein, its quality less superior when compared to that of milk & egg. The proportion of amino acids in millets is not balanced and if consumed along with pulses, the protein quality in millets can be improved. Vegetarians can get quality protein at low cost, if their cereal/ millets to pulses intake is in 8:1 proportion.

Pulses contain ‘B’ vitamin profusely. Besides, they contain rich fibre which provides strength to the body.

Germination of pulses enhances ‘vitamin C content that strengthens teeth, gums, muscles and supplies rich iron to the body.

Pulses like green gram, bengalgram, cowpea, pigeon pea, mothbean keep the body organs intact and provide energy to the body during carbohydrate deficiency. They also increase resistance power of the body.

Consumption of millets in combination with pulses provides energy to the body and also energy releasing vitamins and minerals. As the sprouted pulses are good sources of good quality protein, C-vitamin and iron, public can be assured of balanced nutrition and there by food and nutrition security. Thus millets in combination with pulses play a very important role in controlling mal nutrition.

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Millet Recipes

Little millet *Bisibelebhat*

Ingredients: Little millet 1 Kg, red gram dhal ½ Kg, carrot ½ Kg, beans ½ Kg, potato ½ Kg, groundnut 100 g, *bisibelebhat* mix 150g, tamarind 75 g, mustard and cumin seed 5 g, oil 200 ml, bengal gram dhal 2 tsp, black gram dhal 2 tsp, onion 100 g, garlic 10 g, green chilli 1, turmeric powder 1 pinch, coriander & curry leaves 1 bunch, salt as per taste.

Procedure: Boil 5 ltr of water in a container. Add little millet rice and red gram dhal to the boiling water and cook. When it is half cooked, add chopped vegetables, onion, and garlic and cook till it attains soft consistency. Then add tamarind juice, *bisibelebhat* mix and salt and cook. For seasoning, heat the oil in a separate pan, add mustard seeds and allow them to splutter. Add cumin seeds, curry leaves, black gram dhal, bengal gram dhal and groundnut. Add the seasoning to *bisibelebhat* and mix well. Garnish with finely chopped coriander leaves and serve hot.

Total yield: 5 Kg
Serving Per Person : 120 g
No. of Servings: 40

Little millet *Paddu*

Ingredients: Little millet rice 1 Kg, black gram dhal 250 g, bengal gram dhal and red gram dhal 50 g, fenugreek seeds 15 g, oil 150ml, salt to taste.

Procedure: Soak little millet rice, pulses and fenugreek seeds together and black gram dhal separately for 6 hrs. Take a table spoon of little millet rice and prepare porridge. Grind the soaked little millet rice, pulses and fenugreek seeds together with rice porridge and grind black gram dhal separately. Mix both the batters and allow it to ferment for 8 hrs. Add salt and mix properly. Heat *paddu* pan and grease it. Pour the batter in to each cup of *paddu* pan. When the bottom half is cooked, turn it upside down with a fork to cook the upper portion.

Total yield: 2 Kg
Serving Per Person : 6 no.
No. of Servings: 30

Little millet *Chakli*

Ingredients: Little millet flour ½ Kg, maida flour ½ Kg, cumin seeds 25 g, chilly powder 25 g, hot oil 100 ml, for frying, salt as per taste.

Procedure: Sieve all flour together and roast for 10-15 minutes. Add cumin seeds, chilly powder, salt and mix well. Add hot oil to the flour mixture and mix well. Make dough by adding water. Press in *chakli* press and deep fry till golden color.

Total yield: 1.2 Kg
Serving Per Person : 50 g
No. of Servings: 26

Little millet Upama

Ingredients: Little millet rice 100 g, onion 25 g, green chillies 2nos, vegetables 50 g (optional like peas, cauliflower, cabbage etc), mustard and cumin seeds ½ tsp, bengal gram dhal ½ tsp, ground nut 2 tsp, black gram dhal ½ tsp, oil 25 ml, curry leaves few, coriander leaves few and salt to taste.

Procedure: Roast little millet rice with little oil on a low flame & keep it aside. Heat oil in pan and season with mustard seeds, cumin seeds, black gram dhal, bengal gram dhal, groundnut, curry leaves, chopped green chilly and onion. To the seasoned mixture add 3 cups (750 ml) of water and boil. Add salt to taste to the boiling water and add roasted little millet rice & mix well. Close the container with lid and cook for five minutes or till it becomes soft on a low flame. Add coriander leaves for garnishing and serve hot.

Total yield: 225 g
Serving Per Person : 85 g
No. of Servings: 03

Nutritional facts of millet products

Sl. No.	Name of Receipe	Protein (g)	Fat (g)	Crude fiber (g)	Carbo hydrate (g)	Energy (Kcal)	Calcium (mg)	Iron (mg)
1	Ragi Malt	7.30	1.13	3.60	72.00	328	344.00	3.90
2	Nutritious Ragi Malt	10.52	1.36	3.41	69.31	331	266.60	4.12
2	Bisibelebhat	7.79	9.88	2.74	30.85	231	56.71	2.05
3	Little Millet Paddu	7.54	12.67	4.00	42.56	292	30.64	5.24
4	Little Millet Chakli	12.07	52.86	4.67	68.25	797	42.50	2.92
5	Little Millet Upama	5.08	14.81	3.27	28.64	227	42.27	3.78