SRI MAHAYOGI LAKSHMAMMA GOVERNMENT DEGREE COLLEGE

YEMMIGANUR

CERTIFICATE COURSE

ON

"MILLET RECIPES"

ORGANIZED

BY

DEPARTMENT OF BOTANY

2022-2023

Dr. S. Khadar Basha

Lecturer in Botany

Dr. M. Suseelamma

Incharge Dept. of Botany

Dr. K. Mahaboob Basha

Principal

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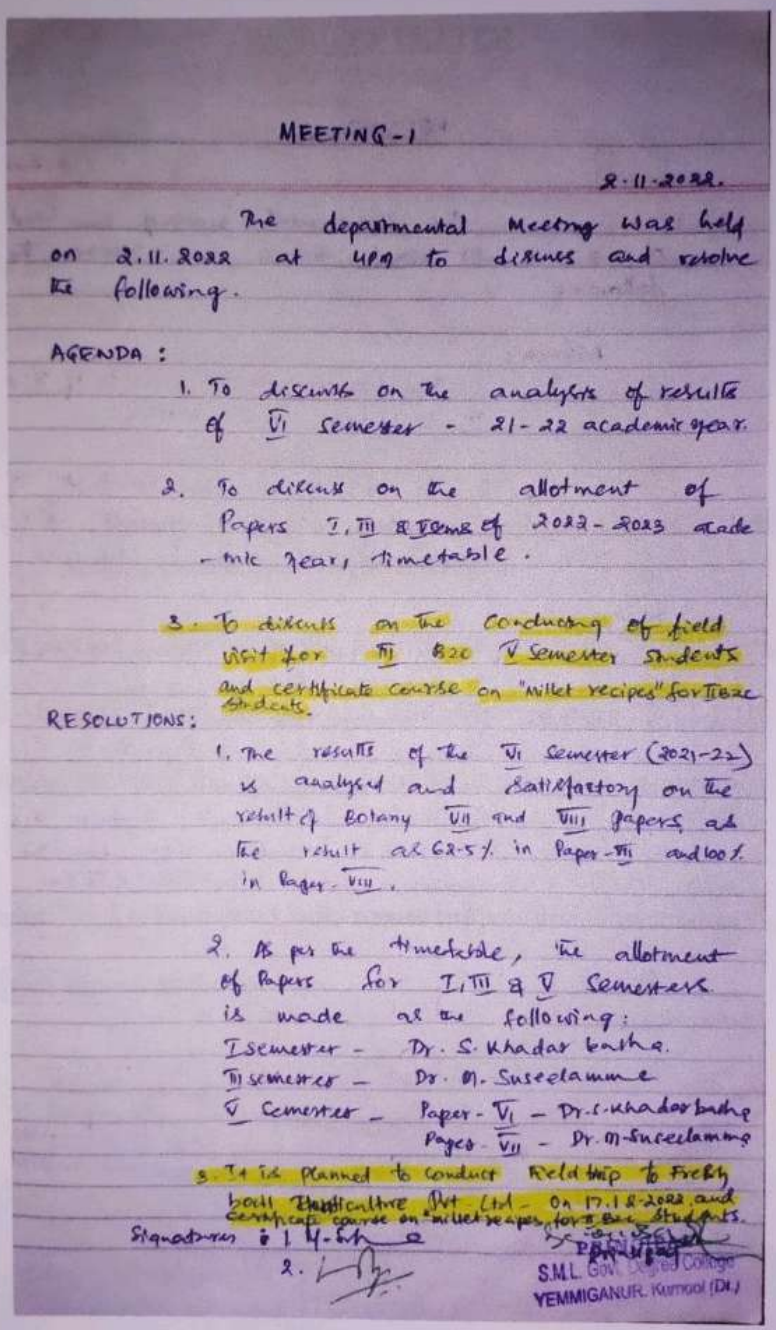
Extract from Departmental Minutes Register



MEETING-1

2.11.2022.

The departmental Meeting was held on 2.11.2022 at 4PM to discuss and resolve the following.

AGENDA :

1. To discuss on the analysis of results of VI Semester - 21-22 academic year.
2. To discuss on the allotment of Papers I, III & V sems of 2022-2023 academic year, timetable.
3. To discuss on the conducting of field visit for III B.Sc V Semester students and certificate course on "Millet recipes" for III B.Sc students.

RESOLUTIONS:

1. The results of the VI Semester (2021-22) is analysed and satisfactory on the result of Botany VII and VIII papers, as the result as 62.5% in Paper-VII and 100% in Paper-VIII.
2. As per the timetable, the allotment of Papers for I, III & V Semesters is made as the following:
   I Semester - Dr. S. Khadar basha.
   III semester - Dr. M. Suseelamma
   V Semester - Paper-VI - Dr. S. Khadar basha
   Paper-VII - Dr. M. Suseelamma
3. It is planned to conduct Field trip to Fresh bowl Horticulture Pvt. Ltd - On 17.12.2022, and certificate course on "millet recipes" for B.Sc students.

Signatures: 1.

2.

PRINCIPAL
S.M.L. Govt. Degree College
YEMMIGANUR. Kurnool (Dt.)

S. Khadar Basha

Signature of the Course Coordinator

REQUEST LETTER

Dated: 18.11.2022

From

The Incharge
Department of Botany
SML Govt. Degree College
Yemmiganur.

To

The Principal,
SML Govt. Degree College
Yemmiganur.

Respected Sir,

Subject:- Dept. of Botany – willing to conduct a Certificate Course – "Millet Recipes" - seeking permission – requested reg.

I am pleased to inform you that a certificate course on "Millet Recipes" for Second Year B.Sc. B.Z.C. students of our college which will be started from 23-11-2022 to 05-01-2023. This certificate course provides the necessary knowledge and skills required to become a self-employed youth.

In this connection, I request you kindly accord the permission to conduct the course for the benefit of the students as well as the society.

Thanking you sir,

Yours faithfully,

(Dr.M. Suseelamma),
I/c Department of Botany,
SML GDC Yemmiganur.

Date: 19-11-2022.

Circular

All the second year III semester students of Botany are here by informed that a Certificate Course on Millet Recipes is going to be conducted by the Department of Botany from 23.11.2022 to 05-01-2023 and the interested students can enrol their names with the course coordinator on or before 21.11.2022.

Signature of the
Course Coordinator

Signature of the Principal
PRINCIPAL
SNL. Govt Degree College
YEMMIGANUR, Kurnool (Dt.)

