Wheat belongs to the genus *Triticum* and there are 30,020 species. The kernel of wheat is usually 1/8 – ¼ inches long. In some kinds of wheat the tip of each kernel is covered by stiff hair called the brush. Wheat grains are ovoid in shape, rounded on both the ends. Along one side of the grain there is a crease, a folding of the aleorone and all the covering layers.

Wheat is consumed mostly in the form of flour obtained by milling the grain. Indian wheat is hard and the moisture content is usually 8-10 percent. Protein content depends on the variety grown, climate and soil condition. Wheat proteins are rich in glutamic acid and low in Tryptophan. Glutamic acid and aspartic acid are present in amide form as glutamine and aspargine. The bran and the germ protein have a higher content of essential amino acids than the inner endosperm proteins. In wheat flour the carbohydrate found are Starch endosperm- 95.8%, Starch germ- 31.5%, Starch bran- 14.1%, Sugar endosperm-1.5%, Sugar germ- 36.4%, Sugar bran- 7.6%, Cellulose endosperm- 0.3%, Cellulose germ- 16.8%, Cellulose bran- 35.2% and Hemicellulose endosperm-2.4%, Hemicellulose germ- 15.3%, Hemicellulose bran- 13.1% . Wheat flour is an excellent source of complex carbohydrates. In addition, wheat flour contains B-vitamins, calcium, iron, magnesium, phosphorus, potassium, zinc, minimal amounts of sodium and other trace elements. [https://en.wikipedia.org/wiki/wheat](https://en.wikipedia.org/wiki/wheat)

Carrot (*Daucus carota*) is a root vegetable, usually orange or red- white blend in color with crisp texture when fresh. Carrot gets its characteristic and bright orange color from β- carotene, which is metabolized into vitamin A in human when bile salts are present in the intestines. Carrots are also rich in dietary fiber, and antioxidants. Carrot can also promote colon health as it is rich in fiber. Vitamin A deficiency (VAD) is a major health problem, particularly in low resource countries, putting and estimated 125 – 130 million preschool aged children at increased risk of morbidity and mortality from infectious disease. Vitamin A supplementation reduces vitamin A deficiency (VAD) and increases child survival; it is complimented by fortifying foods with vitamin A, with the implementation of recently developed risk management tools, vitamin A can be used safe
in food fortification, including point of use fortification in the context of supplementation among specific target groups in low resource countries. **Klaus et al. (2008)**

**Carrot** is the richest source of beta-carotene among all the root vegetables; therefore it holds an important position among vegetables. It belongs to the family *Umbellifereae*, genus *Daucus* and species *carota*. Its common Hindi name is *Gajar*.

Carrots are nutritionaly ; they store a goldmine of nutrients. No other vegetable or fruit contains as much carotene as carrots, which the body converts to vitamin A. This is a truly versatile vegetable and an excellent source of vitamins B and C as well as calcium pectate, an extraordinary pectin fiber that has been found to have cholesterol lowering properties. The carrot is an herbaceous plant containing about 87% water, rich in mineral salts and vitamins (B,C,D,E). Raw carrots are an excellent source of vitamin A and potassium; they contain vitamin C, vitamin B6, thiamine, magnesium, folate (also known as vitamin B9 and natural folic acid).

The known phytonutrients in carrots are lutein, lycopene, alpha, beta and gamma carotenes, zeaxanthin and xanthophyll. These phytonutrients are nature's marvelous provision for combating of various illnesses. Carrots are credited with many medicinal properties; they are said to cleanse the intestines and to be diuretic, remineralizing, antidiarrheal, an overall tonic and anti-anemic. Carrots are rich in alkaline elements which purify and revitalize the blood. They nourish the entire system and help in the maintenance of acid-alkaline balance in the body. The carrot also has a reputation as a vegetable that helps to maintain good eyesight. Its highly energizing nutrients are also particularly beneficial for the liver.

