INTRODUCTION

Fruits are deemed, as a perfect source for providing our body with all the necessary nutrients. Fruits are an important supplement of the human diet as they possess several nutritive components required for the growth and development of the human body leading to a healthy physique and mind. There is a ready source of energy with a unique capacity to guard against many deficiency diseases. Fruits are living tissues that are subject to continuous changes after harvest, because of their peculiar characteristic i.e. high moisture content and rapid role of metabolism. They are more prone to deteriorating rapidly after harvest. There are many types of fruits such as soft fruit like raspberry, blackberry and strawberry to fleshy fruits like apple, pineapple, banana and papaya. In the category of fruits there are delicious fruit options like Grapes, Watermelon and cantaloupe.

The seasonal gluts are avoided by utilization of fruits in processing industries for preparation of various value added products with long shelf life. In advanced countries, (70 to 75 percent) of perishable processed before reaching the consumers table where as in India only 2 percent of the total produce is processed utilizing only 40% of installed processing capacity. In India pineapples are processed into a number of value added products like, Jam, juice, Jelly cheese, canned halves, preserves etc. But the two main limitations of canning are high container cost and the effect of processing and retorting on texture properties of canned products.

Food Preservation is the process of treating and handling foods to stop or greatly slow down spoilage (loss of quality, edibility or nutritive value) caused or accelerated by micro-organisms. Some methods, however, use benign bacteria food (eg. cheese, wine) while maintaining or creating nutritional value, texture and flavour is important in preserving its value as food. (www.foodfreshly.com/food-preservation,2010).

The pineapple is the leading edible member of the family, Bromeliaceae which embraces about 2000 species. The botanical name of pineapple is “Ananas comosus”. The Origin of the Pineapple is the American continent, probably Brazil and Paraguay. It has spread throughout tropical and subtropical region as a commercial fruit crop. The major pineapple producing states in India are Assam, West Bengal, Karnataka, Meghalaya, Manipur, Arunachal Pradesh, Kerala and Bihar During 2009-2010. India produced 1.387 million tones of pineapple from about 91900 ha. Slightly acidic soil with pH range of 5.5 to 6.0 is considered optimum for pineapple cultivation. Areas with
heavy rainfall are best for pineapple growth. Popular commercial pineapple variety in India is Giant. Few other important varieties are Queen, Kew, Mauritius, Charlotte, Rothchild, Jaldhup, Desi, Lakhat etc. (Indian Horticulture Board, Database, 2011).

Indian Horticulture Board, Database 2011 has recommended production and consumption of foods rich in vitamins as the only truly sustainable solution of the problem. The pineapple is considered to be the healthiest fruits which is good source of vitamin A and vitamin B and rich in vitamin C and calcium. It also contains phosphorus and Iron. The nutrient composition of ripe pineapple is given below –

Table 1.1 Nutritional levels (Per 100 ml Pineapple juice)

<table>
<thead>
<tr>
<th>Moisture (%)</th>
<th>Protein (%)</th>
<th>Fat (%)</th>
<th>Mineral matter(%)</th>
<th>Fiber (%)</th>
<th>Carbohydrate (%)</th>
<th>Calories (Kcal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>87.8</td>
<td>0.4</td>
<td>0.1</td>
<td>0.4</td>
<td>0.5</td>
<td>10.8</td>
<td>46</td>
</tr>
</tbody>
</table>

Minerals

<table>
<thead>
<tr>
<th>Phosphorus (mg/100g)</th>
<th>Potassium (mg/100g)</th>
<th>Calcium (mg/100g)</th>
<th>Magnesium (mg/100g)</th>
<th>Iron (mg/100g)</th>
<th>Sodium (mg/100g)</th>
<th>Copper (mg/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>37</td>
<td>20</td>
<td>33</td>
<td>2.42</td>
<td>34.7</td>
<td>0.13</td>
</tr>
</tbody>
</table>

Manganese (mg/100g) Zinc (mg/100g) Sulphur (mg/100g) Chlorine (mg/100g) Molybdenum (mg/100g) Chromium (mg/100g)

| 0.56                | 0.11                | 20                | 13                  | 0             | 0.011           |

