Varietal evaluation of soybean for tofu making

Rajni Goel*, Amarjeet Kaur† and Jasvinder Singh

Krishi Vigyan Kendra, Patiala, Punjab Agricultural University, Patiala-147 001, Punjab, India.
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ABSTRACT

Tofu is a soybean curd precipitated from hot soymilk with a coagulant, followed by molding and pressing to remove whey. An initial survey reveals that soy processors in Punjab do not prefer varieties of soybean from Punjab for processing into milk and tofu. Three varieties viz. SL 958, SL 744 and SL 525 were procured from department of Plant breeding, PAU, Ludhiana and Krishi Vigyan Kendra, Patiala. Control sample (locally available soybean, undescriptive variety) was procured from local soy processors for tofu making. Data is average of three replications. The yield of tofu was highest (1.55kg/kg) from SL 958 followed by control, SL 525 and SL 744 respectively. Organoleptically, overall acceptability score was 7.9, 6.9, 7.2 and 7.5 for tofu from varieties SL 958, SL 744, SL 525 and control, respectively. The values from hunter colorimeter, measuring lightness/darkness showed that varietal differences affected the colour of tofu.

Key words: Colour, Sensory, Soybean, Tofu, Varietal, Yield.

INTRODUCTION

Soybean can play a major role in diversification. Although the bulk of soybean crop is still used for animal feed and oil, the use of whole soybean for human consumption is increasing steadily. It yields more protein per unit of land than any other commercial crop. Its nutritional attributes, particularly its high protein and fat content, endow it with the greatest potential for cost-effective improvement of daily diets and thus for substantial reduction of levels of protein-energy malnutrition. Tofu or soybean cheese is produced traditionally by curdling soymilk with either salt (CaCl₂ or CaSO₄) or an acid (glucono-d-lactone) to get a soy protein gel, which traps water, soy lipids and other constituents in the matrix forming curds. The curds are then pressed into solids (Oboh, 2006). In addition to processing conditions, soybean varieties have been reported to affect the yield and colour of tofu (Cai et al 1997, Khatib et al 2002 and Min et al 2005). Soybean processors in Patiala district are reluctant to use the soybean varieties of Punjab for tofu making giving varied reasons (Goel and Sodhi, 2013). So, the present study was conducted with the following objectives-

- To assess the yield of tofu from different soybean varieties of Punjab
- To assess the effect of soybean varieties on organoleptic quality of tofu
- To evaluate the effect of soybean varieties on colour of tofu

MATERIALS AND METHODS

The study was conducted in the Patiala district of Punjab State in the years 2012-14. Four samples of soybean viz. SL 958, SL 744, SL 525 and control (undescriptive variety available to processors) were procured from Krishi Vigyan Kendra, Patiala and local processors. Soybean seeds were cleaned thoroughly and made free from dust, dirt, stubbles and foreign matter. Damaged seeds with cracked hull etc. were discarded. Soymilk from four samples was prepared using the method shown in Fig. 1. Around 1kg of soymilk per batch was taken. Milk obtained was cooled to around 80°C subsequently 3% calcium sulphate was added (of the total milk obtained). The mixture coagulated and tofu was separated from the whey using a muslin cloth after which it was pressed in a tofu press. Soybean varieties were evaluated for yield of tofu. Yield was calculated as weight of fresh tofu obtained from a specified weight of soybean used for its preparation. Sensory evaluation was done on freshly made tofu. The attributes evaluated were colour, flavour, mouth feel and overall acceptability. For each sample, Panelists scored their liking of these characteristics using the nine point hedonic scale (1= dislike extremely, 2= dislike very much, 3= dislike moderately, 4= dislike slightly, 5= neither like nor dislike, 6= like slightly, 7= like moderately, 8= like very much and 9= like extremely). Colour of tofu prepared from different soybean varieties was measured using hunter colorimeter (Konica Minolta Sensing Inc.) in terms of ‘L’ (lightness), ‘a’ (redness and greenness) and ‘b’ (yellowness and blueness) All the procedures were replicated in triplicates and analyzed statistically using completely randomized design.