Carrot contains a very complete nutrition to provide our body the essential enzymes, vitamins and minerals. Fresh Carrot contain Energy 48kcal, protein 0.9g., carbohydrate 10.6g., fat 0.2g., fibre 1.2g., iron 1.03mg., calcium 80mg., phosphorus 530mg., Carotene 1890µg. Sodium 35.6 mg. and Potassium 108 mg. (Gopalan et. al. 2007 ) Also, it is a good source of fiber, vitamin B1, vitamin B2, vitamin B6, vitamin C, vitamin K, biotin, potassium and thiamine.
Carrots contains a bulk of folic acid, a group of vitamin B, which has good effect to fight against free radicals (substances that cause cancer) in our body. The lignin found in carrot helps to strengthen our immune system to fight against cancerous cells.

**Carrot also provide a host of other benefits for the body:**

- Carrots are excellent for the eyes and may improve eyesight and help with night blindness.
- Carrots contain large quantities of vitamin A, in the form of beta carotene. Beta carotene is an anti-oxidant, and thus it prevents cell degeneration. Anti-oxidants also slow down the aging process.
- Carrot juice is like a tonic. It will improve the overall health of everyone, and increase immunity. In fact, two glasses of carrot juice a day can increase your immunity by as much as 70 percent.
- Carrots can enhance the quality of breast milk.
- Carrot can improve the appearance of the skin, hair and nails.
- When taken daily it can lower cholesterol and blood pressure.
- Carrot juice when taken everyday, helps to prevent body infections and is claimed to be valuable for the adrenal glands (the small endocrine glands situated above the kidneys).
- Carrots can regulate blood sugar.
- Carrot can promote colon health, because carrot is rich in fiber.
- Carrot can help prevent cancer. Beta-carotene consumption has been linked to reduced risk of several cancers, notably lung cancer. British researchers discovered that increasing beta-carotene consumption from 1.7 to 2.7 milligrams a day reduced lung cancer risk more than 40 percent. The average carrot contains about three milligrams of Beta-carotene. Raw carrots were five to eight times less likely to develop breast cancer than women who did not eat carrots.
- Carrots can help with Macular degeneration. This is a common eye disease of elderly. It impairs the macula. Researches found that people who ate the more Beta-carotene had a forty percent lower risk of macular degeneration compared with those who consumed the least.
- Carrots can help prevent strokes. A carrot a day reduces stroke risk by 68 percent.
Carrots help with Diabetes. Carrots are good for blood sugar regulation because of the presence of carotenoids in carrot. Carotenoids inversely affect insulin resistance and thus lower blood sugar.

Some possible benefits of Carrot powder may include:
- Maintaining acid-alkaline balance within the body
- Supporting healthy cholesterol levels
- Anti-diarrhea & anti-anemic properties
- Revitalizing & purifying the blood
- Supporting healthy eyesight
- Diuretic properties

Nutritional quality of fresh and dehydrated carrot contained appreciable amount of protein, iron, beta-carotene, and other nutrients in order to complete the need of human being. Singh et al. (2003). The carrots have a high value of nutrition and the availability of carrot is for limited period (as it is a seasonal vegetable and the shelf life of roots are also very limited), so it is very important to make the availability of this nutritious vegetables throughout the year. Therefore carrot can be dehydrated and its powdered form can be used in preparing various value added food products which will definitely help to solve the food and nutritional scarcity among the population. The effect of blanching on quality attributes of dehydration carrot during long term storage and found that blanched contained higher beta- carotene but lower ascorbic acid than their unblanched counterparts whereas enzymatic browning was unaffected by blanching. Blanching was helpful in limiting loss of quality parameters. Negi and Roy (2002)

Lotus stem (Nelumbo nucifera) contains active constituents such as starch, tannate protein, asparagine, pyrocatechol, d-gallic-catechin, neochlorogenic acid, leucocyanidin, leucodephinidin, peroxidase, vitamins B and C. It is used in the treatment of fever, diarrhoea, haemorrhages, dysentery, toning of heart muscle, lowering blood pressure, excessive menstruation and nosebleeds. (Ogle et al, 2001) reported the use of lotus stem (consists of 6, 2.4, 0.2mg/100g calcium, iron and zinc respectively) as a vegetable used in salads at Vitamin. Several organs of Nelumbo lutea are edible. Leaves and young stems are eaten cooked. The large tuberous roots (the size of a human arm) used to be baked
like sweet potatoes while the leaves were eaten like spinach. The root is rich in starch and when baked (after having been steeped in water to remove any bitterness) it becomes sweet and mealy, somewhat like a sweet potato.

