



CELEBRATING THE INTERNATIONAL YEAR OF MILLETS 2023

A COOKBOOK FOR SUSTAINABLE DIET

**IIHS, KENGERI CAMPUS
JANUARY 2023**

“Sustainable Diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources.”

(FAO, 2012¹)

“Millets’ were among the first crops to be domesticated in India with several evidence of its consumption during the Indus valley civilization. In India, millets are primarily a kharif crop, requiring less water and agricultural inputs than other similar staples. Millets are important by the virtue of its mammoth potential to generate livelihoods, increase farmers’ income and ensure food & nutritional security all over the world.”

(Ministry of Agriculture and Farmers Welfare, 2023)

¹ Food and Agriculture Organisation of United Nations, 2012. Sustainability Diets and Biodiversity: Directions and Solutions for Policy, Research and Action (<https://www.fao.org/3/i3004e/i3004e.pdf>)

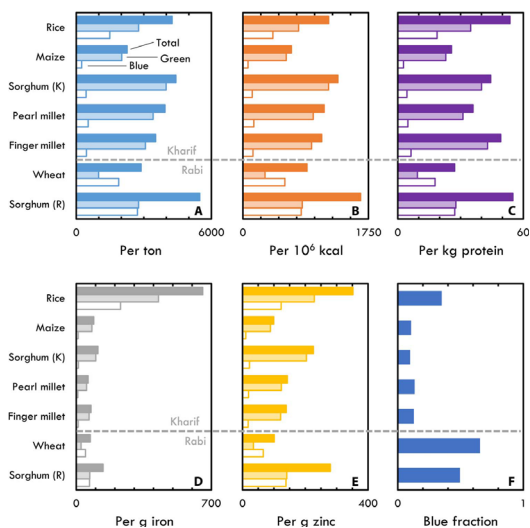
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**All the recipes can have variation in ingredients depending on individual taste preferences.*

Our eating habits have significant implications not only on our own health but also on our planet's health. Food consumption by households results in more than 60% of global Greenhouse Gas emissions and 50-80% of total land, water, and material use (Ivanova et al., 2015)¹. As people's incomes rise, the consumption of resource-intensive diets such as meat, dairy, and processed food also increases. Alongside, climate change alters ecosystems with more extreme weather events and reduced biodiversity, which in many ways defines the composition and quality of our diets. Making the right food choices that reduce detrimental effects on the environment and biodiversity will create favourable conditions to achieve global sustainability goals.

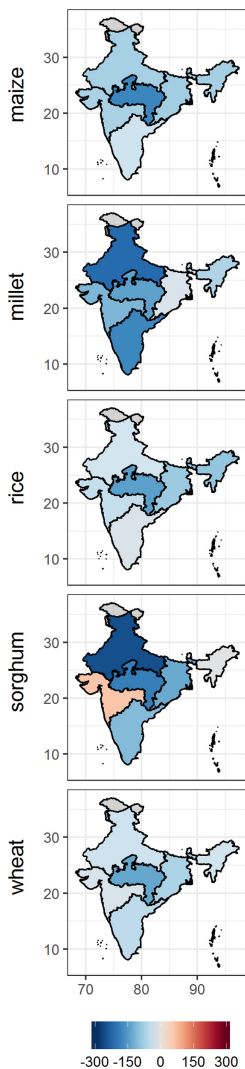
From the production point of view, despite having sufficient food to feed its population, India has large inefficiencies in its food systems in terms of food waste and excessive water use. Numerous studies have examined water stress, land use, nutrition, and the climate associated with cereal production, which showed that certain cereals other than rice and wheat offer distinct nutritional and water use benefits. For instance, Davis et al., (2018)² show that alternative cereals like millet in India demand 33% less water and improve production of protein (+1%), iron (+27%) and zinc (+13%) with only a moderate reduction in calories (see graphs below).



