Exploration and investigation of quality standardization in Chinese pickled vegetables

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BACKGROUND

Chinese pickled vegetables(CPV) are an important part of Chinese culture. They enhance nutrition by providing opportunities for probiotic growth and ensuring food availability in times of scarcity. However, the production procedures of the traditional method, such as brine ratio · container, fermentation temperature, and duration, have not been standardized, causing health and safety concerns. Moreover, false myths about Chinese pickled vegetables have been spread among people. These may lead to a loss of public confidence and even threaten the preservation of this food tradition.

RESEARCH OBJECTIVES

1. To **identify the variables that affect the *safety*** of CPV.
2. To **identify the variables that affect the *quality*** of CPV.
3. To **compare the characteristics** of CPV made by **traditional & modern industrial** methods.
4. To **evaluate the physical and sensory properties** of CPV

METHODOLOGY

Literature review
Historical background & basic features of CPV
Questionnaire
Evaluate the understanding of the market & consumer preferences

Samples: Four **self-made samples +** ***two*** **market products** for comparison
Brine and vegetable ratio → **1L : 2.5kg to 1L : 2.8kg**
- Comparable flavor to commercial products

ASTREE Electronic Tongue → Evaluate taste properties: sourness, saltiness, umami, and sweetness
Salt meter, **sugar refractometer**, and **pH meter** → Measure saltiness, sweetness and acidity

Texture analyzer → Measure texture properties (firmness)
Colorimeter → Measure color properties (L*:Lightness, a*: red-green, b*: yellow-blue)

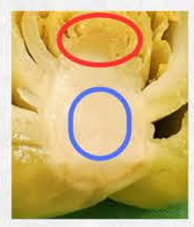
Microbiological analysis
Nutrient agar → measure total bacterial count (CFU/mL)
MRS agar → measure viable lactic acid bacteria (could be probiotics)

RESULTS AND DISCUSSION

What does the public care about?

Taste — Seasoning formula 92.6%
Health — Health benefits 66.2%
Production Method — Type of container 88.2%; Traditionally made 75%

Sample after 39-day fermentation



Stem L*-1.1 a*+0.31 b*+1.3
Leaf L*-1.7 a*+0.07 b*+0.2
Color of both Stem & Leaf → **Darker+ more red+ more yellow**

Firmness
Increasing force
→ Firmness increases
→ **Better mouthfeel**

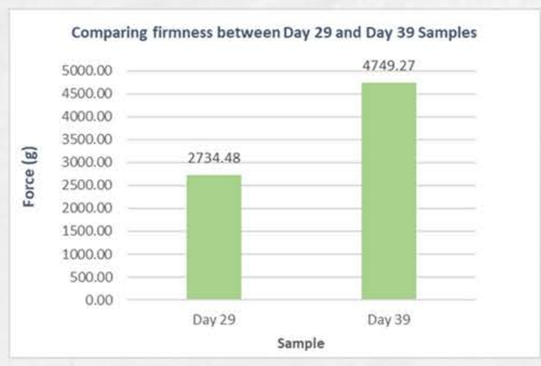
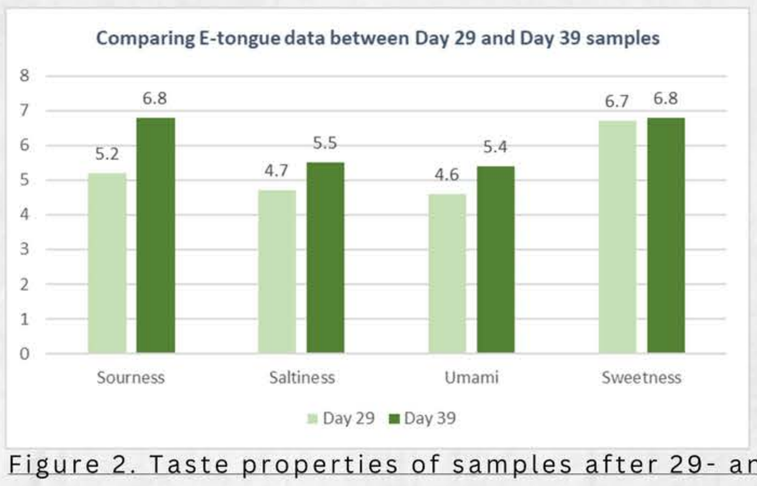


Figure 1. Firmness of samples after 29- and 39-day fermentation.



Taste
Enhanced ↑ ↑ ↑

Figure 2. Taste properties of samples after 29- and 39-day fermentation.

Predict Optimal fermentation period
→ Between **29 and 39 days**
- high probability of probiotics production

After 29 days → 2.5×10^5CFU/mL
After 39 days → no. of anaerobic bacteria significantly reduced
Meanwhile, no. of total bacteria increased from 1.5×10^4CFU/mL to 8.0×10^5CFU/mL
- may affect the probiotics amount

CONCLUSION

The existing **brine ratio is reasonable**, but the **fermentation time** and the newly developed **fermentation vessels** are **not yet perfect**.
The standardized approach involves **maintaining the current brine ratio** and adjusting the fermentation period between **30 and 38 days**.