Figure 1. Tofu made from Peruano Beans. Source: Photo taken by the researcher (2025)

PRODUCING TOFU FROM PERUANO BEANS AS A SOY- FREE ALTERNATIVE

INTRODUCTION

- Tofu is a popular plant-based protein traditionally made from soybeans, but soy allergies and dietary restrictions have created a need for alternative options.

- This project explores the potential of Peruano beans as a soy-free substitute for producing tofu while maintaining its nutritional value and versatility.

- By investigating texture, firmness, and overall quality, this study aims to determine whether Peruano beans can serve as a viable and innovative alternative in plant-based food production.

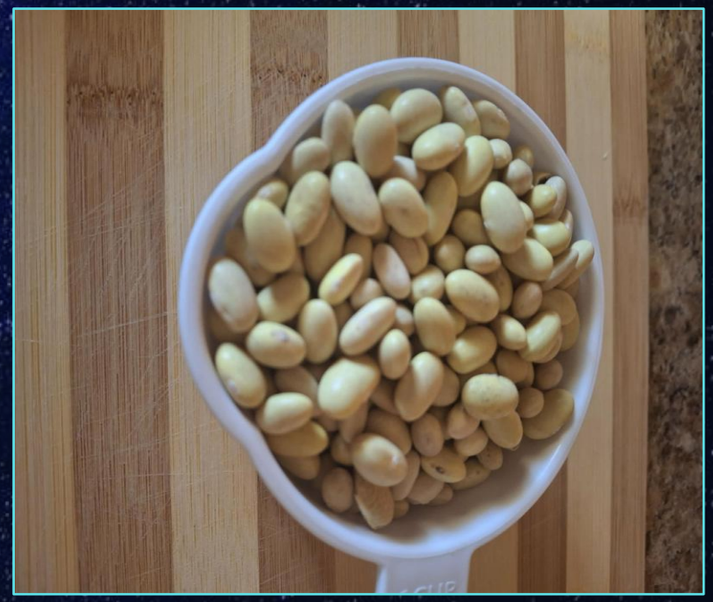

Figure 2. Peruano Beans measured in a cup before the experiment. Source: Photo taken by the researcher (2025)

PROBLEM

Can Peruano beans be used to make tofu, and how does the resulting tofu compare to soy bean tofu in terms of texture, taste, and yield?

BACKGROUND RESEARCH

Tofu is most commonly made from soybeans, but there's a growing interest in using other legumes to create allergen-friendly alternatives. For example, a study by Dimassi *et al.* used a process of soaking, milling, starch sedimentation, and thermal coagulation to produce chickpea-tofu containing **56.2% protein on a dry basis**. Legumes like chickpeas (and by extension, Peruano beans) have a favorable protein and starch profile that helps them form curds when coagulated. Peruano beans, also called Canary beans, are known for their mild flavor and good nutritional content, making them a promising candidate for soy-free tofu. Studying this could help assess whether tofu from Peruano beans is nutritionally and texturally comparable to traditional soy tofu.

HYPOTHESIS

If Peruano beans are processed using the tofu-making method, then they can form a tofu-like product with measurable texture, taste, appearance, firmness, and protein content, because their protein and starch composition allows them to coagulate and form curds similar to traditional soybeans.

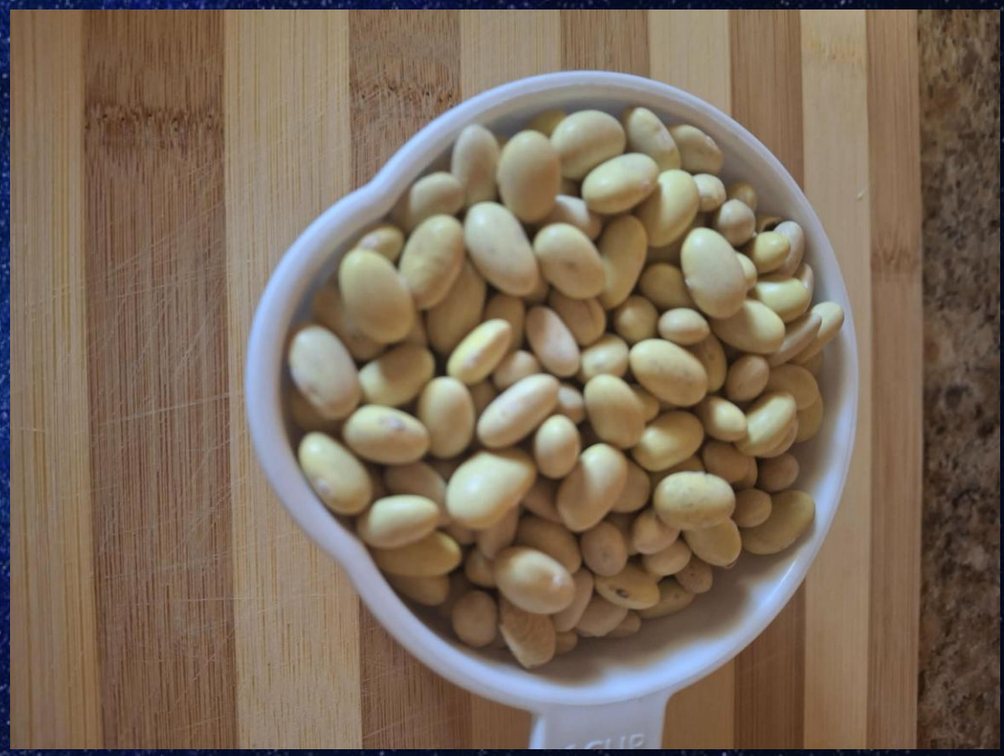

Figure 2. Peruano Beans measured in a cup before the experiment. Source: Photo taken by the researcher (2025)