Water productivity ($m^3 H_2O$) of nutrient production for total, blue, and green Water Foot Prints (WFP). Values correspond to the years 2000 through 2009 and represent the ratio of conventional WFPs on irrigated cropland [(A) that is, $m^3 H_2O / ton$] to nutrient content (that is, amount of nutrient per ton of crop) for (B) calories, (C) protein, (D) iron, and (E) zinc. Blue fraction (F) is the ratio of blue WFP to total WFP] Source: Davis et al. (2018)

1 Ivanova et al. 2015. Environmental Impact Assessment of Household Consumption. Journal of Industrial Ecology, 20(3): 526-536.

2 Davis et al. 2018. Alternative cereals can improve water use and nutrient supply in India. Science Advances, 4: 1-11.



Similarly, Kayatz et al., (2019)³ explored India's cereal water use between 2005 and 2014 and found that enhancing maize, millet and sorghum production may reduce the agricultural use of freshwater. The series of maps on the left show the average annual change in water footprint (in l/(kg yr)) with different crops in six administrative divisions in India.

To achieve the SDG2 goal of Zero Hunger and a transition to sustainable food systems, India needs a transformation of its current agri-food systems, which are overdependent on 20th-century innovations like the Green and White Revolutions. While they made tremendous contributions to food and nutrition security, it was not without other consequences. A few simple steps, if taken by each one of us, will contribute towards the goal. First, we need to understand food as a culture and process, not just a set of products to be consumed. This will help us know what we go on our plate and where our food comes from. Buying locally produced seasonal food ensures freshness and quality. Second, bringing diversity to our plate will indirectly protect the biodiversity (of not only flora but also fauna) around us. Biodiversity improvement is key to sustainable food production and consumption. Third, reducing food waste will help simultaneously improve efficiency of both food production and consumption. These simple steps can help in reducing the attitude-behaviour gap in food choice helping us move forward to transforming the agri-food system.

This cookbook of selected simple food preparations drawing from traditional sustainable diets from South India is based on locally grown ingredients. We hope this cookbook will make a small contribution to readers making thoughtful food choices.

³ Kayatz et al. 2019. "More crop per drop": Exploring India's cereal water use since 2005. *Science of the Total Environment*, 673: 207-217.

NUCCHIN UNDE

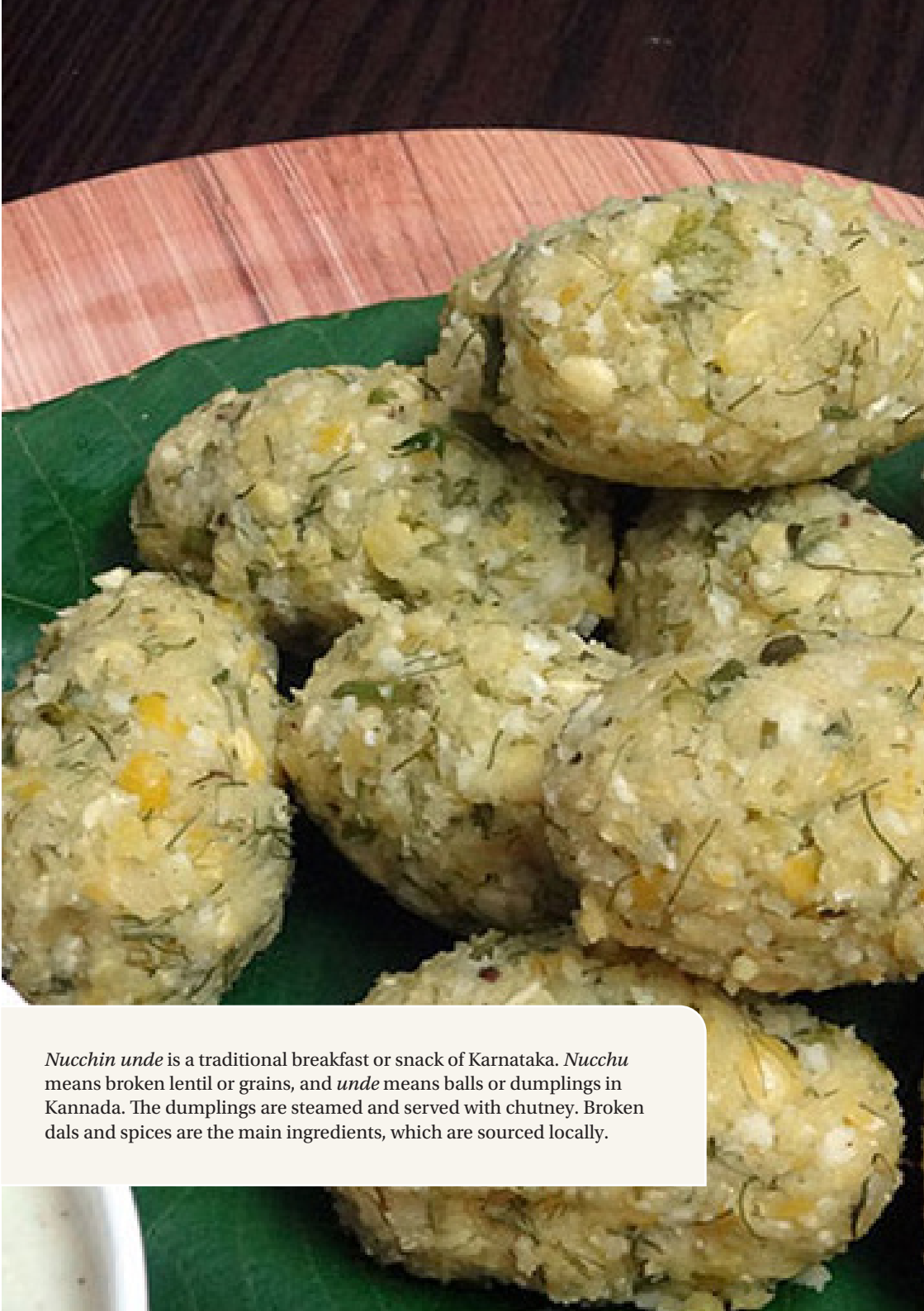
(STEAMED LENTIL DUMPLINGS)

