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# Effect of Different Treatements Such As Microwave and Germination on Physicochemical, Antioxidant Properties of Rose and Mint Flavored Soy Yogurt

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**ABSTRACT;** Two batches of soy yogurt were formulated namely microwave treated M-(93.7% soy milk 6% SMP ,1.33% Toned milk) and the germinated one (G) having the same composition .Also the rose and mint were added at the concentration of 1% . The treatments were evaluated for sensory, physicochemical, antioxidant properties. pH and syneresis of treatments showed a significant difference (P<0.05) in favor, texture and over all acceptability. The DPPH radical scavenging activity was observed highest in Germinated-(80.05%) and the maximum syneresis was observed in microwave treated sample (0.75%-1.05%)

## I. INTRODUCTION ;

Yogurt is a fermented dairy product popular across the world. Among the various cultured dairy products, yogurt is unique with the presence of acetaldehyde which is relatively high concentration and an essential component (Vedamuthu, 1982) .The uniqueness is attributable to the synergistic and symbiotic fermentative processes of a specific mixed starter culture of lactobacillus delbrueckii sub sp bulgaricus and Streptococcus saliv arius sub sp thermophilus during its production process (Kroger,1976).During this process, lactic ,acetic and formic acids, together with acetaldehyde and dactyl give yogurt is characteristic smooth texture . Animal milk is the traditional raw material for making yogurt (Osudanhunsi et al, 2007)

Soy bean (Glycine max L .) , a legume rich in proteins is a cheaper and can serve as an alternative to cow milk. Soy milk processed from soya beans is richer in protein content than animal milk. It contains upto 40% proteins compared with 1% to 5.6% protein content of most animal milk.(Burton,1985) .The selection of vegetable milk as substitute for animal mik is a growing trend due to low fat and cholesterol Soy milk and its fermented products also serves as an alternative for lactose intolerant people. Intake of fermented soy milk improves the environment in the intestinal tract by increasing the amount of probiotics (Chang et al.2005) .Among the soy food products, soy yogurt has received a lot of attention because of its health benefits. In additional to high quality protein soy yogurt it contains a favorable amount of isoflavone compounds which acts as natural substances to replenish female hormone estrogen in order to relieve menopausal symptoms (Huges et al., 2003) However soy yogurt has some disadvantages when compared to cow milk yogurt. In terms of nutrition, soy yogurt is deficient in calcium (Yazici et al., 1997) Further, it does not support the grown of microorganisms including Bifidobacteria and lactobacilli which are required to make soy yogurt (Pham and Shah ,2007) .As a result , the biotransformation level of the non active isoflavone glycosides (IG) which exists in soy milk is dominant form to biologically active forms , isoflavone compound that possesses the estrogenic activity and other health benefits (Satchel, 988). Therefore, supplementation of soy milk with skimmed milk power (SMP) is expected to improve the growth of the yogurt starter culture and enhance the biotransformation of dominant IG to IA .Supplementation of SMP to soy milk increased the biotransformation of IG to IA by 12.6% and 23.7% by Bifidobacterial and lactobacilli, respectively (Pham and Shah 2007)

Texture is one of the essential components of yogurt quality. Yogurt consistency can be improved by the addition of stabilizers. Stabilizers are referred as hydrochlorides and perform two basic functions in yogurt i.e. binding of water and improving the texture. (Kumar and Mishra,2003) Starch is preferred thickening agent due to its creamy texture, processing case and low cost when compared to other stabilizers. Starch has the ability to bind large amount of water because of its regular, long chain structure (Robinson,2002) .The main objective of adding stabilizers to milk is not only to improve the yogurt texture and consistency but also for improving of general appreance by the prevention of whey separation as well as mouth feel