Vitamins

<table>
<thead>
<tr>
<th>Carotene (mg/100g)</th>
<th>Thiamin (mg/100g)</th>
<th>Riboflavin (mg/100g)</th>
<th>Niacin (mg/100g)</th>
<th>Vitamin C (mg/100g)</th>
<th>Choline (mg/100g)</th>
<th>Folic acid Free (mg/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>0.2</td>
<td>0.2</td>
<td>0.1</td>
<td>39</td>
<td>8</td>
<td>0</td>
</tr>
</tbody>
</table>

Folic acid – Total (mg/100g)

| 0                  |

Source- (Indian Horticulture Board, Database 2011)
Pineapple (Ananas comosus, Bromeliaceae) is a wonderful tropical fruit having exceptional juiciness, vibrant tropical flavour and immense health benefits. Pineapple contains considerable calcium, potassium, fiber, and vitamin C. It is low in fat and cholesterol. Vitamin C is the body’s primary water soluble antioxidant, against free radicals that attack and damage normal cells. It is also a good source of vitamin B1, vitamin B6, copper and dietary fiber. Pineapple is a digestive aid and a natural Anti-Inflammatory fruit. A group of sulfur-containing proteolytic (protein digesting) enzymes (bromelain) in a pineapple aid digestion. Fresh pineapples are rich in bromelain used for tenderizing meat. Bromelain has demonstrated significant anti-inflammatory effects, reducing swelling in inflammatory conditions such as acute sinusitis, sore throat, arthritis and gout and speeding recovery from injuries and surgery. Pineapple enzymes have been used with success to treat rheumatoid arthritis and to speed tissue repair as a result of injuries, diabetic ulcers and general surgery. Pineapple reduces blood clotting and helps remove plaque from arterial walls. Studies suggest that pineapple enzymes may improve circulation in those with narrowed arteries, such as angina sufferers. Pineapples are used to help cure bronchitis and throat infections. It is efficient in the treatment of arteriosclerosis and anemia. Pineapple is an excellent cerebral toner, it combats loss of memory, sadness and melancholy. Pineapple fruits are primarily used in three segments, namely, fresh fruit, canning and juice concentrate with characteristic requirements of size, shape, colour, aroma and flavor. (Joy, 2010).

Jam and jelly are made from fruits and they are being made since long in different forms. The methods of production were not very sophisticated but these products were made in conventional manner in many homes. Since availability of fruits is only seasonal, mankind had found out various ways to preserve them for consumption during off-season. Thus, jam and jelly were popular, albeit in different forms since long. With fruit processing techniques being modernized, we see them in present day refined version. But this note is about producing these products with conventional methods on a very small scale.

Jam is a product made by boiling fruit pulp with sufficient sugar to a reasonably thick consistency, firm enough to hold the fruit tissues in position. Apple, pear, sapota (chiku), apricot, loquat, peach, papaya, karonda, carrot, plum, strawberry, mango, tomato, grapes and muskmelon are used for preparation of jams. It can be prepared from one kind of fruit or from two or more kinds. Commercial jams such as tutti-frutti can be
prepared from pieces of fruit, fruit scraping and pulp adhering to cores of fruits which are available in plenty in canning factories (Srivastava and kumar, 2006).

A jelly is a semi-solid product prepared by boiling a clear, strained solution of pectin-containing fruit from pulp, after the addition of sugar and acid. A perfect jelly should be transparent, well-set, but not too stiff, and should have the original flavour of the fruit. It should be attractive colour and keep its shape when removed from the mould. It should be firm enough to retain a sharp edge but tender enough to quiver when pressed. It should not be gummy, sticky or syrupy or have crystallization sugar. The product should be free from dullness, with little or no syneresis (weeping) and neither tough nor rubbery (Srivastava and kumar, 2006).

Fruit cheese has recently become very popular. It is a confection of the type of Karachi Halwa and is prepared from fruits like guava, apple, pear and plum. Fruit cheese have a long shelf-life and are at their best after 3 to 6 months storage. They can be prepared by using fruit pulp 1 kg, sugar 1.25 g, butter 70 g, citric acid 3 g, salt 2 g and appropriate amount of colour (Sethi et al, 2001).