INGREDIENTS

1. 1/2 cup *Tur Dal* / Split Pigeon Pea
2. 1/4 cup *Chana Dal* / Split Chickpea
3. 1 - 3 Green Chillies finely chopped
4. 1/2" length Ginger finely chopped
5. 5 - 6 Curry Leaves finely chopped
6. 1 tablespoon Coriander Leaves finely chopped
7. 1 Onion finely chopped (optional)
8. 1/4 cup Dill Leaves / Sabsige soppu finely chopped (optional)
9. 1/4 cup grated Coconut
10. A pinch of Asafoetida
11. Salt as per taste

INSTRUCTIONS

- Rinse and soak Tur Dal and Chana Dal for 4 hours.
- Drain the water and coarse-grind the dals without adding any water. You can also add Green Chilli and Ginger while grinding.
- Transfer it to a wide bowl. Add in all other ingredients like chopped Onion, Green Chilli, Ginger, Curry Leaves, Coriander Leaves, grated Coconut, Asafoetida, Dill Leaves and salt.
- Mix the ingredients well. Do not add any water.
- Make big lemon-sized dumplings with the spice mixture using your palms.
- Arrange them on a well-greased steamer and steam for 15 minutes.
- Serve tasty Nuchinunde with chutney or curd.



Nuchin unde is a traditional breakfast or snack of Karnataka. *Nuchhu* means broken lentil or grains, and *unde* means balls or dumplings in Kannada. The dumplings are steamed and served with chutney. Broken dals and spices are the main ingredients, which are sourced locally.

JOWAR (SORGHUM) OR MILLET DOSA (GLUTEN-FREE)

INGREDIENTS

1. 1 cup *Jowar* / Sorghum seeds
2. 1/2 cup *Urad Dal* / Split Black Gram
3. 1 tablespoon *Methi* / Fenugreek seeds
4. Salt as per taste

INSTRUCTIONS

- Wash whole *Jowar* / Sorghum seeds, *Urad Dal* and *Methi* or Fenugreek seeds separately.
- Soak for 8-10 hours in a covered bowl.
- Make a paste of all three ingredients without discarding soak water.
- Add a bit of salt to the paste and mix well.
- Cover and let it ferment until it is bubbly and frothing. It could be soaked overnight or for 8-10 hours, depending on the temperature.
- Add more salt, if required, as per taste and health requirements.
- Make *Dosa* or *Idli* with this batter using the usual home techniques.