Free radical generated by exogenous chemicals or endogenous metabolic processes in food systems oxidize bimolecules and cause oxidative stress which results in tissue damage (Kehrer,1993) .Oxidative damage plays an important role in development of diseases like cancer, cirrhosis, arthroscleroses and arthritis .Natural antioxidants from traditional foods like soybean have focused lots of attention due to their functional properties such as scavenging free radicals, antihypertensive, anti-hypercholesterolemia and antithrombotic. These functional properties are due to presence of isoflavone's and proteins. Beside this incorporation of probiotics in soy milk provides a potential to improve the quality of product health of consumers due to reduction in serum cholesterol, anti carcinogenic, immunomoulatory effects. Bio active peptides derived from enzymes hydrolysis or microbial photolytic activities during fermentation of soy milk posses high antioxidant activity (Apostolidis et al., 2006) .The DHHP radical scavenging activity of soy yogurt produced by kefir culture after 48 hours of production was reported to be 92.3% (Mc Cue and Shetty, 2005) . But less consumption of soy milk is due to the presence of beany flavor which is due to the hexanal and pentanals. Then production of flavored soy yogurt is a simple but novel approach to increase consumption of soy based products.

➢ **Objectives;**

- ✓ To develop the flavored soy yogurt with different concentrations of soy milk
- ✓ To analyse physiochemical properties of the product.
- ✓ To analyse antioxidant properties of the product.
- ✓ To analyse the textural properties of the product.

➢ **Definitions of yogurt;**

According to the code of Federal Regulations of the FDA (FDA 1996c) yogurt may be defined as the "food produced by culturing one or more of the optional dairy ingredients (cream milk partially skimmed milk and skim milk) with a characterizing bacterial culture that contains the lactic acid producing bacterial Lactobacillus delbrueckii subsp. Bulgaricus and Streptococcus thermophilus"

In many other countries regulatory agent follow the definition of yogurt defined by Food and Agriculture Organization/World Health Organization (FAO/WHO)

The FAO/WHO Codex Alimnetarius Commission defines yogurt as "a coagulated milk product obtained by lactic acid fermentation through the action of Lactobacillus delbrueckii subsp. Bulgaricus and streptococcus thermophilus from milk with or without additions (milk powder, skim milk powder) (Mares chi and Cueff, 1987)

➢ **Microbiology of yogurt;**

Maze (1905), Grigoroff (1905) found rod and coccal shaped bacterial, yeast's and mould's in yogurt .Much of the credit for the stud of yogurt bacteria belonging to the Lactobacillaceae and Streptococcaceae genera .Generally yogurt cultures are lactobacillus delbrueckii subsp. Bulgaricus and streptococcus thermophilus, which are thermoduric, homofermentative lactic acid bacteria (Tammie and Deeth,1980).Some other strains such as Lactobacillus helveticus, Lactobacillus acidophilus and Bifedocacerium species are also sometimes used as adjuncts

Lactobacillus delbrueckii can ferment glucose, fructose, galactose and lactose to lactic acid. It produce D (-) lactic acid up to 1.7% in milk and has a growth temperature of 22 degree to 60 degree (Rasic and Kurmann, 1987).With an optimal temperature of 40 degree to 50 degree centigrade it can ferment glucose, fructose, lactose and saccharose and produces L(+) lactic acid up to 0.7 -0.8% in milk ,it can grow in presence of bile salts, but is very sensitive to antibiotics (Rasic and Kurmann, 1978)

When single strains of either L.belbrueckii subsp. Bulgaricus or S.thermophilus used, lactic acid and acetaldehyde production is lower compared with that In a mixed culture. (Hamann et al 1971).The yogurt fermentation involves two stages; L delbrueckii subsp. bulgaricus stimulates the growth of S thermophilus by liberating essential amino acids from casein by proteolytic activity .In this stage L.belbrueckii subsp bulgaricus grow slowly because it cannot tolerate the high lactic acid concentration .S.thermophillus produce enough formic acid which stimulates the growth of L.belbrueckii subsp. bulgaricus, the second stage begins. By the symbiotic action, desirable acidity of the final product can be achieved. The former has a higher proteolytic activity .Slocum et al., reported that in yogurt with 10 to 17.5% total solids (TS) maximum proteolytic activity occurred at 14% TS.