Pectin substances present in the form of calcium pectate are responsible for the firmness of fruits. Pectin is the most important constituent of jelly. It is a commercial term for water- soluble pectinic acid which under suitable conditions forms a gel with sugar and acid. In the early stage of development of fruits, the pectic substance is a water- soluble protopectin which is converted into pectin by the enzyme protopectinase during ripening of fruit. Over-ripe fruits are not suitable for making jelly and only ripe fruits are used.

The setting of pectin is also dependent upon the pH and sugar concentration. Stiffness of the gel increases with increasing concentration of pectin up to a certain point beyond which the addition of more pectin has little effect. Too little pectin gives a soft syrup instead of gel. Pectin tends to keep the sugar from crystallizing by acting as a protective colloid, but is not effective when the concentration of sugar is 70 percent or more. The jellying power of fruit pectin depends upon the amount of pectin used as well as its degree of polymerization and acetyl content.

The amount of pectin extracted varies with the method of extraction, the ripeness of the fruit, the quantity of water added for extracting the juice and the kind of fruit. Usually about 0.5-1.0 percent of pectin of good quality in the extract is sufficient
to produce good jelly. If the pectin content is higher a firm and tough jelly is formed and if it is less the jelly may fail to set (Srivastava and kumar, 2006).

Citric acid may be considered as “Nature’s acidulant”. It is found in the tissues of almost plants and animals as well as many yeasts and moulds. Commercially citric acid is manufactured under controlled fermentation condition that produce citric acid as a metabolic intermediate form naturally-occurring yeasts, moulds and nutrients. The recovery process of citric acid is through crystallization from aqueous solution. The high water solubility of citric acid (181 g/100 ml) makes it an ideal additive for foundation fruit syrups and beverages concentrates as a flavor enhancer and microbial growth inhibitor (preferably at pH < 4.6) (Srivastava and kumar, 2006).

Herbs can offer the body nutrients it does not always receive, either from a poor diet, or environmental deficiencies in the soil and air. They are great body balancers that help to regulate body functions. Today, herbs are still the alternative medicine and primary source of health care for 80 percent of the world. Combinations of herbs work better than they do singly, because specific combinations allow inclusions of herbs that can work at different aspects and stages of need, like short term energy, long term endurance or weight control. Grouping herbs with similar properties increases the latitude of the products effectiveness and potency. Herbal combinations are not addictive or habit forming, but are powerful nutritional agents that assist the body naturally. A variety of phenolic compounds (such as caffeic, ellagic, and ferulic acids, sesamol, and vanillin) in addition to the flavonoids are found in fruit, vegetables and many herbs. These phenolics influence the quality and stability of foods by acting as flavorants, colorants and antioxidants (Decker, 1995).

There is therapeutic significance of Basil in the management of various airs carcinogenic cells. Basil protects from nearly all sorts of infections from viruses, bacteria, fungi and protozoa. Recent studies show that it is also helpful in inhibiting growth of HIV and carcinogenic cells. Basil contains vitamin C and other antioxidants (such as Eugenol), which protect the heart from harmful effects of free radicals. Vitamin C and other antioxidants in basil, apart from repairing damages done by the free radicals, can minimize the stress induced by these oxidants. They soothe nerves, lower blood pressure, reduce inflammation and thus reduce stress. One such component is Camphene. Potassium (K) also reduces blood pressure related stress by replacing sodium (Na). Eugenol, a component in essential oils, is very beneficial in reducing
cholesterol from blood. The compound like vitamin C, Camphene, Eugenol and Cineole present in the essential oils of basil, can cure the infections. They also can cure congestion of the lungs. They are found effective in healing damages caused to the lungs due to smoking, tuberculosis, lung cancer etc. Basil helps cure tuberculosis due to antibiotic properties.