This recipe replaces rice in a traditional home dosa recipe with Jowar (Sorghum) or a mixture of millets. Depending on the total amount of batter desired, adjust amounts but maintain proportions in the recipe. The cup for measuring the ingredients can be of any reasonable size depending on the desired amount of Dosa/ Idli batter.

TOMATO-ONION CHUTNEY

INGREDIENTS

1. 1 Onion (finely chopped)
2. 2 Tomatoes (finely chopped)
3. 1" Ginger
4. A small piece of Tamarind
5. 1/4 cup Coconut (freshly grated)
6. 4 dried Byadagi Chillies
7. 2 tablespoons Oil
8. 1 tablespoon Urad dal / Split Black Gram
9. 1/4 teaspoon Turmeric
10. Salt as per taste

FOR TEMPERING

1. 2 teaspoons Oil
2. 1 teaspoon Mustard seeds
3. 1/2 teaspoon *Urad Dal* / Split Black Gram
4. 2 dried *Byadagi* Chillies
5. A few Curry Leaves

INSTRUCTIONS

- Heat Oil and saute Urad Dal, dried Red Chillies to golden brown.
- Add in Onion and Ginger. Saute well.
- Add Tomatoes and saute till Tomatoes turn soft and mushy.
- Add Turmeric, a small piece Tamarind and Salt. Saute well.
- Add 1/4 cup Coconut and cool the mixture completely.
- Transfer the mixture to a blender and make a smooth paste. Add water only if required.
- Now prepare for tempering by heating Oil.
- Add Mustard seeds, Urad Dal, Red Chillies and a few Curry Leaves. Allow to splutter.
- Pour the tempering over the Chutney.
- Serve the chutney with Idli or Dosa.



This is a popular South Indian chutney served mainly at breakfast with Idli or Dosa or even a few rice preparations. It is a simple recipe made with locally produced Onion, Tomato and Red Chilli. The addition of coconut gives good texture and consistency as well as neutralises the strong flavours of Onion and Tomato. Other ingredients such as Chilli, Curry Leaves, Tamarind and Ginger are also locally produced in the state.

SIHI KUMBALAKAI PALYA

(SWEET PUMPKIN DRY SABJI)

INGREDIENTS

1. 1/2 kg *Sihi Kumbalakayi* or Sweet Pumpkin
2. 1 teaspoon *Urad Dal* or Split Black Gram
3. 1 teaspoon *Chana Dal* or Split Chickpea
4. 4 - 6 teaspoons Cooking oil
5. 1/2 teaspoon Mustard seeds
6. 1 Red Chilli (optional)
7. A big pinch of Turmeric powder
8. A big pinch of Asafoetida
9. 4-5 Curry Leaves
10. 1 small piece of Jaggery
11. 1 small marble-sized Tamarind
12. Salt as per taste
13. 2 tablespoons finely chopped Coriander Leaves
14. 1/4 cup water

FOR GRINDING

1. 1/2 teaspoon Mustard seeds
2. 2 - 4 Red Chillies
3. 1/2 cup grated Coconut

INSTRUCTIONS

- Wash, peel and chop the Sweet Pumpkin.
- Heat oil in frying pan and add in Mustard seeds, Urad dal and Chana dal. Allow the Mustard seeds to splutter and Urad Dal to turn brown.
- Add in broken Red chilli and Curry Leaves.
- Add in chopped Sweet Pumpkin, Turmeric powder and Asafoetida. Give a quick mix.
- Add in salt, Tamarind extract and Jaggery. Give a quick mix.
- Add 1/4 cup of water and close the lid.
- Stir in between and cook until soft under low flame.
- Meantime, dry-grind the grated Coconut, Red chillies and Mustard seeds and add the mixture to cooked pumpkin.
- Add Coriander Leaves and mix well for a minute. Switch off the stove and serve the Palya with hot rice or roti.



