DEVELOPMENT AND STANDARDIZATION OF READY TO EAT MIXED VEG COOKIES

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ABSTRACT:

The value added mixed veggies cookies is basically a ready to eat snack which comprises of the healthy and nutritional rich substituents such as oatmeal, whole wheat flour, sprouted multi millet powder, dried veg powder which is the most important constituent(carrot,calabash) incorporating antioxidants,vitamins A,C and E and with acceptable amount of calories, fibre,fat and carbohydrates in the cereal(oatmeal) and sprouted millet powder. The cookie is then evaluated organoleptically and tested under various variations to determine the quality,taste,nutrients and the shelf life of the cookie is found to be accepted for a span of about 15 days and can be extended even more under a proper storage condition with minimum moisture content.

KEYWORDS: Dried veg powder,oatmeal,whole wheat flour,sprouted multi millet powder,ready to eat snack,nutritional rich.

INTRODUCTION:

Vegetables are parts of plants that are consumed by humans as food as a part of meal,they are either eaten raw or cooked and has an important role in human nutrition, being low in fats and carbohydrates but rich in vitamins, minerals and dietary fibre. The carrot is an enlarged taproot and contains high quantities of alpha and beta carotenes and are a good source of vitaminK and vitamin B6. Calabash is of many varieties and shapes but this edible is not frequently used but it is said to have good amount of water content and this guard is one of the world’s first cultivated plants.

Apart from vegetables the other most important primary substituents are cereals and millets which includes oatmeal, whole wheat flour and sprouted millet powder. Basically all these are used in the preparation of porridges and are the most important component in the bakery industry. Millets and cereals are indigenous to many parts of the world and have been consumed by humans for the past several years. The millets and cereals in common share an appreciable amount of energy, carbohydrates, fats, proteins, vitamins, water. Country sugar is added to the product since it is said to be more nutritious than refined white sugar and it is claimed to have various health benefits.
Mixed veggie cookies refers to the ready to eat snack food which comprises of all the essential and the major nutrients and can be consumed by the people of all stages.

In general, serving of 100 grams of any raw millet and cereals along with the combination of vegetables provides the rich nutrients and is depicted in the pictorial form.

![Comparitive Nutritive Analysis of Millets, Cereals And Vegetables](image)

**Fig 1. Comparitive Nutritive Analysis of Millets, Cereals And Vegetables**

Cereals and millets are the best source of grains that are composed of rich source of dietary fibre, magnesium which aids in reducing blood pressure and the risk of strokes and the vegetables such as carrot, bottleguard and beans have certain other principle factor that tend to promote good health benefits. A combination of cereals and millets along with the vegetables in the baking of the ready to eat mixed veggie cookies tends to give equivalent and enormous amount of nutrients and is said to be healthy with certain properties.

**GET RID OF CONSTIPATION:**

Cereals contain both soluble and insoluble fibres which includes cellulose, pectin and hemicelluloses. A diet high in fibre has a link with good digestive health and this tends to getting rid of cancer. On eating them make sure that the insides are clean and prevents colon cancer.

**HEART FRIENDLY:**

Cereals and millets are good for cardiovascular health; having wholegrain cereals ensures that you eat less and have more energy. Making cereals a part of your diet can help you avoid many of those problems.
MAINTAINS BLOOD SUGAR LEVEL:

Diabetes is the most commonly occurring disease in people of all the ages, since they possess fibre rich content and are a great way to regulate blood sugar level and has a chance of type 2 diabetes.

BOOSTS IMMUNITY:

Vegetables contain a number of antiseptic and antibacterial abilities especially carrots that make them ideal for boosting the immune system and they are ought to stimulate the activity of white blood cells and is one of the most important element in the human immune system.

Also the vegetable is also a modest source of thiamin, niacin and minerals such as calcium, iron, zinc and the tender leaves and tendrils are edible and indeed contain higher concentration of vitamins and minerals.

MATERIALS AND METHODS:

The raw materials used in the preparation of the mixed veggie cookies includes vegetables (carrot, calabash and Phaseolus vulgaris), oatmeal, wheat flour, sprouted multimillet powder, country sugar, butter, and to enhance the taste and flavours, toppings such as the vanilla essence and chocochips are added to the product.

PHASEOLOUS VULGARIS(GREEN BEANS):

Green beans are the unripe young fruit which are harvested and consumed with their enclosing pods typically before the seeds inside are fully matured. The bean often contains a string which is totally composed of hard fibrous strands. They are removed before cooking or made edible by cutting the pod into small segments. The most important compound present in green beans in the “flavanol” miquelianin. Over 130 varieties of green beans are known.