Copy to: -

1. Departmental Notice Board.
2. College Library Notice Board.
3. College Office.
4. Departmental Copy.

SRI MAHAYOGI LAKSHMAMMA
GOVERNMENT DEGREE COLLEGE, YEMMIGANUR

Department of Botany
Willingness of B.Sc., B.Z.C. III Semester students
for the Certificate course on
"MILLET RECIPES"

List of students participated in Certificate course

S. No.	Hall Ticket No.	Name of the Student	Mobile Number	Signature
1	21358049003	B. Neelakanta	8886893792	B. Neelakanta
2	21358049004	B. Uma Mahesh	7601034939	B. Uma Mahesh
3	21358049007	B. Mallikarjuna	6305151046 ~~7014681486~~	B.Mallikarjuna
4	21358049008	B. Veeresh	7671925685	B. Veeresh
5	21358049009	B. Shiva	9133130956	B. Shiva
6	21358049012	B. Veerendra	6305551780	B. Veerendra
7	21358049014	B. Ramalingappa	9347913267	B. Ramalingappa
8	21358049016	C. Thulasi	7671064053	C. thulasi
9	21358049017	E. Suresh	9885092812	E. Suresh
10	21358049018	G. Narasimhulu	7995427459	G. Narasimhulu
11	21358049019	G. Nagendra	8143104768	G. Nagendra
12	21358049020	J. Vamsi	7093551367	J. Vamsi
13	21358049021	J. Karthikeya	9014862121	J. Karthikeya
14	21358049022	K. Anitha	9640892967	k.Anitha
15	21358049023	K. Mohammad Raffiq	6300850276	K. MD. Rafiq

Signature of the
Course Coordinator

SML GOVT DEGREE COLLGE, YEMMIGANUR
DEPARTMENT OF BOTANY

Certificate Course on Millet Recipes

Brief Report:

Millets are a traditional staple food of the dry land regions of the world. They are nutri-cereals which are highly nutritious and are known to have high nutrient content which includes protein, essential fatty acids, dietary fibre, B-Vitamins and minerals such as calcium, iron, zinc, potassium and magnesium. They help in rendering health benefits like reduction in blood sugar level (diabetes), blood pressure regulation, thyroid, cardiovascular and celiac diseases. However, the direct consumption of millets as food has significantly declined over the past three decades.

The major reasons of decrease in consumption is the lack of awareness of nutritional merits, inconveniences in food preparation, lack of processing technologies and also the government policy of disincentives towards millets and favoring of supply of fine cereals at subsidized prices. Hence developing technology that makes millet value added products available as convenient to make and easy access at reasonable prices will find great demand and market particularly in urban places where there is growing conscious for nutritive intake of food.

In connection with International Year of Millets (2023), A millet-based recipe certificate course with a duration of 30days aimed is going to be conducted to Second Year III semester students by the Department of Botany and also to provide training for entrepreneurship. The Scientists form KVK, Banavasi namely Dr. P. Sujathamma, Programme Coordinator & Dr. P. Aparna, Subject Matter Specialist acted as resource persons along with Botany Faculty.

OBJECTIVES:

Students will be able

- to gain the knowledge of millet crops.
- to understand the nutritive value of millets.
- to know the value addition of millets.
- to prepare different millet recipes.

The detail of the course is as follows:

FOCUS:

To enhance the skillsamong the students, in the preparation of millet recipes.

Name of the course: Certificate Course on "Millet Recipes"

- **Level:** Certificate
- **Stream:** Science
- **Subject:** Millet Recipes

Eligibility Criteria: 10+2

Duration: 30hours

Language: Telugu and English

Intake: 20 seats

Selection/Admission Criteria: First come first serve

Attendance:85%

Academic calendar for the course: six days in a week

(4 days theory periods & 2 days practical) (9AM to 10AM)

Available infrastructure: Well-equipped laboratory, Materials for the preparation.

Teaching Staff: Qualified &Experienced Lecturers.

Non-teaching staff: 1 lab assistant.

Examination structure & schedule:

At the end of course the examination will be conducted. Its notice & time table will be communicated to the students at least before 5 days of the date of examination.

1. Course MR-01 Theory paper (Short answer type) = 50marks, Two hours duration.

Award of Certificates after successful completion of course to the candidates.

Reservation: NA.

Course Outcomes of MR-01

At the end of the course, the students

- gained the knowledge of millet crops.
- had a comprehensive account of the nutritive value of millets.
- known the value addition of millets.
- Enthusiastically learnt the preparation of various millet recipes.

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Title of the Course: MR-01: Millet Recipes

COURSE CONTENT & SYLLABUS

Theory Course - Duration – 18hours

Unit:1 **Duration: 6hrs**

1.1 Introduction and importance of Millets.
2.1 Types of Millets.
3.1 Seasonal availability of millets.

Unit: 2 **Duration: 6hrs**

1.1 Nutritional value of millets.
2.1 Comparison of nutritional value of different types of millets.
3.1 Millets and Glycemic Index.

Unit:3 **Duration: 6hrs**

1.1 Value addition to millets.
1.2 Recipes of millets – Sorghum Samosa, Sorghum Chandravankalu, Sorghum based groundnut biscuits, Pearl Millet Pakoda, Pearl Millet Pesarattu,
1.3 Soft Finger Millet - Ragi Mudda, Finger Millet Muruku, Foxtail Millet *Kheer*, Foxtail Millet Coconut Rice, Millet Laddu.

PRACTICALS – Duration – 12hours

1. Acquaint with knowledge on millet crops.
2. Materials used for Millet Recipes.
3. List out millet recipes.
4. Value addition of millet products.
5. Field visit to KVK, Banavasi.
6. Preparation of millet recipes.

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DEPARTMENT OF BOTANY

Certificate Course on Millet Recipes

Timings: 9AM to 10AM.

TIME TABLE

S. No.	Date	Topic
1	23-11-2022	Introduction to Certificate Course and Syllabus discussion.
2	24-11-2022	Introduction to Millets
3	25-11-2022	Practical: Introduction and Syllabus discussion.
4	26-11-2022	Practical: Acquaint with knowledge on millet crops.
5	28-11-2022	Importance of millets.
6	29-11-2022	Seasonal availability of millets.
7	30-11-2022	Nutritional value of millets.
8	01-12-2022	Practical: Value addition of millet products.
9	02-12-2022	Practical: Value addition of millet products.
10	03-12-2022	Nutritional value of millets.
11	05-12-2022	Comparison of nutritional value of different types of millets
12	06-12-2022	Comparison of nutritional value of different types of millets
13	07-12-2022	Millets and Glycemic Index.
14	08-12-2022	Value addition to millets
15	12-12-2022	Value addition to millets
16	13-12-2022	Recipes of millets – Sorghum Samosa, Sorghum Chandravankalu
17	14-12-2022	Recipes of millets – Sorghum based groundnut biscuits
18	15-12-2022	Practical: Materials used for millet recipes.
19	16-12-2022	Practical: Field visit to KVK, Banavasi.
20	22-12-2022	Practical: Preparation of millet recipes.
21	23-12-2022	Practical: Preparation of millet recipes.
22	27-12-2022	Recipes of millets – Pearl Millet Pakoda,
23	28-12-2022	Recipes of millets – Pearl Millet Pesarattu
24	29-12-2022	Practical: Preparation of millet recipes.
25	30-12-2022	Practical: Preparation of millet recipes.
26	31-12-2022	Recipes of millets – Soft Finger Millet - Ragi Mudda & Muruku
27	02-01-2023	Recipes of millets – Foxtail Millet Kheer
28	03-01-2023	Recipes of millets – Foxtail Millet *Coconut* Rice, Millet Laddu
29	04-01-2023	Preparation for examination.
30	05-01-2023	Examination conduction & Certificate distribution.