- **Aroma component of yogurt;**

The odour and taste of soured milk products are characterized by numerous volatile bacterial metabolites, some of which are by products of lactic acid fermentation or produced from other reaction mechanisms. Lactic acid itself is suggested to be one of the major compounds significantly contributing to yogurt flavor. The most aromatic compound is acetaldehyde, acetone, acetonin and dactyl in addition to acdetic, formic, butanoic and proponic acid. The typical aroma of yogurt is characterized by acetaldehyde (Pette and Lokema 1950). It was suggested that higher the concentration of acetaldehyde are necessary to produce a desirable flavor in yogurt. The higher concentration of acetaldehyde (5-21 ppm) is reported to be due to low utilization rate of this compound. The lack of alcohol dehydrogenase enzyme in the bacteria is responsible for the conversion of acetaldehyde into ethanol, that is the reason of lo utilization of acetaldehydes, amino acids such as threonine and glycine, and DNA can act as precursors of acetaldehyde. Threonine aldolase activity in S. thermophilus is significantly decreased when the growth temperature is increased from 30 degree to 42 degree centigrade.

- **Total solids;**

The total solid content of processed soy yogurt ranges from 56.2-61.12% (Tuitemwong et al., 1993) .The total solids of processed of soy yogurt ranged from 34-44% (Tammie and Robinson 1999) .The storage of plan soy yogurt resulted in decreasing the percentage of total solids from the total solids of soy yogurt ranging from 15.5 to 31.20 % . The total solids content of plain soy and rose flavored soy yogurt was reported to be 14.5 to 15%.

- **Titratable acidity;**

The percentage acidity of mango soy fortified yogurt increased with the increase in stabilizer content (o.2-0.6%) from 0.71 to 0.73% (Kumar and Mishra, 2003) .The titrable acidity of plain soy and rose flavored soy yogurt ranged from 0.8 to 1.3% during 8 days of the storage. The percent acidity of soy yogurt fermented with maize steep water and commercial starter culture was 0.22 and 0.19% (Farinde et al., 2008) .During the storage of plain soy yogurt , the titrateable acidity ranged from 0.76 to 1.50% (Muhammad et al., 2009)

- **pH;**

The high optimal pH values of soy yogurt varied form 5.0 to 6.0 (Moriguchi et al.,1961) .The pH of soy yogurt fermented with maize steep water and commercial starter culture was 5.80 and 5.67% (Farinde et al., 2008) .The pH of plain yogurt decreases from 5.94- 5.07% during storage (Muhammad et al., 2008) . The pH value of pain soy yogurt made from the soybean with different hypocotyls lengths (0cm, 3cm and 6cm ranged from 3.93 to 3.94% .The pH of probiotics soy yogurt with the addition of insulin was found to increase during the storage from 4.54-4.42% (Milka et al., 2013) .The pH of plain soy ad rose favored yogurt during 8 days of storage was found to decrease from 4.3- 4.0

- **Moisture content:**

The moisture content of mango soy fortified yogurt with addition of stabilizers was studied and it was observed that the moisture content of soy yogurt decreased with increase percentage of stabilizers (0.2-0.6%) from 86.74 – 87.80 %( Osudanhunsi et al., 2007).The moisture content of soy yogurt was found to be 91.61% (Amaze 2011). The moisture content of plain soy yogurt and rose flavored soy yogurt was found to be 87.45 and 86.50% resp.

- **Crude protein ;**

The crude protein content of plain soy yogurt, flavored soy yogurt was found to be 3.75 and 3.99% (Osudanhunsi et al., 2007). The protein content of soy yogurts fermented with maize steep water and commercial starter cultures was 3.33% and 3.25 %( Farinde et al., 2008).The values of protein content for plain soy yogurt during 1 day and last day of storage were 4.13 and 0.28% (Muhammad et al.,2009). The protein content of plain soy yogurt, rose and mint flavored yogurt was found to be 3.33, 3.45 and 3.47% respectively.

