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## Optimization of levels of paneer, butter and garden cress seed for manufacturing of Paneer butter spread on the basis of sensory evaluation

**Kamal A, Andhare BC and Shinde SP**

### Abstract

**Background:** Food and nutritive value of *chhana* or paneer is fairly high as it contains almost all the protein present in milk besides quantity of minerals and vitamins. It possesses a nutty flavour with slightly sour and sweet taste which makes it palatable to Indian palate. It is an ideal food for expectant and nursing mothers, infants, growing children, adolescents and adults. Being rich source of animal protein, it is a good source of all the essential amino acids to the vegetarian. Its fat content renders the fat soluble vitamins A and D, essential fatty acids (linoleic, linolenic and Arachidonic acid) and energy. With its high protein and low sugar content, it is highly recommended to the diabetic patients. It has also particular food value for those who possess the problem of milk intolerance.

**Method:** Paneer butter spread was manufactured using standardized cow milk (4.2% fat and 9% SNF). Standardized milk was taken in a jacketed vessel and heated to simmering temperature (85-90 °C) with continuous stirring by a wooden ladle in a circular motion with occasional scraping of the heating surface. After 10-15 minutes of boiling, 0.02 percent of citric acid (in the form of solution) was added to the milk for the purpose of formation of granules. Vigorous stirring was performed to obtain good quality product. The intensity of heating was reduced when semi-solid state was reached. Amul butter was added into paneer and was thoroughly mixed up. Then Garden cress seed @ 3% & salt @ 1% was added into the paneer & butter mixture at room temperature & was mixed up by using mixer grinder for 5 min. The samples were stored at refrigeration temperature (4 °C, 10 °C, 25 °C) for testing the physico-chemical qualities and its shelf-life quality.

**Results:** Different combinations of paneer, butter and garden cress seed were taken to optimize the product.

**Keywords:** Sensory, paneer, butter, garden cress seed

### Introduction

India is the world's largest producer of milk by volume. Milk is considered to be an appropriate source of valuable macronutrients (fat, protein, lactose) vitamins and micronutrients as minerals which can make it a wholesome food. It can serve as an excellent carrier product for extra nutrient and if enriched or fortified it can satisfy the nutritional needs of the people (Krupa *et al.*, 2011) <sup>[1]</sup>. The country accounts for more than 15% of world's total milk production and is also the world's largest consumer of dairy products. In India, about three-fourth of the population live in rural areas and about 32.7% of the population are in below poverty line (NSSO, 2011) <sup>[2]</sup>. Therefore, among these people, as well as the large vegetarian segment of the country's population, dairy products provide a critical source of nutrition and animal protein to millions of people in India. Among the milk products paneer is gaining momentum in its production and consumption. *Chhana* or paneer is a heat and acid coagulated indigenous milk product which form the base of several popular Indian sweets like *Rasogulla*, *Sandesh*, *Rasmalai* etc. It has also been used as base material for the preparation of a large number of culinary dishes. It has originated in the eastern part of India. *Chhana* or paneer is the product obtained from cow or buffalo milk or a combination there of by precipitation with sour milk, lactic acid or citric acid. It shall not contain more than 70 per cent moisture and the milk fat content shall not be less than 50 per cent of the dry matter basis. Milk solids may also be used in the preparation of this product (PFA, 1976) <sup>[3]</sup>. At present, there are mainly two types of spreads available in the market, namely butter and *cheese spread*. These are usually used along with bread in the breakfast. Being rich in animal fat, butter *spread* is not preferred by obese person or by those who suffered by heart disease, while cheese spread is suitable for consumer of all age groups, but its use is confined only to a small