Students Attendance sheets

ROLL NO	NAME OF THE STUDENT	MONTH / DATE / INITIAL OF LECTURER / NO OF LECTURES	TOTAL NO OF LECTURES ATTENDED BY THE STUDENT	REMARKS
1.	B. NEELAKANTA			
2.	B. UMA MAHESH			
3.	B. MALLIKARJUNA			
4.	B. VEERESH			
5.	B. SHIVA			
6.	B. VEERENDRA			
7.	B. KARIYAPPA			
8.	[illegible]			
9.	E. SURESH			
10.	G. NARASIMHULU			
11.	G. NAGENDRA			
12.	J. VANISI			
13.	T. KARTHEEKEYA			
14.	[illegible]			
15.	K. MAHAMMAD RAFFAQ			

ROLL NO	NAME OF THE STUDENT	MONTH / DATE / INITIAL OF LECTURER / NO OF LECTURES
1.	B. NEELAKANTA	
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6.	B. VEERENDRA	
7.	B. KARIYAPPA	
8.	[illegible]	
9.	E. SURESH	
10.	G. NARASIMHULU	
11.	G. NAGENDRA	
12.	J. VANISI	
13.	T. KARTHEEKEYA	
14.	[illegible]	
15.	K. MAHAMMAD RAFFAQ	

COURSE MATERIAL

Millets are a traditional staple food of the dry land regions of the world. They are nutri-cereals which are highly nutritious and are known to havehigh nutrient content which includes protein, essential fatty acids, dietaryfibre, B-Vitamins and minerals such as calcium, iron, zinc, potassium andmagnesium. They help in rendering health benefits like reduction in bloodsugar level (diabetes), blood pressure regulation, thyroid, cardiovascularand celiac diseases. However, the direct consumption of millets as food hassignificantly declined over the past three decades.

The major reasons of decrease in consumption is the lack of awareness of nutritional merits, in conveniences in food preparation, lack of processing technologies and also the government policy ofdisincentives towards millets and favoring of supply of fine cereals at subsidized prices. Hence developing technology that makes millet value added products available as convenient to make andeasy access at reasonable prices will find great demand and market particularly in urban places wherethere is growing conscious for nutritive intake of food.

In this present era, consumers prefer high-quality foods with longer shelf life. Theyalso look for products which are convenient to prepare as people are too busy intheir daily schedule. Efforts are being made to create awareness on the potential health benefits of millets which are recommended for obese, diabetic, celiac and other lifestyle diseases. In order to make millet value chain sustainable, the production and promotion of various products inthe market is very much essential. Under this motto, IIMR launched its brand name *"Eatrite"* to the Indian markets to promote the millet based products and this book gives details of these products.

Millets are nutri cereals comprising of sorghum, pearl millet, finger millet (major millets) foxtail, little, kodo, proso and barnyard millet (minor millets).These are one of the oldest foods known to humanity. These are one of the several species of coarse cereal grasses in the family *Poaceae*, cultivated for their small edible seeds. They are highly nutritious, non-glutinous and not acid forming foods. Hence they are soothing and easy to digest.

They contain high amounts of dietary fibre, B-complex vitamins, essential amino and fatty acids and vitamin E. They are particularly high in minerals, iron, magnesium, phosphorous, potassium and release lesser percentage of glucose over a longer period of time causing satiety

which lowers the risk of diabetes. These grains are high in carbohydrates, with protein content varying from 6 to 11 percent and fat varying from 1.5 to 5 percent.

Millets are typically annuals and range in height from 30 to 130 cm with the exception of sorghum and pearl millet, which has stalks 1.5 to 3 m tall and about 2.5 cm thick. The inflorescences may be spikes or racemes, in which the flowers are borne on stalks of about equal length along an elongated axis, or panicles with dense clusters of small florets. With the exception of pearl millet, seeds remain enclosed in hulls after threshing. Hulled seeds are usually creamy white.

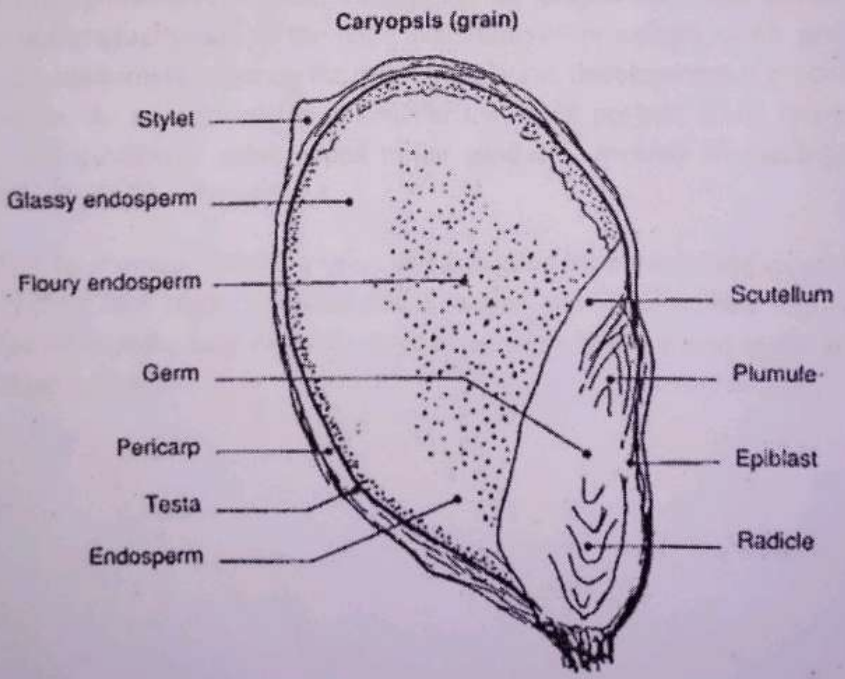
In India, millets has been a staple diet and a main source of income for farmers especially in the semi-arid regions. They are important food and fodder crop in the semi-arid tropics (SAT) of the world and grows in both *kharif* and *rabi* seasons. These grains represent the major source of dietary energy and protein for more than a billion people in the semi-arid tropics.

NUTRITIONAL PROFILE OF MILLETS

The nutritional importance of sorghum and other milletscannot be underestimated. Regular millet consumption reduces the incidence of cardiovascular, gastrointestinaland lifestyle (diabetes) diseases. To popularize the milletconsumption, it is important to understand the nutritional health benefits of millets. However, the data onthe nutritional composition of millets is scanty. Hence an attempt is made to compile brief grain structure and nutritional profile of different millets as describe below.

Structure of Milley grain:

The millet kernels differ from grain to grain but are mainly a covered or naked/utricle caryopsis and consists of threemain anatomical parts, namely the, pericarp (outer layer), endosperm (storage tissue) and germ (embryo). In sorghum the proportion of these amounts about with their seed mass at about 6%, 84%, and 10% respectively. However, the relative proportion of these components varies with relative proportions depending on the cultivars and environmental conditions. The outer layer or the pericarp originates from the ovary wall and is divided intothree histochemical tissues: the epicarp, mesocarp and endocarp. Sorghum is the only cereal grain known to havestarch in the mesocarp layer of pericarp.