- **Crude fat content;**

The fat percentage of processed soy yogurt varied 1.22-2.2% (Tamine and Robinson, 1999). The crude fat content of plain soy yogurt fermented with maize steep water and commercial starter culture was 1.21 and 1.42% resp. (Farinde et al., 2008). A decrease in crude fat content of plain soy yogurt was reported during storage

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(Muhammad et al., 2009). The crude fat content of soy yogurt was found to be 3.6 and 3.30% respectively.

➢ **Ash content;**

The ash content of plain soy yogurt was found to be 0.52% (Osudanhunsi et al., 2007). The ash content of soy yogurt fermented with maize steep water and commercial starter culture was reported to be 0.63 % and 0.56 %( Farinde et al., 2008).A decrease in ash content of plain soy yogurt was reported during storage from 0.69 – 0.05% respectively (Muhammad et al 2009). The ash content of soy yogurts was found to be 0.51% (Amanze 2011). The ash content of plain soy and rose flavored soy yogurts was reported to be 0.62% and 0.74 % (Oyenziyi et al 2014).

➢ **Syneresis or wheying off**

An average of 52.6% syneresis was reported in soy yogurt fortified with 0.104% calcium sulphate (shirae et al 1992). Stabilizers are commonly used in cultured products to reduce whey separation. (Lucey et al 2000) .Percent syneresis of plain soy and rose flavored yogurts was reported to be 44.5-45.9% during the 8 days of storage from 0-4 ml (Osman and Kamal 2010) .The percent syneresis of probiotics soy yogurt with the addition of insulin was reported to be in the range of 34.7 – 28.6% during refrigerated storage (Milka et al 2013)

➢ **Health benefits of soy yogurt:**

✓ **Anticancer;**

Anticancer activity of soy protein has been suggested (Shiomi et al., 1982) ,Park et al., 2005) For e.g. soy trypsin inhibitor was reported to suppress overian cancer cell invasion by blocking urokinase up regulation(Clair et al., 1990 ) Life time consumption of soy proteins in soy yogurt reduced the incidence of azoxymethane induced colon tumors in rats (Kobyshi et al., 2004) .Isoflavones in soy foods , a major group of phyto estrogens have been hypothesized to reduce the risk of breast cancer. Among women with breast cancer, soy food consumption was significantly associated with decreased risk of death and recurrence (Hakkak et al., 2010)

✓ **Immunomodulation :**

Soybean peptides with immunomoulatory activities have been identified from soya bean proteins hydrolysates For e.g. immunostimulating peptides preventing the alopecia induced chematotherapy has been isolated from an enzymatic digest of soya bean protein (Ver, Primt et al 2009) Acid precipitated soya bean protein fraction when digested with peptidase R displayed strong mitogenic activity and increased number of interleukin., interferon and CD4+ cells in mouse spleen cell. A relatively high concentration of genistein inhibits lymphocyte proliferation response induced by mitogen or alloallergin in vitro (Xiao and Hiu et al., 2009)

✓ **Antioxidant activity of soy yogurt:**

The antioxidant effect of intact cells and cell free extracted from of Lactobacillus casei sub sps casei SY13 and Lactobacillus delbrueckii subsp. bulgaricus LJJ, yogurt, was evaluated by various antioxidant assay (Zhang et al., 2011).The result showed that the two Lactobacillus strains had good antioxidant capacity, inhibiting peroxidation of linoleic acid by 62.95% and 66.16% .The cells free on 1, 1-diphenyl-2-picryl hdrazyl (DPPH) radical scavenging ability and chelating ferrous ion capacity were superior to cell free extract. The highest reducing activity was equivalent to 305 and 294 milli mole L –cysteine. This study suggested that two strains are high antioxidant bacterial strains useful in the dairy manufacturing industry.