RESULTS AND DISCUSSION

Colour of seed coat and hilum- SL 958 and control had greenish yellow colour of seed coat while SL 744 and SL
525 had yellow colour of seed coat (Table 1). Colour of hilum was brown for all the four samples.

Yield of fresh tofu: Tofu prepared from each soybean variety showed statistically significant difference in the yield of fresh tofu as given in Table 1. Maximum yield of fresh tofu was obtained from var. SL 958 followed by control, SL 525 and SL 744. Yield of tofu ranged from 1.55kg/kg to 1.27kg/kg. The difference in the yield may be attributed to its varietal

Table 1: The effect of soybean varieties on yield and sensory quality of fresh tofu.

| Variety | Colour of seed coat  | Colour of hilum | Yield of fresh tofu (kg/kg) |
|---------|----------------------|-----------------|---------------------------|
| SL 958  | Greenish yellow       | Brown           | 1.55                      |
| SL 744  | Yellow               | Brown           | 1.27                      |
| SL 525  | Yellow               | Brown           | 1.35                      |
| Control | Greenish yellow       | Brown           | 1.35                      |
| CD (5%) |                      |                 | 0.68                      |

Table 2: Sensory characteristics of tofu from different varieties of soybean.

| Variety | Taste | Texture | Flavour | Colour | Appearance | Over all acceptability (OAA) |
|---------|-------|---------|---------|--------|------------|-------------------------------|
| SL 958  | 6.50  | 7.19    | 6.90    | 7.23   | 7.1        | 6.99                          |
| SL 744  | 6.33  | 7.10    | 6.83    | 6.93   | 7.0        | 6.84                          |
| SL 525  | 6.36  | 6.96    | 6.86    | 6.93   | 7.0        | 6.82                          |
| Control | 6.60  | 7.00    | 6.83    | 7.36   | 7.1        | 6.98                          |
| CD (5%) | 0.15  | 0.14    | NS      | 0.18   | NS         | 0.17                          |
character. Yield may also vary because of its water content. Min et al (2005) reported that soybean varieties vary in chemical and physical properties consequently affected the quality and yield of tofu.

**Sensory evaluation**- Tofu prepared from all the soybean samples had a bland taste, smooth texture and creamish white colour. On a 9 point hedonic scale significant differences were observed in the taste, texture, colour and overall acceptability scores of tofu prepared from different varieties of soybean. Abagoshu et al (2017) reported that the interaction of effect of variety and processing methods was highly significant on the nutritional and sensory attributes of soy milk. For texture, a marginal difference of 1.5% showed that some of the respondents may prefer softer tofu.

**Table 3**: The effect of soybean varieties on colour of fresh tofu (using hunter lab scale).

| Variety  | L     | a   | b   |
|----------|-------|-----|-----|
| SL 958   | 35.16 | -2.53 | 5.36 |
| SL 744   | 25.53 | 4.36  | 7.00 |
| SL 525   | 24.53 | -1.00 | 6.20 |
| Control  | 36.9  | -8.3 | 2.90 |
| CD (5%)  | 5.54  | 3.08  | 4.81 |

Respondents found no significant differences in the flavor and appearance of tofu (Table 2).

Measuring colour using hunter Lab scale-
L scale: Light vs. dark where a low number (0-50) indicates dark and a high number (51-100) indicates light.
Fig 4: Effect of soybean varieties on yellowness of tofu

CONCLUSION

Varietal differences should be considered in selecting soybean for tofu making. SL 958 variety of soybean had shown quite promising results with highest yield and score for sensory evaluation of fresh tofu. Also, SL958 produced lighter and greener tofu comparable to control variety thus fulfilling the requirement of soybean processors for tofu. Due to nutrition and health benefits, acceptance of soy foods is increasing worldwide and hence, the usage and demand for soybean and its products is constantly rising. Though awareness about health benefits is percolating in Indian society but impact is not very large. Hence, there is need to promote soy food among Indian consumers. It is expected that in the years to come, with awareness, the demand will increase and small scale soy processing units will play a great role in promotion and utilization of soy based nutritious and healthy foods.