Structure of Millet grain.

The endosperm is composed of the aleuronic layer, the peripheral, corneous and floury areas. The corneous and floury endosperm cells are composed of starch granules, a protein matrix, protein bodies, and cell wallsrich in cellulose, β-glucans, and hemicelluloses. Endosperm happens to be the main storage tissue. The starch granules are polygonal and often contain dents fromthe protein bodies. The size of starch granule varies from 4 μm to 25 μm. The proportion ratio of corneous to floury endosperm ratio determines the kernel texture in terms ofgrain hardness; the, higher the corneous portion, the harder will be the kernel and vice versa. The corneous portion will be translucent whereas the floury layer will beopaque. The aleuronic tissue is made up of thick cell wallsand happens to be a rich source of protein, oil andminerals. The enzyme proteins are also mostly located inthis tissue. The germ consists of the embryonic axis and, scutellum and it contains reserve nutrients and serves asthe bridge or connecting tissue between the endosperm and germ. The embryo is a very good source of protein, minerals, oil and vitamin.

Chemical and nutritional composition of millet grain

The millet grain is rich in fiber and minerals has sufficientquantity of carbohydrates (60.9-72.6%), protein (6.22- 11.6%) and fat (1.12-4.7%). Starch is the major constituentof the grain. The grain contains protein, albumin, globulin, prolamin and glutelin. Millets do not contain gluten and its slower hydrolysis makes it attractive to diabetics, celiac and ethnic groups. Particularly in developed countries, there is a growing demand for gluten free foods from people with celiac disease and other intolerance to wheat. Though millets nutritionally superior, its consumption has been decreased gradually due to the non- availabilityof processed clean grain in markets. To increase millet consumption among the urban population, developmentof processing technologies is a prerequisite. As a step towards this, under the NAIP project, IIMR has taken upthe millet processing, and developed value added millet products. Around 30 machineries for different processeswere procured and retrofitted.

Millets have unique nutrients value which is good for physical and mental health. They have high fibre content, low sugar, vitamins and vitamins and if consumed regularly they promote movement of the bowels, help detoxify the system, renders less blood sugar and cholesterol than eating fine flour or rice.

Nutrient composition of Millets compared to fine Cereals (per 100 gms)

Millets / Cereals	Carbo-hydrates (g)	Protein (g)	Fat (g)	Energy (Kcal)	Crude fibre (g)	Mineral matter (g)	Ca (mg)	P (mg)	Fe (mg)
Sorghum	72.6	10.4	1.9	349	1.6	1.6	25	222	4.1
Pearl millet	67.5	11.6	5	361	1.2	2.3	42	296	8
Finger millet	72	7.3	1.3	328	3.6	2.7	344	283	3.9
Foxtail millet	60.9	12.3	4.3	331	8	3.3	31	290	2.8
Proso millet	70.4	12.5	1.1	341	2.2	1.9	14	206	0.8
Kodo millet	65.9	8.3	1.4	309	9	2.6	27	188	0.5
Little millet	67	7.7	4.7	341	7.6	1.5	17	220	9.3
Barnyard millet	65.5	6.2	2.2	307	9.8	4.4	20	280	5
Rice (raw, milled)	78.2	6.8	0.5	345	0.2	0.6	10	160	0.7
Wheat (whole)	71.2	11.8	1.5	346	1.2	1.5	41	306	5.3

Micronutrients profile of Millets compared to fine Cereals (mg/100 gms)

Cereals/Millets	Mg	Na	K	Cu	Mn	Mb	Zn	Cr	Si	Cl
Foxtailmillet	81	4.6	250	1.40	0.60	0.070	2.4	0.030	171	37
Prosomillet	153	8.2	113	1.60	0.60	-	1.4	0.020	157	19
Fingermillet	137	11.0	408	0.47	5.49	0.102	2.3	0.028	160	44
Littlemillet	133	8.1	129	1.00	0.68	0.016	3.7	0.180	149	13
Barnyardmillet	82	-	-	0.60	0.96	-	3	0.090	-	-
Kodomillet	147	4.6	144	1.60	1.10	-	0.7	0.020	136	11
Sorghum	171	7.3	131	0.46	0.78	0.039	1.6	0.008	54	44
Pearlmillet	137	10.9	307	1.06	1.15	0.069	3.1	0.023	147	39
Rice	90	-	-	0.14	0.59	0.058	1.4	0.004	-	-
Wheat	138	17.1	284	0.68	2.29	0.051	2.7	0.012	128	47

Nutrient composition of Millets compared to fine Cereals (per 100 gms)

Millets	Thiamin(mg)	Niacin(mg)	Riboflavin	Vitamin A(carotene)(mg/100g)	Vit B6(mg/100g)	Folic Acid(mg/100g)	Vit B5(mg/100g)	Vit E(mg/100g)
Foxtailmillet	0.59	3.2	0.11	32	-	15	0.82	31
Prosomillet	0.41	4.5	0.28	0	-	-	1.2	-
Fingermillet	0.42	1.1	0.19	42	-	18.3	-	22
Littlemillet	0.3	3.2	0.09	0	-	9	-	-
Barnyardmillet	0.33	4.2	0.1	0	-	-	-	-
Kodomillet	0.15	2	0.09	0	-	23.1	-	-
Sorghum	0.38	4.3	0.15	47	0.21	20	1.25	12
Pearlmillet	0.38	2.8	0.21	132	-	45.5	1.09	19
Rice	0.41	4.3	0.04	0	-	8	-	-
Wheat	0.41	5.1	0.1	64	0.57	36.6	-	-

Sorghum *Samosa*

Ingredients:

Sorghum flour – 1 cup, *maida*– 1 cup, potatoes – 1 cup, boiled peas, onions, green chillies and curry leaves as required.

Preparation Method:

Take one cup of sorghum flour and one cup of *maida*.

Mix well and add required amount of water to make dough.

- Make small *chapati* balls and spread the dough with roller stick and cut into half's.
- Mash boiled potatoes, add chopped onions, green chilies and curry leaves.
- Make seasoning with chopped onions, green chilies, curry leaves and boiled mashed potatoes, boiled peas and salt to taste.
- Fill the above mixture in each half and fold in triangular shape and deep fry.
- Serve hot with tomato sauce or *chutney*.

Sorghum *Chandravankalu* (Moon biscuits)

Ingredients:

Sorghum flour – 1 cup, whole wheat flour – 1 cup, sugar powder – 1 cup, butter – 2 tsp and oil – 1/4 cup.

Preparation Method:

- Mix sorghum flour, whole wheat flour, powdered sugar and butter
- Add oil to the flour and make it into dough and roll it.
- Cut crescent shapes of dough pieces and place it onto a greased bakery tray.
- Bake it in oven at 150°C for 20 min for preparation of sorghum moon biscuits.
- Cool and pack.