## II. MATERIALS AND METHODOLOGY:

The soya bean seeds were purchased from local market .Suitable care was taken to ensure good quality and mould-free seeds were selected. The skim milk powder and toned milk were also purchased from the same market. Plastic cups (200mL) were purchased from retailer in the local market. Rose and Mint flavor was prepared in the laboratory. The chemical used for the analysis were pure.

➢ **Methods:**

✓ **Preparing of soy Milk:**

The soy milk was prepared as per the following procedure and includes the following steps.

1. **Soaking :** After removing the stones, broken beans and other debris, the quality seeds were soaked in the water for over night
2. **Drainage, dehulling and washing:** when the beans split open easily, they were ready to be drained. The soaking water was discarded and the beans were dehulled with hand. The beans were washed repeatedly with tap water
3. **Wet grinding:** The washed beans were ground in a grinder with added water to give

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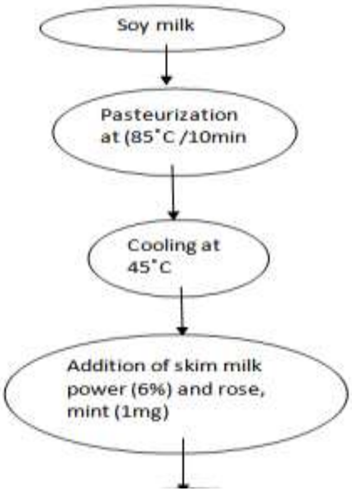
the desired solid content to the final product. The ratio of beans to water on weight basis 1:3

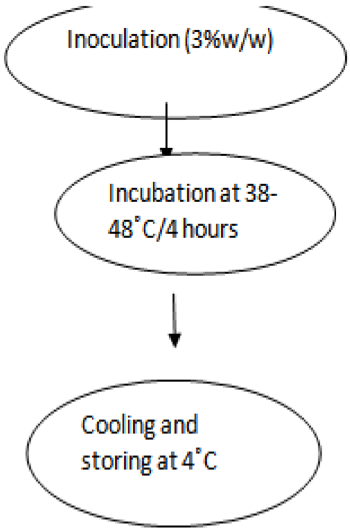
4. **Filtration:** The resulting slurry was filtered through a cheese cloth to remove the insoluble fibre and obtain the soy milk
5. **Heating:** The soy milk obtained was brought to a boil to improve its nutritional value by heat inactivating soybean trypsin inhibitor and to sterilize the product. Heating or near boiling was continued for 15-20 minutes with continuous stirring. Bringing soy milk to a boil also avoids the problem of foaming. Fresh soy milk can be kept up to 3 days in the refrigerator

➢ **Preparation of soy yogurt sample:**

The following batches were used for the analysis .Toned milk in concentration of 1.33% and 6.6% in plastic cups and final volume were made up to 150 mL with freshly prepared soy milk. In addition 6% (SMP) were added and final volume was made up to 150 mL with soy milk. In all the samples, the SMP percentage was kept 6% .All the samples were pasteurized at 85 degree centigrade for 10 minutes .The samples were then cooled to a temperature of 45 degree centigrade and 1 mg of rose flavor and mint flavor was added to all the samples except the controlled one .Inoculum was added from previously made yogurt at the rate of 3% to all samples and mixed. All samples were covered with food grade aluminium foil and kept in incubator at 38-48 degree centigrade for 4 hours .After fermentation, the cups filled with yogurt were cooled and stored in the refrigerator at 4 degree centigrade

**Flow diagram**




➢ **Antioxidant activity of yogurt samples:**

✓ **Sample preparation;**

10 g of yogurt samples were homogenized with autoclaved, sterile spatula. Homogenized samples were centrifuged two times at 10,000 for 10 minutes and supernatant was filtered and collected. All experiments were performed within 4 days of sample extraction and were kept at 4˚C(Apostolidis et al., 2006)