**Lotus root** is sweet and can be eaten uncooked & steamed, fried or made into soup as fruit, and stuffed with glutinous rich in it flue – shaped holes and steamed as dessert. Tender young lotus root are good for salads while starchy mature, lotus root are good for making soups. Lotus root powder makes wonderful thick soup and dessert soup. This is also cooked as vegetable. This root has a milled flavour and a crisp texture. It can be cooked with other vegetables, soaked in syrup and pickled in vinegar. Lotus root, known as renkon in Japan, is an interesting vegetable, that changes its nature by how much it cook. When its raw it is rather bitter; when cooked briefly it has a very unique, crunchy texture; when stewed for some time, Lotus root turns starchy. Its packed with fiber and various nutrients and even used for medicinal purpose. *Maki et al. (2008)*

Lotus stem are buried in the mud and the stalks of the leaves and flowers are strongly attached to the stem, resisting the tug of human hands to pull them out without cutting them. Lotus stem is an under- water edible rhizome of lotus plant. The lotus stem is a vegetable that is indigenous to Asian, and is found under water. Similar in shape to a long squash, it is not uncommon for lotus roots to grow to a length of four feet. The exterior of this stem is covered with a peel that is reddish brown colour in appearance, with a white interior that has the appearance of lace. Lotus stem is tuberous roots of the lotus water lily, family *Nymphaeaceae*. The lotus root is about 8 inches long, and about 2 inches in diameter. On the outside, the skin of lotus root is smooth and green in colour; on the insides, several large air pockets run the length of the tuber for buoyancy in the water. When a stem is sliced in half it resembles a wagon wheel because of these large air pockets. Essentially all parts of the lotus stem plant are edible viz. roots, stems, leaves and seeds. Roots are cooked as a vegetable. It is also a source of starch or arrowroot. Much used and relished in Chinese cooking, the stem has a mild flavour and a crisp texture. It can be cooked with other vegetables, soaked in syrup or pickled in vinegar. The root. Contains about 1.7% protein, 0.1% fat, 9.7% carbohydrate, 1.1% ash.
Lotus stem has crunchy texture sweet tangy flavours. Lotus stem is tonic for treatment of diarrhea. Dysentery etc, a paste applied to ringworm and other skin ailments. It is also taken internally in the treatment of hemorrhages, excessive menstruation and nose bleeds. The roots are harvested in autumn or winter and dried for later use. The root nodes are used in the treatment of nasal bleeding, haemoptysis, haematuria and functional bleeding of the uterus. Subbuti (2007)

The lotus seeds or nuts are quite versatile and can be eaten raw or dried and popped like popcorn, phool makhana. They can also be boiled until soft and made into paste or boiled with rock sugar to make a (sweet soup). Combined with sugar, lotus seed paste becomes one of the most common ingredients used in pastries such as moon cakes, daifuku and rice flour pudding. Ripe lotus seeds provide a spleen tonic and are used for their astringent action in the treatment of chronic diarrhea. The seeds are used as an antidepressant and to inhibit inflammation. Follett and Douglas (2006)

The lotus stems are usually available in summer and the best have white skins, short yet fat joints and a faint aroma. Lotus stem has a high medicinal value whether cooked or not. Uncooked lotus stem is a “cold” food that helps, improves the appetite, promotes fluids, and relieves blood stagnation, thirstiness and hangovers. Cooked lotus stem is “warm” and help nourish the stomach and spleen reinforces the heart and blood, smooth nerves and relieves diarrhea.