There are two types of beans:

i. Bush beans: where they are planted 2 inches apart.
ii. Pole beans: where they are planted 3 inches apart.

They are sowed after the last spring frost and harvested in the summer with minimum soil temperature of 48 degrees F.

100 grams of beans consists of:
DAUCUS CAROTA (CARROT):

Carrot is the root vegetable usually orange in color. The root contain high quantities of alpha and beta carotene and they are also said to be a good source of vitamin K and vitamin B6. They are harvested between 90-120 days after they are sowed and cultivated and they are especially used in many cuisines in the preparations of salads. The optimum temperature is said to be 21°C and dead soil is deep, loose and well drained, sandy with a pH of 6.3 to 6.8. They grow best in sun but tolerate some shade. 100 grams of carrot contains appreciable amount of energy (41Kcal), dietary fibre (2.8 g), fat (0.24 g), protein (0.93 g), and vitamins, water and sugar. They can be stored for several months in the refrigerator at a temperature of about 0°C - 5°C.
CALABASH (BOTTLE GUARD):

Calabash is said to be fruit which can be either harvested young to be consumed as a vegetable. Bottle guards are grown by direct sowing of seeds or transplanting 15-20 day-old seedlings. The plant is best preferred, well-drained, moist, rich soil, the crops are ready for harvest within two months. They are the traditional plants that are consumed and cultivated since many ages. 100 grams of calabash gives appreciable amount of nutrients which includes energy of 15 kcal, carbohydrates 3.69 g, specially rich in dietary fibre of 1.2 g, fat 0.02 g, protein 0.6 g, vitamins and minerals.

OATMEAL:

Oatmeal is made of hulled oat grains that have either been milled or rolled. It is most commonly used in the preparation of porridge. The oat groats are milled to produce fine, medium, or coarse oatmeal. Ground oats are known as “white oats”; steel cut oats are known as “coarse oatmeal”. Oats is categorized into rolled oats and flattened oats. Oatmeal sometimes refers to the porridge made from the bran or fibrous husk. The un-enriched oatmeal is 84% water, contains 12% carbohydrates including 2% dietary fibre and 2% each of protein and fat, provides 71 calories and contains 29% of the daily value of manganese. The oatmeal on consuming lowers the risk of heart disease and reduce the levels of blood cholesterol.

WHOLE WHEAT FLOUR:

Whole meal flour is a powdery substance derived by grinding the whole grain of wheat. Whole wheat flour is baking used in the bakery industries. Whole wheat refers to the fact that all the grain (bran, germ and endosperm) are used and nothing is lost in the process of making the flour. Whole grain wheat flour is a full flavored flour containing vitamins, minerals and proteins. Whole grain is a good source of calcium, iron, fibre and other minerals like selenium. Depending on the gluten content wheat is classified into soft and hard. 100% of the bran and germ is reintroduced to produce whole wheat flour. Whole wheat possesses certain benefits which includes the ability to control obesity, boost energy, inhibit type two diabetes, improve metabolism, prevent asthma reduces the risk of breast cancer and boosts digestion.

SPROUTED MILLET POWDER:

Millets are a group of highly variable small seeded grasses widely grown around the world as cereal crops or grains. The crop is favored due to its productivity and short growing season and dry, high-temperature conditions. Millets are further classified into minor and major millets. India
is the largest producer of millets of about 36%. Millets grows rapidly and can be grazed 5-7 weeks after sowing, when it is 20-30 cm high. Millets are small grained annual warm weather cereals belonging to grass family. They are highly tolerant of drought and other extreme weather conditions. Millets posses certain nutrients and have certain health benefits like weight loss, reduce levels of bad cholesterol, keeps the immune system strong, they are rich source of minerals, calcium and phosphorous.

![Image of ingredients](image.jpg)

**Fig 4. Ingredients used in the cookie**

**GENERAL METHOD OF PROCESSING OF READY TO EAT MIXED VEGGIE COOKIES:**

1. Collecting of samples (Primary ingredients)
2. Cleaning and grading
3. Weighing of sample
4. Drying
5. Grading (or) pulverizing
6. Addition of secondary ingredients
Dough formation
  ↓
Shaping
  ↓
Baking(180°C)
  ↓
De-panning
  ↓
Storage and analytical tests
  ↓
Packaging

**PRIMARY INGREDIENTS** Oatmeal, whole wheat flour, sprouted multi-millet powder, dried veggie powder, butter.

**SECONDARY INGREDIENTS**– Country sugar, milk powder, chocochips, vanilla essence.

**COLLECTING OF THE SAMPLE:**

The initial step in the processing of the mixed veggie cookie is collecting the sample in the required quantity and desired quality which includes oatmeal, whole wheat flour, sprouted millets and vegetables (carrot, calabash, green beans).