Sihi kumbalakai or the Sweet Pumpkin is easily grown in kitchen gardens of almost all the houses in Karnataka. This creeper plant is usually made to climb on roofs of the houses. The creeper has bright yellow flowers that attract butterflies and other insects. All the parts of this plant including leaves (with stems), flowers and fruit are edible and used in both dry and gravy dishes. This dry preparation is a simple recipe and goes well with roti or rice.

MILLET OR JOWAR BREAD

(GLUTEN-FREE)

INGREDIENTS

1. 400 grams of a mix of Ragi-Bajra-*Jowar* flours in any proportion. Sprouted version of flours can be used.
2. 200 ml Lukewarm water
3. 3 teaspoons Psyllium husk or *Isabgol*
4. 250 ml Water
5. 7-9 grams Salt
6. 2 tablespoons Gluten-free sourdough starter

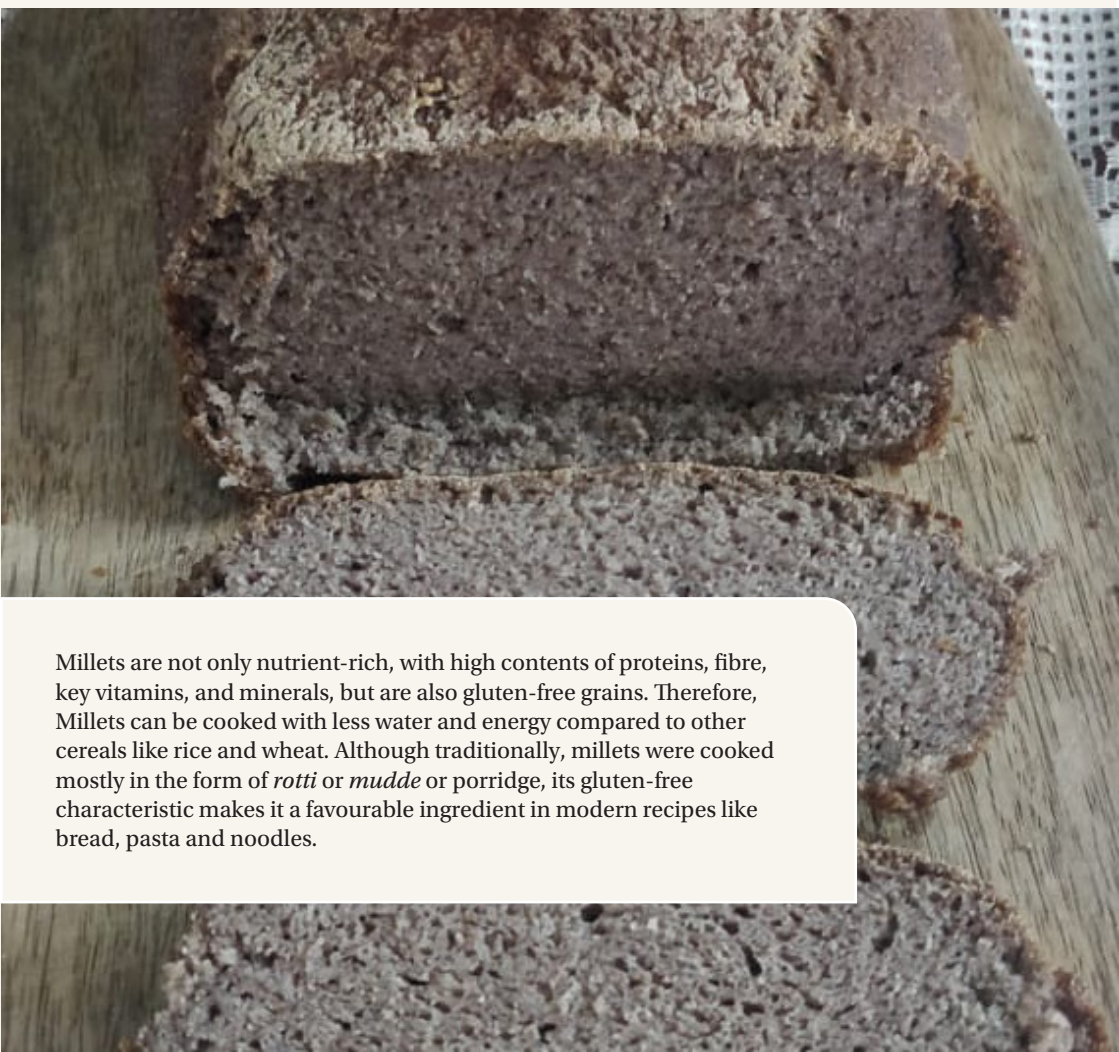
INSTRUCTIONS

- Take mix of Ragi-Bajra-Jowar flours or just Jowar (Sorghum) in a glass bowl. Make a well in the middle of the flour.
- In a separate bowl mix thoroughly lukewarm water and Psyllium husk. Wait until it forms a gel in about 2 minutes. Pour into the well made in the flour mix.
- Separately, keep this water in another vessel and mix and stir 7-9 g of salt as per the strength of salt and desired taste.
- Add water with salt into the flour and mix.
- Add the gel after it is ready.
- Add to the above, 2 tablespoons of gluten-free sourdough starter (see any online resources for making and maintaining a gluten-free starter) or use activated conventional yeast mixed with lukewarm water and a bit of brown sugar or honey. Make sure the yeast froths to confirm it is alive and well.
- Mix thoroughly with a spoon and clean hands and add water as needed to make a paste-like batter.
- Cover the batter with a lid or wet cloth and wait until the batter has risen.
- Time to rise with the sourdough method may take 4-5 hours. With conventional yeast it will be faster but depends on the temperature as well.
- Preheat oven to 230 °C.
- Grease thoroughly a bread tin or pan with a removable cover with ghee.