✓ **Radical scavenging activity of yogurt samples by DHHP method:** Antioxidant activity of yogurt samples were determined as the ability of each extract to scavenge 1,1-diphenyl-2picrylhydrazyl (DHHP) radicals by using a method described by Brand-William et al (1995) with some modifications .For the assay, 200μL of samples extract was taken I a tube and volume was made up to 1 mL with methanol. Three milliliters of freshly prepared (200 μM) was added to the sample tube and mixed vigorously for 15 seconds. The sample tube was kept at 37 for 20 minutes in dark.The absorbance of the sample was measured at 517 nm by using UV Spectrophotometer .For control , 1mL methanol, 3mL DHHP reagent was added and absorbance was read at 517 nm. The DPPH radical scavenging effect was expressed as %inhibition

**Inhibition%=A517nm(control)A517nm(sample) X100/A517nm(control)**

➢ **Determination of total phenolics:**

✓ **Preparation of Gallic acid stock solution:**

The Gallic acid stock solution was prepared fresh for analysis by dissolving 20 mg Gallic acid with 15 ml of ethanol (40%) and then

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solution volume was brought to 100 mL with distilled water. The solution was sealed and stored in amber colored glass containers in refrigerator condition

Six Gallic acid standards dilutions (50,100,150,200,250 and 300ppm) were prepared for analysis using Gallic acid stock solution and distilled water

The total phenolics were determined by an essay described by singleton and rossi(1965). Separate tubes were taken 0.5ml of samples extracts were added to tubes, 0.5 ml of each of the gallic acid standerd dilutions were added to separate tubes and 0.5 ml of distilled water was added to one tube which served as blank. To each tube, 7.5 ml of distilled water was added followed by 0.5 ml of Folin Ciocaltea reagent(1:2).all the tubes were mixed on the vortex mixer and incubated at room temperature for1-8 minutes . 1.5 ml of sodium carbonate (10%) was added to each tube and mixed again on vortex mixer. All the tubes were incubated at room temperature for 1 hour . Absorbance was measured at 765 nm and blank was used to calibrate the spectrophotometer.

The Gallic acid standard dilution absorbance values were used to build a standard curves that expressed the absorbance values verses the Gallic acid standard concentration (ppm). Using the curves, the total phenolics values of sample extract were calculated and expressed in µ GAE/mL

## III. RESULTS AND DISCUSSIONS:

**The results of sensory evaluation are as follows**

| **Treatment** | **Apprence** | **Flavour** | **Texture** | **Acceptablility** |
|---|---|---|---|---|
| **controlled** | **7.02±0.03** | **6.00±0.00** | **7.05±0.07** | **6.76±0.07** |
| **germinted** | **7.01±0.02** | **8.25±0.35** | **8.01±0.01** | **7.81±0.00** |
| **microwave** | **7.01±0.02** | **7.05±0.07** | **8.02±0.13** | **7.56±0.00** |

Means SD values having different superscript latter in columns are significally different ($p<0.05$)

✓ **Flavor**

The results in the above tables shows that there is a significant difference ($p<0.05$) in mean score for flavor.The flavor score was shown to be lowest (6.0) in case of treatment (control) since no flavor was added to it .The highest score for flavor was assigned to treatment germinated (8.25) although rose and mint was added in germinated and microwave treated samples were found to be little bit tart by the penalists.

✓ **Texture:**

The result in the above table shows that there is a significant difference (P, 0.05) in the mean scores for texture. Controlled was assigned the lowest score of 7.05 in the mean scores for texture. Since no starch was added to it.While the high serum separation was observed on the surface of controlled one. Serum separation occurs if there is insufficient protein present to allow formation of firm yogurt get when protein denaturation takes place as the pH is reduced during fermentation (Nabulsi et al., 2014)

✓ **Over all acceptability:**

The result in the above table shows that there is a significant difference ($p<0.05$) in the treatments in terms of overall acceptability. The highest scorer of 7.81 was assigned by the penalists to the treatment (germinated) while the controlled was assigned lowest of 6.67 in the terms of overall acceptability by the penalists .While the microwave was assigned to (7.5).Although the germinated contain the high percentage of soy milk it was accepted by most of the penalists.