**CLEANING AND GRADING:**

The collected samples of cereals and millets are cleaned such that they are free from dust, husk and other in-edibles whereas the vegetables are cleaned such that they are free from the soil, weeds and ensured that they are fresh and graded according to the quality.

**WEIGHING:**

The cleaned and graded samples of cereals, millets, vegetables are measured in varying proportions according to the requirement of the taste so that they possess good aroma and taste.

**DRYING:**

The primary ingredients are now dried to remove the moisture present so that the shelf life of the product can be extended to a appreciable period of time. The vegetables do possess excess amount
of moisture. In order to remove the moisture the samples are either sundried or by using mechanical terms.

![Fig 5. Dried Veg Powder](image)

**ROASTING AND PULVERIZING:**

The cereals and millets are roasted at a temperature of 60°C until they tend to loss their raw flavor. The vegetables need not be roasted they are completely dried and then pulverized. The cereals that is the sprouted millets are pulverized once they are roasted. They are pulverized such that they attain uniform granularity and do not possess a coarse texture.

**ADDITION OF SECONDARY INGREDIENTS:**

The secondary ingredients includes the addition of milk powder, choco chips, vanilla essence, sugar are added to the mixture to enhance the flavor and taste of the product.

**DOUGH FORMATION:**

The primary ingredients which includes the whole wheat flour, oatmeal, sprouted multi millet powder should be mixed in proper proportion along with milk and ensure that they possess the consistency of the dough which tends to give a better output with a desirable moisture content.
SHAPING:

Once the dough is brought to a specific and required condition they are shaped accordingly of equal size and weight and they are panned making sure that they do not stick to the pan.

BAKING:

Baking is the most desired and important aspect in the cookie processing which ensures the final quality, taste and appearance of the product. It is ensured to be done at a specific temperature of about 180°C for 20 minutes and make sure that they are baked properly.

![Fig 6. Baking Of Cookies](image)

DEPANNING:

The baked cookies are depanned once they are allowed to cool so that they possess a definite shape without any disruption to the shape and texture of the product.

STORAGE AND ANALYTICAL TESTS:

The cookies are packed in large quantities in air-tight containers or polythene containers in various quantities depending on the requirement and they are stored such that they are not exposed to any other contaminants and they are transported easily.

DEVELOPMENT OF MIXED VEGGIE COOKIES:

The primary ingredients which comprises of oatmeal, whole wheat, sprouted millets and the vegetables which includes calabash, carrot, phaseolus vulgaris undergo the process of separation, cleaning where they are separated from the husk, dust and the non-edibles before they are being processed. The cleaned ingredients are now dried where they are spread uniformly in trays and they are either sundried or by using tray drivers; ensure that the moisture content varies day to day depending on the temperature. The process is said to be carried out until maximum
moisture in the ingredients are removed. Once they are dried they are roasted until it loses its raw flavor. Now the roasted ingredients are pulverized such that they have a uniform texture. The pulverized substituents are added according to the requirement along with dry veggie powder, country sugar, butter and ensure that they form a smooth dough. The dough is now patted into the required shape and size and they are panned.

SECONDARY INGREDIENTS USED IN PREPARATION OF THE MIX:

The secondary ingredients such as almonds, cashews, raisins, chocochips are added to the dough or they are said to be topped which enhances the flavor of the product. All these compounds contain essential nutrients, flavanoids and has many health benefits such as prevents cancer, relieves acidity, helps in digestion and gives glowing skin.

TRIAL 1:

To achieve a good flavor and texture three different trials were performed by varying the ratio of oatmeal, whole wheat flour, sprouted multi millet powder and dried veg powder. During the first trial two parts pulverized cereals and millets are added along with two parts of whole wheat flour and dried veggie powder and then topped with trace amounts of secondary ingredients.

TRIAL 2:

The next trial is carried out by the blending one part of oatmeal and whole wheat flour along with two parts of sprouted multi millet powder and dried veg powder each. The blended mixture is now mixed two parts of secondary ingredients.