Lotus stem powder makes wonderful thick soup and dessert. It also stop diarrhea, clear heat and improves appetite. The rich fibre content of lotus root stimulates peristalsis and relieves constipation. Drinking 2 to 3 glasses of lotus stem juice a day can stop bleeding of oesophagus and stomach (vomiting blood); bleeding of rectum, intestines or stomach; nose bleeding and gum bleeding. Lotus stem soup also serves similar purpose. Patients with fever can drink it cold, while those with steady temperature should drink it warm.

Lotus stem or kamalkakdi is a common vegetable in Indian cuisine, although it might not be easily found in every grocery store’s produce section.

Some possible benefits of Lotus Stem may include:
- Lotus stem are very rich in Iron, which is required for RBC formation in blood.
• There is a good amount of calcium also present, required for maintenance and repair of bones and teeth.
• Lotus stem is high in dietary fibre. It is highly recommended for pregnant women and people with chronic complaints of constipation.
• The chlorophyll present in the stalk acts as an active antioxidant to fight against cancer producing free radicals.
• Lotus stem increase the intake of antioxidant. Edible lotus proved to contain tryptophan, an amino acid that influences antioxidant activity. Antioxidant protect the cells of body from free radicals, compounds found in environmental toxins that can damage cells. (Douglas 2010)

Lotus stem powder contain Energy 234 kcal, protein 4.1g., carbohydrate 51.4g., fat 1.3g., fibre 25.0g., iron 60.6 mg., calcium 405 mg., phosphorus 128 mg., Sodium 438 mg., and Potassium 3007 mg. (Gopalan et al. 2007)

Flax (also known as common flax or linseed) (binomial name: Linum usitatissimum) is a member of the genus Linum in the family Linaceae. It is native to the region extending from the eastern Mediterranean to India and was probably first domesticated in the Fertile Crescent. Flax was extensively cultivated in ancient Ethiopia and ancient Egypt. Flax is grown for its use as an edible oil, as a nutritional supplement, and as an ingredient in many wood finishing products. Flax is also grown as an ornamental plant in gardens. Flax fibers are used to make linen. The Latin species name usitatissimum means most useful, pointing to the several traditional uses of the plant and their importance for human life.

Flaxseed, called (‘Tisi’ or ‘Alsi’) in northern India, has been roasted, powdered and eaten with boiled rice, a little water, and a little salt since ancient times in the villages.

Flax seeds come in two basic varieties: (1) brown (2) yellow or golden. Most types have similar nutritional characteristics and equal numbers of short-chain omega-3 fatty acids. The exception is a type of Yellow flax called solin (trade name Linola), which has a completely different oil profile and is very low in omega-3 fatty acid. Alpha linolenic acid, the omega-3 fatty acid found in flax seed and walnut promotes bone health by helping to prevent excessive bone turnover when consumption foods rich in omega-3 fatty acid result in lower ratio of omega-6 fatty acid in the diet. Griel et al. (2007).
Brown flax can be consumed as readily as yellow, and has been for thousands of years, it is better known as an ingredient in paints, fiber and cattle feed. Flax seeds produce a vegetable oil known as flaxseed or linseed oil, which is one of the oldest commercial oils, and solvent-processed flax seed oil has been used for centuries as a drying oil in painting and varnishing.

A Duke University Medical Center reported that 25 men who were awaiting surgery to remove their prostates. Their low-fat diet was supplemented daily with 3 tablespoons of flaxseed meal that they sprinkled on their cereals, salads, yoghurt, applesauce, or juice. After 34 days the men showed lower cholesterol levels, decreased testosterone levels, and fewer tumor cells compared to the control group.

Whole flaxseeds may pass through body undigested because they do not break down easily. They must be thoroughly chewed or ground into a meal to aid digestion. Alpha lipoic acid, a component in flaxseeds, is a powerful antioxidant that protects against free radical damage of both water and fat-soluble nature. Flaxseeds also protect DNA and aid in recycling vitamins C and E. These tiny miracle seeds may even have anti-aging benefits.