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society who have a western taste, on account of its peculiar flavour which do not suit very much to Indian people of its high cost. Garden cress (*Lepidium sativum* L.) belonging to *Brassicaceae* family is widely grown in India, Europe and USA. It has been used as an important medicinal plant since the *Vedic* era. In *Ayurveda*, it is considered as hot, bitter, galactogogue and aphrodisiac and claimed to prevent *Vata* and *Kapha*. Garden cress seed is good source of essential and non-essential amino acids and they are also used as a novel source of hydrocolloid. Its extract exhibit strong shear-thinning behaviour and is used as a substitute for gum Arabica in the formulation of different products. The garden cress seed oil has a balanced amount of both polyunsaturated fatty acids and monounsaturated fatty acids and is a good source of linolenic acid. It contains natural antioxidants, *viz.* tocopherols and carotenoids and eugenol that help in preventing cancer and protect the oil from rancidity. Its seeds, oil and powder contains significant amounts of protein, fat, minerals, fibers and phytochemicals which are incorporated in many functional beverages and foods. A number of clinical trials have been conducted on rats that also support the efficacy of garden cress seeds (Raghvendra R H *et al.*, 2001 and Umesha S S and Naidu K A 2012)<sup>[4, 8]</sup>. It was reported that GCS contain 22.5% protein, 27.5% fat, 30% dietary fiber, and 1193 mg/100 g potassium. The functional properties of Garden cress seeds stimulate us to exploit its different valuable properties and by developing fortified products developed by incorporating Garden cress seed (Singh C. S. *et al.*, 2015)<sup>[7]</sup>.

## Material and Methods

### Materials

#### Cow milk

Milk was collected daily in morning from dairy farm, and was kept in the refrigerator and was brought to the laboratory for the analysis. The samples were filtered through muslin cloth and chemically analyzed for their various attributes *viz.* fat, SNF, titratable acidity and total solids. Cow milk which has standardized at 4.2% fat and 9% SNF was taken from the dairy from of Banaras Hindu University, Varanasi (U.P) India.

#### Butter

Amul brand butter was obtained from the local market of Varanasi (U.P) India.

#### Coagulants

Analytical grade citric acid was used as coagulant for the preparation of Paneer butter spread and it was obtained from the laboratory of Animal Husbandry and Dairying, Banaras Hindu University, Varanasi (U.P) India.

#### Salt

Refined Commercial grade Tata brand salt was used for the preparation of Paneer butter spread. It was obtained from the local market of Varanasi (U.P) India.

### Methods

#### Manufacturing of Paneer butter spread

Paneer butter spread was manufactured using standardized cow milk (4.2% fat and 9% SNF). Standardized milk was taken in a jacketed vessel and heated to simmering temperature (85-90 °C) with continuous stirring by a wooden

ladle in a circular motion with occasional scraping of the heating surface. After 10-15 minutes of boiling, 0.02 percent of citric acid (in the form of solution) was added to the milk for the purpose of formation of granules. Vigorous stirring was performed to obtain good quality product. The intensity of heating was reduced when semi-solid state was reached. Amul butter was added into paneer and was thoroughly mixed up. Then Garden cress seed @ 3% & salt @ 1% was added into the paneer & butter mixture at room temperature & was mixed up by using mixer grinder for 5 min. The samples were stored at refrigeration temperature (4 °C, 10 °C, 25 °C) for testing the physico-chemical qualities and its shelf-life quality. The process diagram for manufacturing of Paneer butter spread is shown in figure 1.