TRIAL 3:

A blend of one parts of oatmeal and dried veg powder along with two parts of whole wheat flour and sprouted multi millet powder, topped with one part of secondary ingredients is found to be the absolute trial with acceptable flavor, texture, appearance and browning quality.
QUALITY ANALYSIS:

Various test and analysis have been done to evaluate the quality of the product, its taste which is determined organoleptically, the flavor of the product, the shelf life of the product, moisture content and the ash content to determine the minerals present in the product, all these are very essential to determine the state of the product.

1. Moisture content:

It is the main aspect in determining the product shelf-life. Product with high appreciable amount of moisture in it degrades the quality of the product and the shelf-life will be very minimum which results in the microbial growth. 5 grams of each powdered sample are taken in petri dish and the moisture content is evaluated by placing the sample in the hot air oven for 1 hour at 130 degree which resulted in negligible moisture. The moisture content of a food material is defined through the following equation:

\[
\text{%Moisture} = \left(\frac{m_w}{s_{ample}}\right) \times 100
\]

Where \(m_w\) is the mass of the water and \(s_{ample}\) is the mass of the sample. The mass of water is related to the number of water molecules \(n_{ew}\) by the following expression: \(m_w = \frac{n_w M_w}{N_A}\), where \(M_w\) is the molecular weight of water (18.0 g per mole) and \(N_A\) is Avogadro’s number (6.02 * 10^{23} molecules per mole). The moisture content is determined by measuring the mass of a food before and after the water is removed by evaporation.

\[
M_{cw} = \frac{mc_{wb}}{1+mc_{db}}
\]

\[
M_{cdb} = mc_{wb} / (1+mc_{wb})
\]
2. Ash content:

Ash content is determined for almost all the products which are in the powdered form which evaluates the mineral content present in the product. The sample is placed in the muffle furnace for 3 hours at 553 degree Celsius and the ash content is found to be 3% which is highly appreciable. Determining the ash content may be important for several reasons. It is part of proximate analysis for nutritional evaluation. Ashing is the first step in preparing a food sample for determination of elemental issues.

- % Ash (dry basis) = \( \frac{M_{ASH}}{M_{DRY}} \times 100 \)
- % Ash (wet basis) = \( \frac{M_{ASH}}{M_{WET}} \times 100 \)

**TABLE: 1**

<table>
<thead>
<tr>
<th>S.NO</th>
<th>WEIGHT OF SAMPLE</th>
<th>WEIGHT OF CRUCIBLE</th>
<th>WEIGHT OF SAMPLE WITH CRUCIBLE</th>
<th>ASH CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>INITIAL</td>
<td>FINAL</td>
</tr>
<tr>
<td>1</td>
<td>5 g</td>
<td>0.024</td>
<td>0.029</td>
<td>0.022</td>
</tr>
</tbody>
</table>

**CALCULATIONS FOR ASH TEST:**

Weight of sample before heating = 0.029 g

Weight of sample after heating = 0.022 g

Weight of total ash (W1-W2) = 0.029 - 0.022

ASH CONTENT = 0.007*100

= 0.7%
3. Organoleptic Taste:

The sample that is made to prepare the payasam is organoleptically tested and various parameters such as the taste, flavor, texture, consistency are evaluated and changes are made according to the requirement and sugar is added according to the desired taste.

Sensory evaluation

<table>
<thead>
<tr>
<th>People opinion (excellent, satisfactory, unsatisfactory)</th>
<th>Taste (out of 5)</th>
<th>Appearance (out of 5)</th>
<th>Flavour (out of 5)</th>
<th>Rating (out of 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>5</td>
<td>-</td>
<td>4.5</td>
<td>5</td>
</tr>
<tr>
<td>Good</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>-</td>
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<tr>
<td>Unsatisfactory</td>
<td>-</td>
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</tr>
</tbody>
</table>

Fig 8. Sensory Evaluation Of The Quality Of The Product (out of 5)
EVALUATION OF BROWNING:

Browning determines the quality of the cookie based on the texture, flavour and colour. To determine the browning efficiency a batch of five untrained persons were used to access the degree of browning. The cookies were given to the batch without any knowledge on the objectives of the study or the variations in baking time. Each person was as liked to group the cookies into three categories: underbaked, adequately baked and overbaked independent of others.

CONCLUSION:

The ready to eat mixed veg cookie is found to be a nutritious snack which is composed of all the essential millets, cereals and vegetables along with the secondary ingredients which tend to enhance the taste of the product and is accepted to be a healthy snack comprising of all the compound nutrients. The cookie is found to be a complete snack with no added flavour and preservatives and the shelf-life of the product remains appreciable for a longer period of time and do possess good flavour and aroma for a prolonged period of time. The energy yield after the consumption of cookie is found to be high.

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