Vitamin C, Vitamin A, phytonutrients and the essential oils in basil, are excellent antioxidants and protects the body from nearly all the damages caused by the free radicals. In traditional Indian medicine system called Ayurveda, it is considered as a tonic to retain youth and avoid aging (Wikipedia/ Healths benefits of Basil, 2011).

Basil can protect from radiation poisoning and also heal up damages from it. It acts as a vaccine against pox if consumed regularly. It is very efficient in curing cough and cold. It is also beneficial in reducing labour pain, destroying rabies germs, treating gastroenteritis, mumps, cholera, whooping cough, measles, rheumatism, nausea, septic, urinary, genital infections, destroying worms in stomach. Dried leaves are use as an insects-repellent by mixed with grains. It has mild and coagulant activity comparable with that of aspirin thus preventing thrombosis. (wikipedia.com html/basil.com, 2009)

The true mint is a perennial herb belongs to the family lamiaceae. They are used for flavoured food candy, teas, beverages, antiseptic mouth rinse, mint sauce and the mint jelly. Mint gets its name from a nymph named, minth (mintho). It is also used to flavour cheeses, bread, salad and yoghurt. Mint is a good appetizer and promotes digestion, due to its typical aroma. It also soothes stomach in cases of indigestion, inflammation etc (Admin, 2007).

The aroma of mint activates the salivary glands in our mouth as well as glands which secrete digestive enzymes, thereby facilitating digestion. Thus it is extensively used in culinary. The strong aroma of mint is very effective in opening up congestion of nose, throat, bronchi and lungs, giving relief in respiratory disorders resulting from asthma, cancer. Now, there is a mixed opinion about this. Some say that prolonged use of menthol may cause sterility and induce inability to conceive, by interfering with the production of ova and also killing these gametes, because of its germicidal and insecticidal properties. While another group suggests that mint may be used to treat sterility in females. (Mukherjee, 2009).
Ginger (gingiber officinalis) is a member of the zingiberaceae family that is in the tropical forests of many countries as India, China, Fiji and Indonesia. Ginger is an excellent source of minerals like potassium, calcium, magnesium and manganese. Therefore it should be added in our diet. Ginger is also used in aromatherapy as an essential oil to treat a number of complaints. The essential oil can be added for bath use, as a messaging rub. Ginger has long been renowned for its ability to relieve all type of sickness and nausea as well as acting as a strong “anti-inflammatory” and as an aid to poor digestion (www.helpwithcooking.com, 2007). A clue to ginger’s success in eliminating gastrointestinal distress is offered by recent double-blind studies, which have demonstrated that ginger is very effective in preventing the symptoms of motion sickness including dizziness, nausea, vomiting, and cold sweating. In a double-blind trial, ginger root brought about a significant reduction in both the severity of nausea and number of attacks of vomiting in 19 of 27 women in early pregnancy (less than 20 weeks)(www.whfoods.com/ginger, 2009).

