

## KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

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**Project reference number:** 46S\_MSc\_104

**Title of the project:** Kodo malt as a smart nutrition for post Covid-19 infections.

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## **Introduction:**

Kodo millet is grown in poor soils and it is widely distributed in the regions of India and African Countries. In India, it is a small grain crop and a significant crop in the plateau of Deccan. Its cultivation is usually limited to Gujarat, Karnataka, Chhattisgarh, Eastern Madhya Pradesh and parts of Tamil Nadu. It is an annual grass species that grows to around 90 cm height. The Kodo millet grain colour varies from light red to dark grey and is bound in a tough husk that is difficult to remove. Kodo grains comprise protein 8.35%, fat 1.45%, carbohydrate 65.65%. Kodo millets do not contain gluten and are useful for individuals who are intolerant to gluten. Kodo millet is very easy to digest due to higher amounts of lecithin, which is good for functioning of the nervous system. These have a variety of phytochemical constituents including derivatives of hydroxybenzoic acid and hydroxycinnamic acids, myricetin, catechin, luteolin, apigenin, daidzein, naringenin, kaempferol, and quercetin, which has physiological and health benefits. It also imparts a better immune system. These are considered as rich sources of energy, carbohydrate, and protein and are comparable to other cereals but have more fat, calcium, iron, dietary fibre, and Vitamin E (tocopherols and tocotrienols) content. These are found to be rich sources of phytochemicals such as phenolic acids, flavonoids, catechins, phytic acid, and phytosterols. These phytochemicals are having antioxidant and antimicrobial properties too. Kodo millet has the highest phenolic content of all millets. Regular use of Kodo millet helps in postmenopausal females, cataractogenesis and cardiovascular disease such as high blood pressure and high level of cholesterol. It has antioxidants that help against oxidative stress and maintain glucose concentrations in type-2 diabetes.

## **Objectives**

Smart nutrition or nutraceutical properties of food play a very important role in boosting the immune system. Connecting link between nutrients available in kodo malt and human immune system as well as preventing or reducing post Covid infections.

The main objective is to:

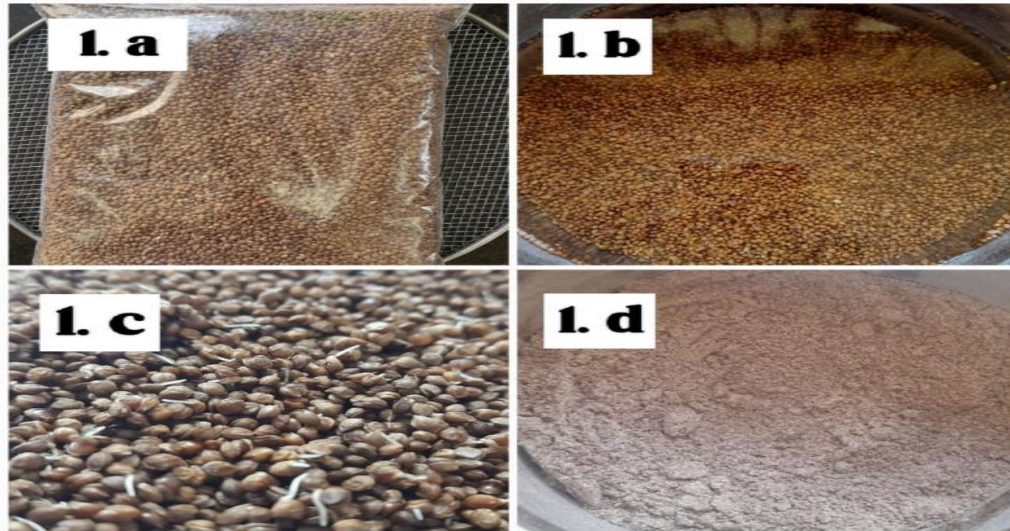
- To develop enriched food products of processed kodo millet to provide a good immunity.
- Processing (cleaning, washing, soaking, and germination) to maintain the stability and acceptance of the product.
- Sensory Evaluation.
- Analysis of developed products.
- Shelf life determination

## **Methodology**

Studying many research and review articles, by understanding importance of Kodo Millet (*Paspalum scrobiculatum*), Variety: “RK 390-25” purchased from Karnataka State Rural Development and Panchayat Raj University, (KSRD&PRU) Gadag.

### **The sample preparation:**

1. Soaking of known grams of kodo millets for 24 hours
2. Germination for the time period of 48 hours.
3. Shadow drying is done under the natural air flow and surrounding temperature (mean temperature = 25 °C) for 36 h.
4. Pulverizing dried germinated kodo millets to obtain fine malt powder.



**Fig no: 1- Sample preparation**

1a- Raw kodo millet, 1b- Soaked millet, 1c- Germinated millet, 1d- Pulverized millet

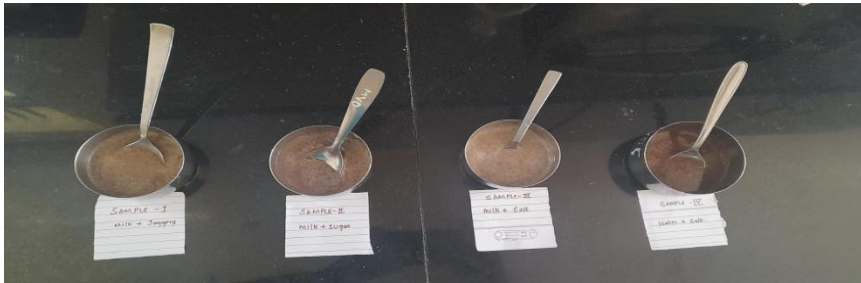
### **Standardization of Kodo malt recipe by Sensory evaluation**

The malted millet is sieved under 150 microns mesh so that a fine millet malt powder is achieved.