Sorghum based groundnut biscuits

Ingredients:

Dehulled sorghum flour, refined wheat flour, skimmed milk powder, salt, ammonia, roasted-groundnut grits, egg, baking powder, fat, sugar, vanilla essence and salt.

Preparation Method:

- Creaming of fat and sugar is done in planetary mixer for 30 min.
- Then add flour, half of the groundnut grits and other ingredients to the creamed mixture.
- Make the mixture in to soft dough.
- Roll the dough.
- Sprinkle rest of the groundnut powder on the rolled sheet.
- Now cut the dough into moulds.
- Bake the moulds at 150O F for 15-20 min and cool them.
- Then cool for some time and pack.

Pearl Millet *Pakoda*

Ingredients:

Chopped onion, green chilli; pearl millet flour – 1 cup, bengal gram flour – 1/2 cup; chilli powder and salt –as required.

Preparation Method:

- Mix pearl millet sorghum flour, bengal gram flour, chopped onion, green chilli, chilli powder, salt and water with medium batter consistency.
- Fry the batter in oil with the required shapes.
- Excess oil is removed in a tissue.
- This is served as evening snack along with tomato sauce.

Pearl Millet *Pesarattu*

Ingredients:

Pearl millet -1 cup, whole green gram -1 cup, red chillies-4, green chillies – 2, chopped onion -2-3, ginger - ½ inch, salt to taste and coriander leaves chopped - 2 tsp.

Preparation Method:

- Soak pearl millet and whole green gram together for 5-6 hr and grind them grind them to batter consistency and ferment for 3-4 hr.
- Grind red chillies, green chillies, ginger, needed salt and add to the batter along with finely chopped onions and coriander leaves.
- Heat a *tawa* on medium flame and put *pesarattu*.
- Flip the pesarattu to the other side for cooking on both sides.
- Once cooked remove from tawa and serve hot with any *chutney/ sambar.*

Soft Finger Millet - Ragi Mudda

Ingredients:
Finger millet flour - 1/4 cup and water - 1 cup

Preparation Method:
- Mix about 2 tsp of finger millet flour with water.
- In an aluminum or thick-bottomed utensil, boil water and add salt.
- Add finger millet flour and water mixture and stir continuously.
- Add the remaining finger millet flour and simmer for 3-4 minutes.
- Transfer half of liquid to a utensil.
- Stir the paste till it becomes an uniform paste without lumps add the transferred liquid again to the mixture
- Cover the utensil and cook in sim mode for another 2-3 minutes.
- Roll the paste into a ball
- Soft finger millet *mudda* or soft finger millet ball is ready.
- Serve hot with *sambar or chutney.*

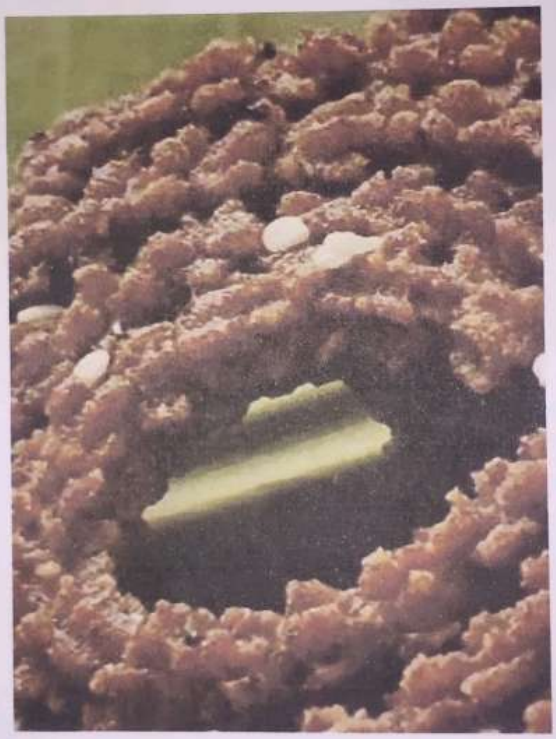
Finger Millet *Muruku*

Ingredients:

Finger millet flour – 1 cup, rice flour – 1 cup, sesame seeds – 2 tsp, turmeric – 1/2 tsp, salt – 1 tsp, chilli powder – 2 tsp, tymol seeds – 1/2 tsp; water – as required; oil – for frying.

Preparation Method:

- Prepare dough with all ingredients and water.
- Fill the dough in hand operated *muruku* making machine
- Prepare 3-4 rounds of *muruku* on a cloth
- Fry the prepared *muruku* in oil. Put the flame on low to ensure proper frying
- After frying put the *muruku* on paper and cool it and serve as evening snack.



Foxtail Millet *Coconut* Rice

Ingredients:

Foxtail millet - 1 cup, coconut grated - 1 cup, ghee - 2 tsp, coriander leaves – 2 tsp and salt – as desired.

Preparation Method:

- Foxtail millet is soaked for 2 hr and cooked fully.
- Add ghee and cumin, green leaves, ginger, leaves, red chilli, curry leaves and saurte them in a pan.
- Add cooked foxtail and grated coconut and cook for two min.
- Add salt as per taste and serve hot.

Foxtail Millet *Kheer*

Ingredients:
Dehulled foxtail millet grain – 1 cup, dry fruits, ghee, water, sugar, milk, cardamom powder – as required.

Preparation Method:
- Cook the dehulled foxtail millet in boiling water for 5 min.
- Roast dry fruits in ghee • Boil the water and milk, then add the cooked millet, add sugar and stir slowly for 10-15 minutes until it is cooked.
- Add cardamon powder and decorate with cashew nuts and other dry fruits.
- Serve hot as a traditional sweet.

Millet *Laddu*

Ingredients:

Sorghum *rawa*- 1/2 cup, pearl millet flour - 1/4 cup, finger millet flour - 1/4 cup, sugar - 3/4 cup, coconut powder, dryfruits, ghee, cardamom powder and milk - as required.

Preparation Method:

- Heat ghee in a pan and roast sorghum *rawa*, pearl millet flour and finger millet flour till nice aroma comes.
- Roast chopped dryfruits in ghee.
- Add cardamon powder and sugar powder to the roasted ingredients.
- Add warm milk or ghee and cook till all the mixture gathers together, make lemon size ball and serve.

****

MR-01

B.Sc. Certificate Course
EXAMINATION – JANUARY 2023
SUBJECT: BOTANY

Title of the Course: MILLET RECIPES

Time: 1hr 30mins. **Max. Marks: 50**

SECTION – A

Answer any FIVE of the following questions: 5 X 10M= 50mks.

1. Describe the millet crops grown in local area.
2. Describe the structure of millet grain.
3. Explain the nutritional value of millets.
4. Describe the role of millets in maintaining the glycemic index.
5. Compare the nutritional values of different types of millets.
6. Describe the process of value addition to millets.
7. Write about any two value added millet products.