Cardamom consists of two genera of the ginger family Zingiberaceae, namely Elettaria and Amomum. Cardamoms are used as cooking spice. Medically, cardamom is used for flatulent indigestion and to stimulate the appetite in people with anorexia. Moreover, in Ayurvedic medicine it is used as a carminative, diuretic, stomachic and digestive, and for cough, colds and cardiac stimulation. Cardamom has been used in traditional medicine against kidney and urinary disorders, and as a gastrointestinal protective. Cardamom oil has reported anti-inflammatory and antibacterial uses. In India, green cardamom (A. subulatum) is broadly used to treat infections of the teeth and gums, to prevent and treat throat trouble, congestion of the lungs and pulmonary tuberculosis, asthma, heart disease, inflammation of the eyelids and digestive disorders. When mixed with neem and camphor, cardamom is used as a nasal preparation to treat colds. An infusion of cardamom can be used as a gargle to relieve sore throats, which has led to its use in cough sweets. Cardamom is also reportedly used as an antidote for both snake and scorpion venom and for food poisoning. In traditional Chinese medicine it is used to treat stomachache, constipation, dysentery, and other digestion problems. Cardamom pods, fried and mixed with mastic and milk, are used for bladder problems. The seeds are popularly believed to be an aphrodisiac (Kunnunakkara, A. et al., 2009).
Cloves (Syzygium aromaticum, or Eugenia aromaticum or Eugenia caryophyllata) are the aromatic dried flower buds of a tree in the Myrtaceae family. Cloves are native to Indonesia and are used as a spice in cuisine all over the world. The name derives from the French “clou,” (nail) as the buds vaguely resemble small irregular nails in shape. The spice is used in Ayurveda, Chinese medicine and Western herbalism and dentistry, where the essential oil is used as an anodyne (painkiller) for dental emergencies. It has been reported as analgesic, anesthetic, antibacterial, antiparasitic, antidual, antioxidant, antiperspirant, antiseptic, carminative, deodorant, digestive, rubefacient, stimulant, stomachic, tonic and vermifugal. Cloves are used as a carminative to increase hydrochloric acid in the stomach and to improve peristalsis. Cloves are also said to be a natural anthelmintic. The essential oil is used in aromatherapy, especially for digestive problems. Topical application of this spice over the stomach or abdomen will warm the digestive tract. In Chinese medicine cloves are considered acrid, warm and aromatic, entering the kidney, spleen and stomach meridians, and are notable in their ability to warm the middle, direct stomach (energy flow) downward, treat hiccough and fortify the kidney. Because the herb is so warming, it is contraindicated in any person with fire symptom. As such it is used in formulas for impotence or clear vaginal discharge, for morning sickness together with ginseng and patchouli, and for vomiting and diarrhoea due to spleen and stomach coldness. Clove oil is used in various skin disorders like acne and pimples, to treat severe burns and skin irritations, and to reduce the sensitiveness of the skin. Cloves are used for the treatment of dog and cat ear problems in British Columbia, Canada. The essential oil extracted from cloves is used as an ointment to relieve pain and promote healing in herbal medicine. Cloves are also employed as a fragrance in flavouring industries. (Kunnumakkara, A. et al., 2009)
JUSTIFICATION

Fruits and vegetable which are among the perishable commodities are important ingredients in the human dietaries. Due to their high nutritive value they make significant nutritional contribution to human well being. They are cheaper and better source of protective foods.

The perishable fruits and vegetable are available as seasonal surpluses during certain parts of the year in different region and they glut in the market and become source during other seasons. So they get wasted in large quantities due to absence of facilities and know for proper handling distribution, marketing and storage, leading to great wastage of the perishable fruits and vegetable. Such losses in the food front aggravate the existing syndrome of malnutrition, under nutrition. If they can be supplied in fresh or preserved form throughout the year for human consumption. The national picture improved greatly as pineapple is whole some fruit. It is a great source of vitamin A and B and rich in vitamin C and calcium as compared to other fruits.

In India pineapple are processed in a number of value added products like canned halves, preserves, chutneys, Jam, Jelly and cheese. It improves the economic status of all groups. It is a good source of income.

Some children do not like straight pineapple but considering its nutritive qualities like rich in vitamin A, B and vitamin C. It can be given in various forms like jam, jelly and cheese by improving its taste, flavour, colour adding to other raw materials. Some important flavours viz. basil, mint, ginger, cardamom, clove can be added to enhance the taste, flavor and colour to ripe pineapple fruits for developing various products. Thus, the use of herbs in cooking or with food is an art which will benefit the body by preventing a range of health problems. Healthy pineapple product can be made by incorporating selected herbs which are low in calories and rich in vitamins, minerals and antioxidants.

The aim of this research would be to substitute various canned food forms with healthy pineapple product options which would act as a booster to individual’s health. The developed products can be seen as a variety in flavor and health beneficial in its category of its food range.
Keeping in view the importance of different flavors, shelf life, cost effectiveness and excellent nutritional value, in combination with herbs the present investigation entitled "Value addition of Pineapple based food products" was undertaken with following objectives -

**OBJECTIVES :**

1. To analyze the chemical properties of the prepared value added products.
2. To assess the Organoleptic characteristics of value added products.
3. To find out the shelf life of the prepared products.
4. To work out the economics of the prepared products.