- Pour the batter into the bread tin. Place in the oven using baking or oven gloves. The lid will help keep moisture in and give a crunchy crust.
- Remove the cover carefully using baking or oven gloves in

about 20-25 minutes and continue to bake for another 20-25 minutes until the crust has darkened as desired. You can check temperature if you have a cake/bread thermometer. Insert into the dough and it should read above 200 °F (93.3 °C).

- Remove from oven and let the bread tin cool for a few hours before tipping or coaxing the bread loaf out. Cool further before slicing the bread.

Note - Proportions can be adjusted as per desirable attributes of the bread. Ragi (Finger millet) will give a darker bluish-grey colour and sandy texture, Jowar gives a smooth texture, and Bajra (Pearl millet) has a bitter tinge. You can also add some starchy flour like Tapioca or brown rice flour in the mix if you wish. Some mixtures may be a bit gritty or sandy depending on the proportions.



Millets are not only nutrient-rich, with high contents of proteins, fibre, key vitamins, and minerals, but are also gluten-free grains. Therefore, Millets can be cooked with less water and energy compared to other cereals like rice and wheat. Although traditionally, millets were cooked mostly in the form of *rotti* or *mudde* or porridge, its gluten-free characteristic makes it a favourable ingredient in modern recipes like bread, pasta and noodles.

SOPPU SAARU

INGREDIENTS

- 1 cup Tur Dal / Split Pigeon Pea
- 1 teaspoon Turmeric powder
- 100 grams Red Amaranth leaves, finely chopped
- 100 grams Spinach Leaves (Palak), finely chopped
- 100 grams Fenugreek Leaves finely chopped
- 30 grams Tamarind, soaked in warm water
- 1 cup Pearl Onions (Sambar Onions), halved

- 1 teaspoon Jaggery, grated/powder
- 1 teaspoon Turmeric powder
- Salt, to taste

FOR ROASTED MASALA

- 1 tablespoon *Chana dal* / Split Chickpea
- 1 tablespoon *Urad Dal* / Split Black Gram
- 2 tablespoons Coriander seeds
- 1 tablespoon Cumin seeds
- 1 tablespoon Whole Black Peppercorns
- 1/2 teaspoon Fenugreek seeds