SML GOVERNMENT DEGREE COLLEGE, YEMMIGANUR
DEPARTMENT OF BOTANY

Title of the Course: MR-01: MILLET RECIPES

AWARD SHEET

S. No.	Hall Ticket Number	Marks	Grade
1	21358049003	42	A
2	21358049004	45	A
3	21358049007	39	B
4	21358049008	40	B
5	21358049009	48	O
6	21358049012	44	A
7	21358049014	41	A
8	21358049016	46	O
9	21358049017	44	A
10	21358049018	48	O
11	21358049019	47	O
12	21358049020	48	O
13	21358049021	38	B
14	21358049022	48	O
15	21358049023	48	O

Marks Obtained	Grade
46 – 50	O
41 – 45	A
36 – 40	B
31 – 35	C
26 – 30	D
21 – 25	E
< 20	Fail

Signature of the Examiner

PEARLMILLET

FINGER MILLET

FOXTAIL MILLET

BARNYARD MILLET

LITTLE MILLET

PROSO MILLET

Inauguration of Millet Recipe Certificate Course by the Principal Dr. K. Mahaboob Basha

Dr. M. Suseelamma, Incharge Dept. of Botany addressing in Inauguration

Dr. S. Khadar Basha, Millet Recipe Certificate Course coordinator addressing the students.

Dr. P. Sujathamma, Programme Coordinator, KVK, Banavasi addressing the students on Value Addition of Millets and its products.

Dr. P. Aparna, Subject Matter Specialist, KVK, Banavasi addressing the students on Value Addition of Millets and its products.

Dr. S, Khadar Basha addressing the students at KVK, Banavasi on Value Addition of Millets and its products.

Dr. P. Aparna, Subject Matter Specialist, KVK, Banavasi showing the preparation of Millet Product i.e. Millet Laddu.

SML GOVT DEGREE COLLGE, YEMMIGANUR
DEPARTMENT OF BOTANY
Certificate Course on Millet Recipes

Feed Back from Students

1. Name of the Student : B. Neelakanta
2. Class & Group : II B.Z.C.
3. Regd. No. : 21358049003
4. Opinion : A.Excellent ✓ B.Good C.Satisfactory
5. Signature of the Student: B. Neelakanta.

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1. Name of the Student : B. Uma Mahesh
2. Class & Group : II B.Z.C.
3. Regd. No. : 21358049004
4. Opinion : A.Excellent ✓ B.Good C.Satisfactory
5. Signature of the Student: B. Umamahesh.

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1. Name of the Student : B. Mallikarjuna
2. Class & Group : II B.Z.C.
3. Regd. No. : 21358049007
4. Opinion : A.Excellent ✓ B.Good C.Satisfactory
5. Signature of the Student: B. Mallikarjuna

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1. Name of the Student : B. Veeresh
2. Class & Group : II B.Z.C.
3. Regd. No. :21358049008 ✓
4. Opinion : A.Excellent B.Good C.Satisfactory
5. Signature of the Student: B. Veeresh

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1. Name of the Student : B. Shiva
2. Class & Group : II B.Z.C.
3. Regd. No. : 21358049009
4. Opinion : A.Excellent B.Good C.Satisfactory
5. Signature of the Student: B. Shiva

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1. Name of the Student : B. Veerendra
2. Class & Group : II B.Z.C.
3. Regd. No. : 21358049012
4. Opinion : A.Excellent B.Good C.Satisfactory
5. Signature of the Student: B. Veerendra

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1. Name of the Student : B. Ramalingappa
2. Class & Group : II B.Z.C.
3. Regd. No. :21358049014
4. Opinion : A.Excellent B.Good C.Satisfactory
5. Signature of the Student: B. Ramalingappa

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1. Name of the Student : C. Thulasi
2. Class & Group : II B.Z.C.
3. Regd. No. : 21358049016
4. Opinion : A.Excellent B.Good C.Satisfactory
5. Signature of the Student: C. Thulasi

---

1. Name of the Student : E. Suresh
2. Class & Group : II B.Z.C.
3. Regd. No. : 21358049017
4. Opinion : A.Excellent B.Good C.Satisfactory
5. Signature of the Student: E. Suresh

---

1. Name of the Student : G. Narasimhulu
2. Class & Group : II B.Z.C.
3. Regd. No. : 21358049018
4. Opinion : A.Excellent B.Good C.Satisfactory
5. Signature of the Student: G. Narasimhulu

1. Name of the Student : G. Nagendra
2. Class & Group : II B.Z.C.
3. Regd. No. : 21358049019
4. Opinion : A.Excellent B.Good C.Satisfactory
5. Signature of the Student: G. Nagendra

1. Name of the Student : J. Vamsi
2. Class & Group : II B.Z.C.
3. Regd. No. : 21358049020
4. Opinion : A.Excellent B.Good C.Satisfactory
5. Signature of the Student: J. Vamsi

1. Name of the Student : J. Karthikeya
2. Class & Group : II B.Z.C.
3. Regd. No. : 21358049021
4. Opinion : A.Excellent B.Good C.Satisfactory
5. Signature of the Student: J. Karthikeya

1. Name of the Student : K. Anitha
2. Class & Group : II B.Z.C.
3. Regd. No. : 21358049022
4. Opinion : A.Excellent B.Good C.Satisfactory
5. Signature of the Student: K. Anitha

1. Name of the Student : K. Mohammad Rafeeq
2. Class & Group : II B.Z.C.
3. Regd. No. : 21358049023
4. Opinion : A.Excellent B.Good C.Satisfactory
5. Signature of the Student: K. MD. Rafeeq

S. Ulhadar Basha

SML Government Degree College
Yemmiganur

Affiliated to Rayalaseema University, Kurnool, Andhra Pradesh.

Certificate Course on "MILLET RECIPES"

ORGANIZED BY

DEPARTMENT OF BOTANY

CERTIFICATE

This is to certify that Mr./~~Kum.~~/~~Sri.~~ K. Anitha, II Bsc BZC has successfully Completed a Certificate Course on "MILLET RECIPES" Organized by the Department of Botany, SML Government Degree College, Yemmiganur, Kurnool (Dist.) Andhra Pradesh from 23-11-2022 to 05-01-2023.

S. Khadar Basha

Dr. S. Khadar Basha
Lecturer in Botany &
Course Coordinator

M. Suseelamma

Dr. M. Suseelamma
Incharge Dept. of Botany

K. Mahaboob Basha

Dr. K. Mahaboob Basha
Principal

జొన్న ఇడ్లి :

కావలసిన పదార్థాలు : జొన్నరవ్వ-1000 గ్రా., మినపప్పు-500 గ్రా., ఉప్పు-తగినంత.

తయారుచేయు విధానము : మినపప్పును నాలుగైదు గంటలు నానబెట్టి రుబ్బుకోవాలి. ఈ పిండికి జొన్నరవ్వ కలిపి ఒక రాత్రి పులియబెట్టాలి. పిండికి ఉప్పు కలిపి మామూలు కన్నా ఎక్కువ పలుచగా కలిపి ఇడ్లీ చేయవచ్చును.

జొన్న పప్పు చెక్కలు :

కావలసిన పదార్థాలు : జొన్నపిండి - 200 గ్రా., డాల్డా-3 టేబుల్ స్పూన్లు, పెసరపప్పు-3 టేబుల్ స్పూన్లు, ఉప్పు, కారం-తగినంత, నూనె వేయించడానికి.