### Levels of factors for optimization of the product

#### A. Level of Paneer

1. 100%
2. 90%
3. 80%
4. 70%

#### B. Level of Butter

1. 0%
2. 10%
3. 20%
4. 30%

#### C. Level of Garden cress seed-

1. 0%
2. 1%
3. 2%
4. 3%

#### D. T<sub>0</sub> Control sample

#### E. Replication

1. R1
2. R2
3. R3

E- Total number of observation =  $12 \times 3 = 36$

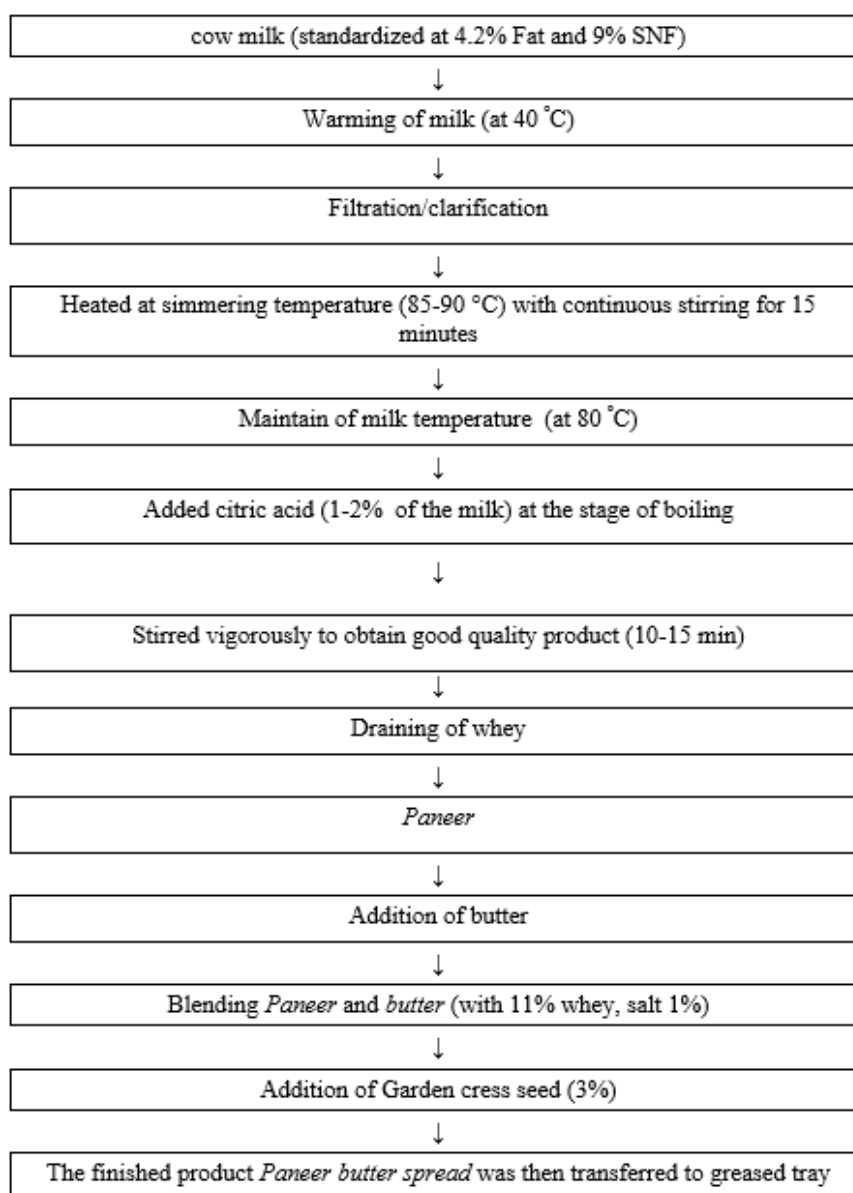
Treatment of different level combination of paneer @ 100%, 90%, 80%, 70% and butter @ 0%, 10%, 20%, 30% and garden cress seed @ 0%, 1%, 2%, 3% (by weight) are given in Table 1.

### Sensory evaluation

The sensory analysis of Paneer butter spread stored under MAP was carried out by a semi trained panel of 9 judges drawn from staff and students of the Department of Animal Husbandry and Dairying and the Centre of Food Science and Technology at Banaras Hindu University, Varanasi (India). The judges were asked to score for the sensory attributes *viz.* color and appearance, flavor, body and texture, sweetness and overall acceptability, on a 9-point Hedonic scale. And the treatment which got highest hedonic score was selected as the optimized product.

### Results and Discussion

The present work was carried out to optimize the process of method for manufacturing of Paneer butter spread on the basis of sensory evaluation.