Flax seed sprouts are edible, with a slightly spicy flavor. Excessive consumption of flax seeds with inadequate water can cause bowel obstruction. Whole flax seeds are chemically stable, but ground flaxseed can go rancid at room temperature in as little as one week. Refrigeration and storage in sealed containers will keep ground flax from becoming rancid for a longer period; trained sensory panelists could not detect differences between bread made with freshly ground flax and bread made with ground flax stored for four months at room temperature. Ground flax is remarkably stable to oxidation when stored for nine months at room temperature and for 20 months at ambient temperatures under warehouse conditions. Pre-ground flaxseeds—while more convenient—also come with a shorter shelf life than whole flaxseeds. Ground flaxseeds—even when carefully packaged in a gas-flushed, light-protective pouch and refrigerated after opening—typically last about 6-16 weeks. Whole flaxseeds, on the other hand, will typically last for 6-12 months when stored in an airtight container in a dark, cool dry spot. If directly refrigerated, they may last for 1-2 years. Flaxseed oil is
especially perishable and always be purchased in opaque bottles that have been kept refrigerated. Flaxseed oil have a sweet nutty flavor.

**A study done at Duke University suggests** that flaxseed may stunt the growth of prostate tumors, although a meta-analysis found the evidence on this point to be inconclusive. Flax may also lessen the severity of diabetes by stabilizing blood-sugar levels. There is some support for the use of flax seed as a laxative due to its dietary fiber content though excessive consumption without liquid can result in intestinal blockage. Consuming large amounts of flax seed may impair the effectiveness of certain oral medications, due to its fiber content, and may have adverse effects due to its content of neurotoxic cyanogen glycosides and immuno suppressive cyclic nonapeptides.

**Medical Benefits:**

- Flaxseeds contain both soluble and insoluble fiber, with insoluble fiber in the form of cellulose and lignin comprising the larger proportion. **The National Cancer Institute recognized** fiber to be important in the prevention of various cancers, including colon cancer.
- Flaxseeds offer relief to sufferers of chronic constipation, who recommended ingesting a tea made of ground flaxseeds. Modern day herbalists recognize the wisdom of the ancients and continue to offer the flaxseed remedy to their patients.
- Flaxseed oil contains Omega-3 alpha linolenic acid, an essential fatty acid necessary for regulating a host of bodily functions. Because the human body does not manufacture the essential Omega-3 fatty acid, people must consume it from food sources. Flax is one of the few plant foods that contains the alpha linolenic acid; others include walnuts, soybeans, and canola oil.
- The Omega-3 in flax is similar to that in fish but not identical. Some claim Omega-3 from flax may not have the same cardiac benefit as fish oil, but that view is controversial. Fish oils contain two fatty acids, EPA (eicosapentaenoic acid) and DHA (docosahexanoic acid) that flaxseed oil does not contain. However, the body can manufacture the EPA and DHA fatty acids from flaxseed.
oil when other oils are eliminated from the diet, suggesting that flaxseed oil can have the same benefit as fish oil.

- Amino Acids are the building blocks of protein, essential fatty acids such as Omega-3 fats, are the building blocks of prostaglandins, hormone like substances present in both male and female reproductive glands. The prostaglandins may also aid in regulating blood pressure.

- Omega-3’s have been found to be effective in the successful treatment and prevention of arthritis. Both fish oils and linseed oil have been used. More recently, research using combinations of the Omega-3 and -6 fatty acids found that 60 percent of rheumatoid arthritics were able to completely discontinue their non-steroidal anti-inflammatory drugs (NSAIDS) and another 20 percent were able to reduce their dosages of NSAID in half.

- Omega-3s help to decrease allergic response. Since the body must be rebuilt, a longer time is needed before allergies are alleviated.

- Linseed oil helps the kidneys remove sodium and water. Water retention (edema) is involved in swollen ankles, some forms of overweight, PMS, and late stages of cancer and cardiovascular disease.

- Linseed Oil is famous for its ability to make the skin smooth, soft and velvety. It will also alleviate those skin conditions whose origin is the lack of the Omega-3s in the diet.