తయారుచేయు విధానము : పెసరపప్పును ఒక గంట సేపు నానబెట్టాలి. జొన్నపిండికి నానిన పెసరపప్పు, ఉప్పు, కారం, వేడి చేసిన నెయ్యి వేసి తగినన్ని నీళ్ళతో ముద్దగా కలిపి అరగంట సేపు నాననివ్వాలి. తర్వాత పిండిని నిమ్మకాయంత చిన్న వుండలుగా చేసి తడిబట్ట మీదగాని, పాలితీన్ పేపరుపై గాని గుండ్రంగా పలచగా వేళ్ళతో వత్తాలి. కడాయిలో నూనె కాగిన తర్వాత ఈ పప్పు చెక్కలు వేసి రెండు వైపులా కాలిన తర్వాత తీయాలి. వేడినీరు వేసి పిండి కలిపితే చెక్కలు కరకరలాడుతూ ఉంటాయి. పిండిలో జీలకర్ర పొడి, అల్లం, పచ్చిమిరపకాయ రసం కూడా వేసుకోవచ్చు.

సజ్జ బొబ్బట్లు :

కావలసిన పదార్థాలు : సజ్జపిండి-250 గ్రా., మైదా-50 గ్రా., ఎండుకొబ్బరి-50 గ్రా., శనగపప్పు-100 గ్రా., యాలకలపొడి-1 స్పూను, నూనె-25 మి.లీ.

తయారుచేయు విధానము : సజ్జపిండిలో కొంచెము మైదా, తగినంత నీరు పోసి చపాతి పిండిలాగా కలుపుకొని ప్రక్కన పెట్టుకోవాలి. నానిన శనగపప్పును ఉడికించి దానిలో బెల్లం, ఎండుకొబ్బరి, యాలకలపొడి వేసి ముద్దలా ఉడికించి ప్రక్కన పెట్టుకోవాలి. ముందుగా చేసిన ముద్దను చపాతిలా వత్తుకోవాలి. కడాయిలో నెయ్యి పోసి రెండువైపులా దోరగా వేయించి తీయాలి.

అపర్ణ
కృషి విజ్ఞాన శాస్త్రవేత్త

డా॥ జి. ప్రసాద్‌బాబు
అధిపతి మరియు
కార్యక్రమ సమన్వయకర్త

ఆచార్య ఎన్.జి.రంగా వ్యవసాయ విశ్వవిద్యాలయం
కృషి విజ్ఞాన కేంద్రం,
బనవాసి-518 360. కర్నూలు జిల్లా.

ఆచార్య ఎన్.జి.రంగా వ్యవసాయ విశ్వవిద్యాలయం
కృషి విజ్ఞాన కేంద్రం
బనవాసి-518 360. కర్నూలు జిల్లా.

చిరుధాన్యాలు - పోషకాల సంపద

మెట్ట సేద్యంలో చిరుధాన్యాల సాగు చాలా అనుకూలం. జొన్నలు, సజ్జలు, రాగులు, కొర్రలు, ఆరికలు, సామలు, వరిగలు మరియు ఊదలు వంటి వాటిని చిరుధాన్యాలు అంటారు. చిరుధాన్యాలు గ్రామీణ ప్రాంతాలలో కనుమరుగయి పోయాయి. ఎందుకనగా మధ్యతరగతి మరియు అట్టడుగు వర్గాల ప్రజల యొక్క ఆహారపు అలవాట్లలో ఎనలేని మార్పు వచ్చింది. పిల్లలు మరియు పెద్దలు అందరు కూడా సులువుగా లభించే ఆహారానికి మరియు జంక్ ఫుడ్స్‌కు తొందరగా ఆకర్షితులవుతున్నారు. ఇలాంటి ఆహారంలో కేవలం కాలరీలు తప్ప ఆరోగ్యానికి అవసరమయిన ఖనిజలవణాలు, విటమిన్లు వుండవు కనుక వీటిని తీసుకోవడం మంచిది కాదు. రైతులు కూడా వాణిజ్య పంటలయినటువంటి వరి, గోధుమ, ప్రత్తి, చెరకు, పూలు మరియు కూరగాయల పంటలు పండించడానికి మొగ్గు చూపుతున్నారు. మార్కెట్‌లో చిరుధాన్యాలు ఎక్కువగా లభించకపోవడం మరియు వాటికి సరైన ధర లేకుండా ఉండటం వలన ఈ పంటల యొక్క సాగు గణనీయంగా తగ్గిపోయింది.

ఈ చిరుధాన్యాలను అత్యంత తక్కువ నీటితోనే దాదాపు నీటి పారుదల అవసరం లేకుండా పండించవచ్చు. ఎటువంటి వాతావరణ పరిస్థితులయినా తట్టుకోగలగుతాయి. ఈ పంటలను ఎక్కువ పురుగు మందుల వాడకం లేకుండా, సేంద్రియ ఎరువుల ద్వారా పెంచవచ్చు. ఇది వాతావరణ కాలుష్యాన్ని కూడా నివారిస్తుంది.

ఈ చిరుధాన్యాల విలువ తెలుసుకోలేక ఈ మధ్యకాలంలో ఊబకాయం, చక్కెర వ్యాధి, గుండెజబ్బులు మరియు క్యాన్సర్ మొదలయినటువంటి రోగాలు చాలా ఎక్కువయ్యాయి. ఇప్పటి పంటల్లో ఎక్కువగా రసాయనాలు మరియు పురుగు మందుల వాడకం ఎక్కువగా ఉండటం వలన శరీరంలో చాలా ప్రమాదకరమయిన మార్పులు చోటు చేసుకుంటున్నాయి. ఇలాంటి సమస్యలను అధిగమించాలంటే మన సాధారణ భోజనంలో చిరుధాన్యాల ఆవశ్యకతను గుర్తించాలి.

పిండిపదార్థాలు, మాంసకృతులు, క్రొవ్వు పదార్థాలు, పీచు పదార్థం మాత్రమేకాక శరీర జీవక్రియలకు అవసరమయిన విటమిన్లు, ఖనిజ లవణాలు సరిపడా లభించగల్గితేనే అది సమతుల ఆహారం లేదా పోషకాహారం అవుతుంది. వరి, గోధుమతో పోల్చినపుడు చిరుధాన్యాలలో పోషకాలు అధికం. ఎముకల పుష్టికి అవసరమయిన కాల్షియం, రక్తపుష్టికి అవసరమయిన ఇనుము, మాంసకృత్తులు, బి-విటమిన్లు, పీచుపదార్థం మరియు యాంటీ ఆక్సడెంట్లు చిరుధాన్యాలలో ఎక్కువగా లభిస్తాయి.