- 20ml- milk
- 100 ml- water
- 5 gms- millet malt -The malt is roasted for 2-3 minutes
- 10 gms - jaggery

Cooked for 10 to 15 minutes.

Several formulations are made with sweet and savoury combinations; finally the recipe for malt with jaggery and milk passed the sensory test means liked by maximum number of panel.



**Fig no: 2 Recipes with Sweet and savoury combinations**

### **Proximate Analysis of Kodo malt powder:**

Proximate analysis by AOAC (Association of official analytical chemists) methods

#### **Determination of Moisture %**

It is to know the concentration of moisture in a food sample. The experiment has been carried out in a Hot air oven, for 3 hours at 105 °C.



**Fig no: 3 - Determination of moisture in Kodo millets**

#### **Determination of Ash%**

The ash content in the food is carried out by taking a standard weight of the sample for example in this case, 5 grams of sample was taken in each of the crucibles. These were kept in the chamber for ignition for about 3 hours, later transferred into a desiccator.



**Fig no: 4- Determination of ash in kodo millets**

### **Estimation of Crude fibre**

As we know that the crude fibre stimulates and helps in the production of important gut bacteria, we have estimated the same in kodo millets, after the malting. Sample containing a mixture of Fibre components, cellulose, Hemicellulose and lignin is quantified. Weigh 1 gram of sample in a fibre bag and insert the glass spacer into the bag. Run the programme for NDF, ADF determination and Rinse the samples once done. Dry them in a hot air oven and record the weight of the samples.



**Fig no: 5 - Estimating crude fibre**

**Estimation of Fat:** Millet is naturally a low fat food, but in Kodo millet the fat is 4.2 g / 100g. But as this is a Malted sample, the fat is 3.62 g/100g. This is carried out by the soxhlet extraction method.

**Estimation of Phenolic content:** Organic solvent extraction is the main method used to extract phenolic. For this Gallic acid method is used to determine the contents.

### Determination of Shelf life:

In this observation the sample is put in different Packaging materials to see its stability and quality of the same. We are targeting the shelf life of just 6 months. We have used different materials like

- Single layer plastic - zip lock
  - Retort pouch - 95 micron
  - LDPE Pouch
  - Regular aluminum pouch
- The sample has been placed in the pouches on 22-03-2023.
- After the 3 months, these samples will be compared to a fresh malted sample to conclude the shelf life of kodo malt.



**Fig no- 6: 6.a- Retort pouch, 6.b- Aluminum pouch, 6.c- Zip lock pouch, 6. d- LDPE pouch**

## **Results and Conclusions:**

### **Macronutrients and micronutrients analysis of Kodo malt**

Nutrient %	Trial 1	Trial 2	Trial 3
Moisture in %	8.6	8.8	8.4
Ash in %	2.6	2.9	2.4
Fat in g/100g	3.63	3.77	3.44
Fibre in g/100g	0.1096	0.120	0.108

### **Phytochemical Analysis of Kodo malt**

Phytochemical %	Trial 1	Trial 2
Total Phenolic content as Gallic acid in mg/100g	299.1	286.3

Milletts are often considered healthy and nutritious. Here we found out that the malted milletts are way more digestible than the normal ones. With the results we can say that both are equally nutritious but the bio availability is better in the sprouted ones.

Nutritional composition of kodo millet by fssai standards show that it is rich in crude fibre and iron content compared to other ones. After germination the bioavailability of nutrients increases. The crude fiber decreases after germination, making the millet cook easier and digest better.

Comparing to raw kodo millet, germinated kodo millet or malt drink is more palatable, aroma and taste is good. By using malt powder different types of products can be developed to encourage people to adopt healthy eating habits. Example extruded products of kodo millet, infant foods other snack products.

Considering kodo malt's nutritional value and health benefits, if we develop a habit of replacing a cup of tea with kodo malt definitely it will act as smart nutrition.



### **Innovation in the project:**

By performing and by following scientific methods and sensory evaluation, Kodo malt drink is confirmed and concluded as smart nutrition. Example – smart nutrition for post covid-19 infections.

### **Scope for future work:**

The COVID-19 pandemic has brought numerous challenges to the global healthcare system. In terms of nutrition, kodo malt is a rich source of fibre, protein, and minerals such as iron and calcium. This makes it a great choice for individuals who are looking to add more nutrients to their diet. Kodo malt is also low in fat and has a low glycemic index, which means it can help regulate blood sugar levels.

As the food industry continues to evolve and adapt to changing consumer demands, kodo malt has great potential as a key ingredient for the future. Its sustainability, gluten-free properties, and high nutritional value make it a valuable addition to the food manufacturer. To further capitalize on the growing demand for healthy and organic food products, producers can focus on sustainable and organic farming practices. By adopting sustainable and organic farming practices, the producers can attract environmentally conscious consumers and establish themselves as a responsible brand in the market.

By adopting sustainable farming practices, producers can also ensure that their products are free from harmful chemicals and pesticides, making them a healthier alternative to other malt products. Through the research and development we can create new and innovative malt products that cater to the specific health needs of their customers.