MATERIALS

1. 1 cup of Peruano beans
2. Water
3. Coagulant
4. Blender
5. Cheesecloth/Nut milk bag
6. Saucepan
7. Tofu mold/Strainer with holes
8. Weight
9. Store-bought tofu
10 .Knife

METHODOLOGY

PROCEDURE A

1. Soak Peruano beans overnight (8-12 hours), then boil until soft.
2. Blend with water (3:1 water to beans) to make a smooth puree.
3. Strain through cheesecloth to separate bean milk.
4. Heat bean milk.
5. Add 2 tbsp lemon juice slowly while stirring.
6. Pour curds into mold lined with cheesecloth and press for 30 minutes and refrigerate.

PROCEDURE B

1. Open store-bought tofu, drain excess water.
2. Cut a similar-sized portion (~100g) as the homemade tofu for testing.
3. Refrigerate until ready for side-by-side testing.

PROCEDURE C

Test both tofu samples for:

1. Texture (by touch and cut)
2. Firmness (weight test or press test)
3. Taste (blinded, optional survey)
4. Appearance (color, uniformity)
5. Estimate protein based on nutritional databases

METHODOLOGY

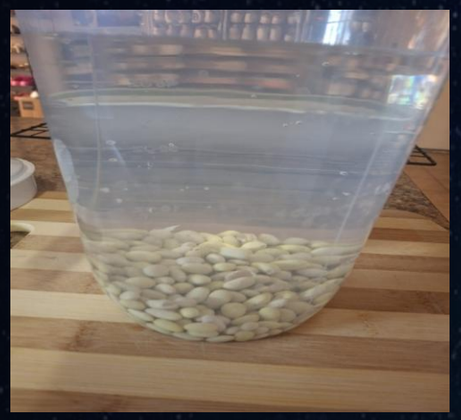

Figure 3. Peruano Beans soaked in water during the experiment. Source: Photo taken by the researcher (2025)

Figure 4. Blended Peruano Beans with water strained to extract the bean milk. Source: Photo taken by the researcher (2025)

Figure 5. Heated Peruano Bean milk with lemon Juice during the experiment. Source: Photo taken by the researcher (2025)

DATA

	Store-Bought Soy Tofu	Homemade Peruano-Bean Tofu
Texture	Slightly coarse	Smooth
Firmness	Firm	Softer
Appearance	White, even color	Dirty White
Taste	Neutral	Nutty
Protein per 100g	10 grams	7 grams
Pressed well?	Yes	Mostly, but softer

RESULTS

- Soy tofu had a slightly coarse, firmer texture, more consistent shape, and held together better.
- Peruano bean tofu had a soft, smooth texture, with a dirty white color and mild flavor.
- Both were acceptable in taste tests; some preferred the nutty flavor of Peruano bean tofu.
- Soy tofu had higher protein content, but Peruano bean tofu still offers a good amount for plant-based diets.

VARIABLES

INDEPENDENT

- The type of tofu being tested:
- Store-bought soy tofu
- Homemade Peruano bean tofu

DEPENDENT

- Texture (smooth, grainy, soft, firm)
- Firmness (tested with a weight or hand pressure)
- Appearance (color, uniformity)
- Taste (subjective testing)
- Estimated protein content (based on known data)

CONTROLLED

- Method of evaluation
- Same coagulant (lemon juice) used in homemade version
- Same tools
- Refrigeration/storage time before testing
- Amount of tofu tested (e.g., 100g per sample)

IMPORTANCE OF THE STUDY

This study is important because it turns protein-rich Peruano beans into healthy, sustainable tofu, offering a nutritious and affordable plant-based protein option.

Future research could investigate different coagulants, soaking times, and pressing techniques to improve the texture, protein content, and overall quality of Peruano bean tofu as a soy-free alternative.

Figure 6. Peruano Beans- water mixture strained during the experiment. Source: Photo taken by the researcher (2025)

CONCLUSION

The experiment showed that Peruano beans can be used to make a soy-free tofu, and while it differs from store-bought soy tofu in texture and firmness, it is still a viable and nutritious alternative. Its softer consistency may work best in recipes where smooth or crumbled tofu is used (e.g., scrambles, sauces, dips). I recommend that future studies experiment with different coagulants and pressing times to improve the texture and firmness of Peruano bean tofu.

REFERENCES

- USDA Food Data Central: Nutrition info for soybeans and Peruvian beans
- Tofu-making tutorials and videos (homemade methods)
- Academic articles on plant-based protein alternatives
- Research Progress in Tofu Processing: From Raw Materials to Processing Conditions." *PubMed*, 2017,
- Personal experiment data
- From ancient crop to modern superfood: Exploring the history, diversity, characteristics, technological applications, and culinary uses of Peruvian fava beans - ScienceDirect