✓ **Proximate composition of soy yogurt:**

| Treatment | Moisture% | Protein% | TS% | Ash content |
|---|---|---|---|---|
| controlled | 89.05± 0.07 | 3.07±0.10 | 10.80±0.14 | 0.62±0.02 |
| Germinated | 88.05 ± 0.01 | 3. 25±0.00 | 11.05±0.07 | 0.69±0.00 |
| Microwave | 87.70± 0.00 | 3.22±0.00 | 12.24±0.06 | 0. 70±0.00 |

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✓ **Antioxidant activity:**

| Treatment | DPPH(% inhibition) | Total phenolics cont.(µGAE/mL |
|---|---|---|
| Controlled | 84.28±0.00 | 243.37±.17 |
| Germinated | 84.18±0.00 | 240.05±0.07 |
| Microwave | 80.57±0.00 | 230.50±0.70 |

➢ **Texture profile analysis:**

✓ **Hardness:**

Hardness is defined as the maximum force of first compression. The results in the table show that there is a significant difference ($p<0.05$) in the hardness of all the samples due to different of soy milk. The highest value of hardness was observed in germinated (150.25g) while the lowest value was observed for the controlled (102.30g) and for the microwave is 123.10g on respectively**.** The hardness of yogurt is directly dependent on and its protein content and the type of protein .It is generally accepted that the soybean glycine is a hexamer consisting of five disulphide bonds .The tight and rigid molecular structure results in a firmer gel. Although, germinated did not contain the highest percentage of protein but shows highest degree of cross linkage of gel network when we add the starch to it.

✓ **Cohesiveness;**

Cohesiveness is defined as the extent to which a material can be deformed before it ruptures and depends upon the strength of internal bonds – cohesiveness of all the treatments show a significant difference ($p<0.05$).The Cohesiveness value of all the treatments ranged from 0.35 -0.58 . The highest value of all the cohesiveness was observed in case of germinated (0.58) which may be due to strong internal bonds while the lowest value was observed in controlled (0.35).

✓ **Gumminess:**

Gumminess is defined as the value obtained after the multiplication of hardness and cohesiveness .The Gumminess of all the samples ranges from 36.91-86.75 .Germinated samples shows the highest value of gumminess (86.75g) and the controlled shows the lowest value of 36.9g

| sample | Gumminess | Hardness | Adhesiveness | Cohesiveness |
|---|---|---|---|---|
| controlled | 36.91**±0.02** | 102.30**±0.42** | -58.83**±0.21** | 0.35**±0.00** |
| Germinated | 86.75**±0.35** | 150.25**±0.35** | -46.15**±0.49** | 0.58**±0.00** |
| Microwave | 51.58**±0.11** | 123.25**±0.35** | -52.15**±0.21** | 0.42**±0.00** |

➢ **Storage study:**

✓ **Titratable acidity:**

The result shows that acidity of soy yogurt samples is significantly ($p<0.05$) affected due to the different concentrations of soy milk. Storage period of 8 days significantly ($p<0.05$) affected the titratable acidity of all the soy yogurt samples the result mentioned in the above table shows that the acidity of all samples increased during refrigerated storage. Increased in acidity from 1 day to 8 days was 0.70-0.87%, 0.72- 0.89% and 0.73%- 1.00% for the controlled, germinated and microwave respectively