- 4 Dry Red Chillies
- 1/2 cup Fresh Coconut, grated

FOR SEASONING / TADKA

- 1 teaspoon Gingelly oil
- 1/2 teaspoon Mustard seeds
- 1/2 teaspoon Cumin seeds (Jeera)
- 2 Dry Red Chillies
- A few Curry leaves
- 1/4 teaspoon Asafoetida

INSTRUCTIONS

- Wash the Tur Dal and add it into the pressure cooker along with 2½ cups of water and Turmeric powder. Close the lid and pressure cook for 2 whistles.
- After 2 whistles, turn the heat to low and simmer for 3 to 4 minutes and turn off the heat. Allow the pressure to release naturally. Once the pressure releases, open the cooker and mash the dal lightly until smooth.
- Soak Tamarind in hot water for 15 minutes. Then, using your fingers, mash the tamarind well into the water until it feels completely soft. This process helps extract the juice and sourness from the tamarind. Repeat this process another couple of times by adding 1/4 cup of water at a time. Combine all the tamarind water into a single bowl and set aside.
- For the masala, preheat a pan over medium heat; add the *Chana dal* and *Urad dal* and roast until the dals turn golden and lightly crisp. At this stage, add the Coriander seeds, Cumin seeds, Methi seeds and Dry Red Chillies.

- Stir for another minute or two until you notice the seeds start crackling and you can smell the aromas coming through.
- Finally, add the Coconut and stir it for 30-40 seconds and turn off the heat. Allow the mixture to cool. Once cooled, blend to make a fine powder. Keep aside.
- Add the tamarind water, chopped greens, Onions, ground sambar powder, Turmeric powder and salt. Add 1/4 cup of water and pressure cook for 2 whistles. Turn off the heat.
- Release the pressure immediately by lifting the weight off with a fork. Releasing the pressure immediately ensures the greens retain its bright colours. Keep aside.
- Finally, heat oil in a large saucepan over medium heat; add the Mustard seeds, Cumin and Red chillies and allow the seeds to crackle. Add the Curry leaves and Asafoetida.
- Stir in the cooked dal and *Soppu saaru* into the seasoning. Give the *Soppu saaru* a stir and bring it to a brisk boil for 2 to 3 minutes and turn off the heat. Check the salt and adjust according to your taste.
- Serve *Soppu saaru* with rice or *Ragi Mudde*.



Soppu saaru is a traditional Karnataka-style sambar made with mix greens such as Spinach, Amaranth and Fenugreek leaves. The recipe is known as Ulsoppu in many regions of Karnataka. The saaru goes perfectly well with ragi mudde or rice.

AVAREKALU USLI

(HYACINTH BEANS FRY)

INGREDIENTS

1. 1.5 cups Avarekalu / Hyacinth beans
2. 1 big Onion (finely chopped)
3. 2 Green Chillies
4. 6 Crushed Garlic cloves
5. 1/2-inch piece of Crushed Ginger
6. 1 teaspoon Roasted Cumin powder
7. 1 teaspoon Cumin seeds
8. 1/4 teaspoon Fenugreek or Methi seeds
9. 1/4 teaspoon Hing / Asafoetida
10. 1/4 teaspoon Grated coconut Coriander leaves - to garnish

INSTRUCTIONS

- Wash and drain the Avarekalu. Finely chop Onion, slit Green Chilli and Coriander leaves.
- Heat oil in a pressure cooker base. Splutter Mustard, Curry leaves, Green Chilli, Onion, crushed Ginger and Garlic.
- Saute till transparent. Add salt, hing and Avarekalu. Saute for a minute.
- Add 1 cup of water and pressure cook for 2 whistles in low flame.
- Open the cooker and add grated Coconut, Coriander Leaves. Mix well.
- Add water if needed. Give one boil.
- Dry roast Cumin seeds and Methi seeds. Powder it.
- Add the powder to the boiling Avarekalu Usili. Mix well and switch off the flame.
- Serve as evening snack or along with Akki rotti and rice.



Avarekalu usli is a Karnataka special recipe served either as a snack or a side dish for akki rotti, rice or chapati. Avarekalu grows in abundance in winter in Karnataka and is used in varieties of preparations.