వరి, గోధుమతో పోల్చినపుడు చిరుధాన్యాల్లోని పోషకాలు (100 g)

పేరు	పిండి పదార్థాలు (గ్రా)	మాంస కృతులు (గ్రా)	పీచు (గ్రా)	కాల్షియం (మి.గ్రా)	ఐరన్ (మి.గ్రా)	బి1 (మి.గ్రా)	బి2 (మి.గ్రా)	నియాసిన్ (మి.గ్రా)
జొన్న	70.7	10.4	1.6	25	4.1	0.38	0.15	4.3
రాగి	72.6	7.3	3.6	344	3.9	0.72	0.19	1.1
సజ్జ	67.0	11.6	1.2	42	8.0	0.38	0.21	2.8
కొర్ర	63.2	12.3	8.0	31	2.8	0.59	0.11	3.2
వరిగలు	63.8	12.5	5.2	8	2.9	0.41	0.28	4.5
సామలు	60.9	9.7	7.6	17	9.3	0.30	0.09	3.2
ఊదలు	55.0	11.0	13.6	22	18.6	0.33	0.10	4.2
ఆరికలు	66.6	9.8	5.2	35	1.7	0.15	0.09	2.0
వరి	76.0	6.8	0.2	10	0.7	0.06	0.06	1.9
గోధుమ	71.0	11.8	1.2	41	5.3	0.41	0.10	5.1

పిల్లల పెరుగుదలకు, జ్ఞాపకశక్తికి కేలరీలతో పాటు ప్రోటీన్లు, విటమిన్లు, ఖనిజలవణాలున్న సమతులాహారం చాలా అవసరం. జంక్ ఫుడ్స్ బదులు ఇంట్లో చిరుధాన్యాలతో తయారుచేసిన కొర్రమురుకులు, జొన్న మురుకులు, రాగి, జొన్న, సజ్జ, కొర్ర కలిగిన మల్టీగ్రైన్ మురుకులు, రాగి మిక్సర్, వేరుశనగ వుండలు, బొరుగుల వుండలు, రాగి, జొన్న, సజ్జ లడ్డూలను (బెల్లంతో చేసినవి), కంపెనీ బిస్కెట్స్ కాకుండా చిరుధాన్యాలతో చేసిన బిస్కెట్లు పెట్టడం మంచిది. ఇవే రుచిగా వుంటాయి మరియు మంచి ప్రోటీన్లు అందుతాయి. రక్తహీనత బారినుండి పిల్లల్ని కాపాడుకోవచ్చు. పీచుపదార్థం బియ్యం కంటే ఎక్కువ కాబట్టి మలబద్ధక నివారణకు గుండెజబ్బుల వారికి, చక్కెరవ్యాధిగ్రస్తులకు ఎంతో మేలు చేస్తాయి.

భారత్ వంటి వర్ధమానదేశాలలో ఇప్పటికీ పెద్ద ఎత్తున అనారోగ్యాలకు, మరణాలకు కారణమవుతున్న పోషకాహార లోపాన్ని ఎదుర్కోవడానికి చిరుధాన్యాలు బహువిధాలుగా దోహదం చేస్తాయి.

చిరుధాన్యాలతో తయారుచేసిన కొన్ని ముఖ్యమైన వంటకాలు :

రాగి లడ్డు :

కావలసిన పదార్థాలు : రాగిపిండి-1 కే.జి., బెల్లం-800 గ్రా., నెయ్యి-100 యం.ఎల్., ఎండుకొబ్బరి-100 గ్రా., యాలకలపొడి-1 స్పూను

తయారుచేయు విధానము : రాగిపిండిని దోరగా వేయించాలి. బెల్లం పాకం పట్టాలి. బెల్లం తీగ పాకం వచ్చాక రాగిపిండిని, ఎండుకొబ్బరి తురుమును, యాలకలపొడిని, కరిగించిన నెయ్యి చేర్చి కలపాలి. బాగా కలిపిన తరువాత లడ్డూలు కట్టాలి. జీడిపప్పు, ఎండుద్రాక్ష లేదా వేరుశనగ పప్పుగాని కలుపుకుంటే ఇంకా రుచిగా వుంటాయి.

రాగి మిక్చర్ :

కావలసిన పదార్థాలు : రాగిపిండి-1 కే.జి., శనగపిండి-750 గ్రా., కారం-తగినంత, ఉప్పు-తగినంత, నూనె-వేయించడానికి, అటుకులు-200 గ్రా., వేరుశనగపప్పు-200 గ్రా., వేయించిన శనగపప్పు-150 గ్రా.

తయారుచేయు విధానము : రాగిపిండి, శనగపిండి, ఉప్పు, కారం వేసి తగినన్ని నీళ్ళతో పిండిని ముద్దగా చేసుకోవాలి. కడాయిలో నూనె కాగిన తరువాత సన్నకారా గొట్టంలో పిండిని వుంచి సన్నకార వత్తి వేయించాలి. కారా రెండువైపులా దోరగా వేగిన తర్వాత తీసెయ్యాలి. నూనె వేడి చేసి వేరుశనగపప్పు, అటుకులు, వేయించిన శనగపప్పు, కరివేపాకు, ఉప్పు, కారం వేసి తాలింపు పెట్టి, ఈ మిశ్రమాన్ని సన్నకారాతో కలపాలి.

కొర్ర మురుకులు :

కావలసిన పదార్థాలు : కొర్రపిండి-1 కే.జి., వేరుశనగ పిండి-250 గ్రా., కారం-తగినంత, ఉప్పు-తగినంత, వాము-1 టీ స్పూను, నూనె-వేయించడానికి.

తయారుచేయు విధానము : వేరుశనగ పప్పును వేయించి పిండి చేయాలి. ఈ పిండిని, కొర్రపిండి, ఉప్పు, కారం, వాము వేసి తగినన్ని నీళ్ళతో పిండిని ముద్దగా చేసుకోవాలి. వీటితోపాటు కొంచెం వేడి చేసిన నూనెగాని, నెయ్యి గాని కలిపితే మురుకులు కరకరలాడుతూ వుంటాయి. కడాయిలో నూనె కాగిన తరువాత మురుకుల గొట్టంలో పిండిని వుంచి మురుకులు వత్తి వేయించాలి. మురుకులు రెండువైపులా దోరగా వేగిన తర్వాత తీసెయ్యాలి. ఇదే మాదిరిగా జొన్నపిండితో కూడా మురుకులు చేసుకోవచ్చు.

కొర్ర పాయసం :

కావలసిన పదార్థాలు : కొర్ర బియ్యం-1 కే.జి., నెయ్యి-200 మి.లీ., పాలు-1 లీటర్, జీడిపప్పు, ఎండుద్రాక్ష, యాలకలపొడి.

తయారుచేయు విధానము : బాగా శుభ్రపరచిన కొర్రబియ్యాన్ని ఒక గంట సేపు నీటిలో నానబెట్టి, తగిన నీటిలో ఉడికించాలి. తర్వాత పాలు, బెల్లం, యాలకలపొడి కలిపి కాసేపు ఉడికించాలి. దీనికి నేతిలో వేయించిన జీడిపప్పు, ఎండుద్రాక్ష కలుపుకుంటే కొర్రపాయసం ఎంతో రుచికరంగా ఉంటుంది.