The increase in the acidity occurred due to the conservation of lactose into the lactic acid by the activity of lactic acid bacterial (LAB) .the acidity of LAB to cleave lactose remains active even at refrigerated storage. Maximum increase in acidity during storage was shown in the table given below

| Treatment | Day 1 | Day 4 | Day 7 | Day 8 |
|---|---|---|---|---|
| controlled | 0.870.± 00 | 0.70 ± 0.00 | 0.76 ± 0.00 | 0.85 ± 0.01 |
| Germinated | 0.85 ± 0.00 | 0.72 ± 0.00 | 0.76 ± 0.02 | 0.81 ± 0.01 |
| Microwave | 0.92 ± 0.03 | 0.73 ± 0.00 | 0.82 ± 0.00 | 0.88 ± 0.00 |

➢ **PH:**

✓ Negative algorithm of the hydrogen ion concentration is called PH.It is more authentic means of measurement than titrateable acidity. The titrateable acidity provides a measurement of quantity of acid present whereas PH gives the measurement of potency of that acid. the result in the below table shows that the PH of soy yogurt samples is significantly the controlled showed the highest PH value of 5.15 .The storage period of 8 day significantly (p<0.05) affected the PH value of yogurt samples decreased as the storage time increased, which would be due to conversion of lactose to lactic acid. Moriguchi et al.,(1961) stated high optimum PH values of soy yogurt ranged from 5.0 – 6.0, Buono (1990) found the PH values of soy yogurt ranging from 3.9 – 4.3

| treatment | Day 1 | Day 4 | Day 7 | Day 8 |
|---|---|---|---|---|
| Controlled | 5.15 ± 0.00 | 5.01 ± 0.01 | 4.95 ± 0.00 | 4.95± 0.00 |
| Germinated | 5.14 ± 0.00 | 5.00±0.00 | 4.90±0.00 | 4.77±0.00 |
| Microwave | 5.09±0.00 | 4.85±0.00 | 4.71±0.02 | 4.58±0.00 |

- **Syneresis**

Syneresis is the major problem for yogurt during storage.The results in the below table shows that the syneresis of yogurt samples is significantly (p<0.05). The controlled shows the maximum syneresis ranging from (54-6%) during the last days of storage. The maximum syneresis was reported in controlled. Syneresis values for the treatments controlled, germinated and microwave. During the 8 days of storage. Syneresis occurs if there is insufficient protein present to allow formation of yogurt get when protein denaturation takes place as the pH is reduced during fermentation (Nabulsi et al 2014). An average of 52.6% syneresis was observed in soy yogurt fortified with 0.104% calcium sulphate (Shirae et al., 1992).However with the addition of 0.3% gelatin and 0.14% calcium sulphate, syneresis ranging from 42.06-46.3% was obtained for flavored soy yogurt

| Treatment | Day 1 | Day4 | Day7 | Day8 |
|---|---|---|---|---|
| controlled | 54.0±**0.00** | 55.0±**0.00** | 57.0±**0.03** | 58.0±**0.70** |
| Germinated | 45.0±**0.00** | 45.0±**0.00** | 46.0±**0.00** | 46.2±**0.00** |
| Microwave | 46.0±**0.00** | 47.2±**0.00** | 49.0±**0.00** | 49.4±**0.00** |

## IV. CONCLUSION:

The present research showed that soy yogurt produced after the incorporation of rose and mint flavor was better in terms of physico-chemical properties as compared to yogurt which was devoid of starch and flavor. The highest total solid content (14.49%) and ash content (0.71%) was observed due to least amount of soy milk. Soy yogurt has gained popularity because of its health benefits due to antioxidants and soy proteins. Btu the consumption is limited due to beany after taste. An attempt was done to mask the objectionable beany flavor found in the soy yogurt by the addition of the rose and the mint flavor and it was observed that the treatment such as the germination and microwave were accepted by the penalists .It was observed that the antioxidant activity of soy milk yogurt with the high concentration of soy milk was higher as compared to that of low soy milk samples this is due to the more concentration of poly phenols. This research proves that there are opportunities to develop and market functional foods like soy yogurt that provides health benefits with increased consumer's acceptability.

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