MILLET CURD

INGREDIENTS

1. 1 cup Foxtail millet / Navane (in Kannada)
2. 1/2 cup Fresh Curd
3. 1 teaspoon Chopped Ginger
4. 1 teaspoon Chopped Green Chilli
5. Salt as per taste

FOR TEMPERING

1. 1 teaspoon Oil
2. 1/2 teaspoon Mustard seeds
3. A few Curry leaves

INSTRUCTIONS

- Wash and pressure cook millet with 1:4 ratio of Millet and water.
- Pressure cook for 3 whistles.
- Once pressure is released, add cooked Millet in a bowl. Smash it with a spatula.
- Add fresh Curd and Salt. Combine well, add some hot water if needed.
- Add chopped Ginger and Green Chilies.
- To temper, heat Oil in a small pan, add Mustard seeds and Curry leaves. Allow it to crackle.
- Add seasoning to the cooked millet and curd and mix well. Serve with pickle and papad.



Curd rice squares the meal in South India. Millet curd is prepared usually using Foxtail millet, but other millets such as Kodo or Barnyard millets also can be used. This is a simple recipe with cooked millet and curd mixed along with some seasoning.

RAGI COOKIES

INGREDIENTS

1. 50 grams *Ragi* / Finger millet flour
2. 50 grams Whole Wheat flour
3. 60 grams Jaggery powder
4. 80 grams Unsalted Butter
5. 1/2 teaspoon Baking powder
6. 2 tablespoons Milk

INSTRUCTIONS

- Dry roast the Finger millet flour (*Ragi* flour) on low flame for about 10 minutes. This will help remove the raw smell or taste of the flour. Transfer it into a bowl and let it cool.
- Mix all the dry ingredients (*Ragi* flour, Jaggery, Wheat flour and Baking powder) by adding butter.
- Add 1 tablespoon Milk at a time and start binding the dough.
- Cover the dough and let it rest in refrigerator for 30 min.
- Meanwhile preheat the oven at 160 °C.
- Shape the refrigerated dough into small balls. Flatten each dough ball between the palms and place on a baking tray.
- Bake the cookies in a preheated oven for 15 to 18 minutes.
- Let the cookies cool completely before serving.



Ragi (Finger millet) forms the main ingredient of the staple diet in Karnataka. In 2021, *Ragi* was cultivated in about 7.81 lakh hectares of land, producing about 13.6 lakh tonnes of the crop. The cropping system of the least water-intensive *Ragi* is predominantly intercropped with either Cowpea or Pigeon pea or Niger or Field Bean. Such intercropping systems help in diversifying diets and increasing nutritional intake. A large proportion of farms, even in peri-urban Bangalore largely grow *Ragi* for their own consumption and share it with their family members who do not grow it. This nutritious but small grain is used in various dishes, including the modern cookie preparation.

KOKUM JUICE

INGREDIENTS

1. 1 cup Kokum fruits
2. 2 cups Water
3. 2 cups Sugar
4. 5-6 Green Cardamom
5. 1 teaspoon Roasted Cumin powder
6. 1-2 pinches Black Salt

INSTRUCTIONS

- Rinse the Kokum fruits, cut them and remove the seeds.
- Blend the pulp and outer cover in mixer-grinder with little water.
- Strain the mixture and keep aside.
- Boil the Sugar and Water until the syrup becomes thick and sticky.
- Add the Kokum pulp in cooled sugar syrup.
- Add the roasted Cumin powder and powdered Cardamom.
- Mix well. Store this Kokum juice in a clean jar or bottle and refrigerate.
- When serving, dissolve 2-3 tablespoons of Kokum juice in one glass of water.



Kokum, a fruit of a plant that belongs to the Mangosteen family, grows in abundance in the coastal and ghat regions along the western Indian boundary. The deep-red Kokum fruits have a peculiar flavour. Both fresh and dry forms of ripe Kokum fruits are used in a variety of culinary preparation in Karnataka and other neighbouring states. In ayurvedic medicine, dried Kokum is known to help with digestion and reduce the burning sensation caused due to acidity.

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