**Fig 1:** Process diagram for manufacturing the Paneer butter spread along with mass balance.

**Table 1:** Treatment of different level combination of paneer, butter and garden cress seed

Combination	Paneer butter ratio @ 100:0	Paneer butter ratio @ 90:10	Paneer butter ratio @ 80:20	Paneer butter ratio @ 70:30
Garden cress seed @ 1%	T <sub>1</sub> 100:0:1 combination of paneer @ 100%, butter @ 0% and garden cress seed @ 1% by weight	T <sub>2</sub> 90:10:1 combination of paneer @ 90%, butter @ 10% and garden cress seed @ 1% by weight	T <sub>3</sub> 80:20:1 combination of paneer @ 80%, butter @ 20% and garden cress seed @ 1% by weight	T <sub>4</sub> 70:30:1 combination of paneer @ 70%, butter @ 30% and garden cress seed @ 1% by weight
Garden cress seed @ 2%	T <sub>5</sub> 100:0:2 combination of paneer @ 100%, butter @ 0% and garden cress seed @ 2% by weight	T <sub>6</sub> 90:10:2 combination of paneer @ 90%, butter @ 10% and garden cress seed @ 2% by weight	T <sub>7</sub> 80:20:2 combination of paneer @ 80%, butter @ 20% and garden cress seed @ 2% by weight	T <sub>8</sub> 70:30:2 combination of paneer @ 70%, butter @ 30% and garden cress seed @ 2% by weight
Garden cress seed @ 3%	T <sub>9</sub> 100:0:3 combination of paneer @ 100%, butter @ 0% and garden cress seed @ 3% by weight	T <sub>10</sub> 90:10:3 combination of paneer @ 90%, butter @ 10% and garden cress seed @ 3% by weight	T <sub>11</sub> 80:20:3 combination of paneer @ 80%, butter @ 20% and garden cress seed @ 3% by weight	T <sub>12</sub> 70:30:3 combination of paneer @ 70%, butter @ 30% and garden cress seed @ 3% by weight

#### Development of optimized product

Different combinations of Paneer, butter and garden cress seed were taken to conduct the experiment. Level of Paneer and butter was optimized by mixing *Panner* and butter and

garden cress seeds at five different viz. T<sub>1</sub> 100:0:1%, T<sub>2</sub> 90:10:1%, T<sub>3</sub> 80:20:1%, T<sub>4</sub> 70:30:1%, T<sub>5</sub> 100:0:2%, T<sub>6</sub> 90:10:2%, T<sub>7</sub> 80:20:2%, T<sub>8</sub> 70:30:2%, T<sub>9</sub> 100:0:3%, T<sub>10</sub> 90:10:3%, T<sub>11</sub> 80:20:3%, T<sub>12</sub> 70:30:3% (paneer: butter: garden

cross seed). The sensory characteristics of Paneer butter spread samples were evaluated on the basis of flavor, body & texture, color & appearance and overall acceptability. Finally

product level T<sub>11</sub>80:20:3 (paneer: butter: garden cress seed) was optimized on the basis of sensory evaluation by the semi-trained panel (Table 2).

**Table 2:** Sensory profile of Paneer butter spread

Treatment Paneer: butter: garden cress seed	Color and appearance	Flavour	Body and texture	OOA
T <sub>1</sub> (100:0:1)	5.32±0.34	8.38±0.24	5.45±0.28	6.35±0.15
T <sub>2</sub> (90:10:1)	7.28±0.30	6.75±0.44	8.38±0.37	7.38±0.34
T <sub>3</sub> (80:20:1)	8.59±0.32	9.15±0.35	8.19±0.34	8.49±0.25
T <sub>4</sub> (70:30:1)	8.72±0.48	8.48±0.39	7.36±0.40	8.65±0.39
T <sub>5</sub> (100:0:2)	7.35±0.50	6.36±0.20	6.58±0.29	6.16±0.40
T <sub>6</sub> (90:10:2)	6.26±0.20	7.45±0.24	7.84±0.18	7.52±0.48
T <sub>7</sub> (80:20:2)	9.12±0.49	9.19±0.15	8.36±0.37	8.67±0.37
T <sub>8</sub> (70:30:2)	8.11±0.40	7.25±0.54	9.46±0.32	8.32±0.35
T <sub>9</sub> (100:0:3)	6.32±0.38	7.36±0.49	8.75±0.40	7.16±0.39
T <sub>10</sub> (90:10:3)	9.15±0.20	7.59±0.38	6.16±0.42	8.59±0.40
T <sub>11</sub> (80:20:3)	9.35±0.15	9.76±0.20	8.36±0.36	9.20±0.34
T <sub>12</sub> (70:30:3)	7.75±0.42	6.34±0.34	8.46±0.45	7.48±0.49

### Conclusions

Different combinations of Paneer, butter and garden cress seed were taken to optimize the product. Finally, the product level T<sub>11</sub> (80:20:3) (paneer: butter: garden cress seed) was optimized on the basis of sensory evaluation and the optimized product was selected for further storage study under MAP.

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