  Linseed oil can also be helpful in multiple sclerosis (in places where essential fatty acid consumption is high, multiple sclerosis is very rare); Omega-3 are necessary for visual function (retina), adrenal function (stress), and sperm formation; cystic fibrosis (Omega-3-containing oils will loosen the viscous mucous secretions and relieve breathing difficulties); some cases of sterility and miscarriage; some glandular malfunctions; some behavioral problems (schizophrenia, depression, manic-depressive disorder, etc.); addictions (to drugs or alcohol); and pathologically deviant behaviors.

  **The University of Toronto conducted a study** using flaxseeds and found them successful in lowering cholesterol as well as inhibiting the growth of new cancer cells. **At a 1995 Toronto meeting of the American Association of Cancer Research, a scientist and member of the study team announced that the lignans in flaxseeds may be**
responsible for reducing the tumor growth in rats. Flaxseeds contain the highest concentration of lignans found in any food. Flax seed and its lignans have potent anti estrogenic effects on estrogen receptor positive breast cancer. Dab et al. (2007)

Lignans are plant estrogens, also called phytoestrogens, that may aid in maintaining strong bones, preventing the growth of many cancerous tumors, and inhibiting the formation of gallstones. These plant estrogens may have antibacterial, antiviral, and antifungal properties. Lignins are fibers that may bind to testosterone, the male hormone, and inhibit the growth of prostate tumors.

British Journal of Nutrition reported that flax oil was beneficial in helping to regulate blood glucose levels in diabetics. Because most Americans consume highly processed refined oils, many are deficient in Omega-3 fatty acids that may provide numerous health benefits to people with high cholesterol, heart disease, stroke, angina, high blood pressure, rheumatoid arthritis, multiple sclerosis, psoriasis and eczema, and cancer. Flaxseeds, an unrefined food, provide the richest source of Omega-3 fatty acids.

Flaxseeds are attributed with the ability to boost the immune system, increase vitamin D levels, and prevent loss of calcium and magnesium. Flaxseed powder contain Energy 530 kcal, protein 20.3g., carbohydrate 28.9g., fat 37.1g., fibre 4.8g., iron 2.7 mg., calcium 170 mg., phosphorus 370 mg., Sodium 30 mg. and Potassium 813 mg. (Gopalan et al. 2007 )
JUSTIFICATION:

For alleviating micronutrient deficiencies in India, efforts are under way to enrich cereals. Since 70 percent of our population belongs to the rural areas and have poor economic status, they have to depend on vegetables for requirement of micronutrient as they are easily available and cheap in comparison to animal food. Carrot are rich in antioxidant (beta carotene, alpha carotene, photochemical and glutathione) and Vitamin A, B, C, D and E. they are also a good source of folic acid and magnesium. All these nutrients are required for all stages. But it is a major issue commonly among the children and women who belong to low income group. Lotus stem is one of the natural plants which are used as healthier supplement for various diseases. Vitamin C is a powerful water soluble antioxidant which protects body from scurvy, develop resistance against viral infection, boost immunity, hasten wound healing and remove cancer causing harmful free radicals from body. Collagen is the main structural protein in the body required for maintain the integrity of blood vessels, skin organ and bones. Lotus stem and its products is a healthy supplement for various disease and it is also helpful for maintaing health status. Flax seed have gained popularity as being beneficial in treating a cancer of breast, prostate and colon and heart diseases. Flax seed are the highest source of omega-3 fatty acids they are very much high in lignans and mucilage (soluble fiber). This study is a potential uses of carrot, lotus stem and flax seed flours to develop Vitamin A, Calcium, Iron, Fibre Phosphorus, Sodium and Potassium rich recipes, which will nutritionally beneficial and for a good health to all age group especially in children and women of different section of the community or section.
OBJECTIVES:

- To estimate the chemical composition of selected Flours.
- To find out feasibility of addition of vitamin A, iron, calcium and fibre rich flours in wheat flour and prepare micronutrient enriched food products.
- To evaluate the sensory attributes of the prepared food products.
- To determine the nutritional quality of the prepared food products.
- To determine the total plate count and coliform bacteria in prepared food products.
- To calculate the actual cost of the prepared food products.
- To compile recipe along with their nutritional composition and prepare a booklet.