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Potential application of Thai local vegetables for flavoring properties using cold or hot drying methods

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Abstract The flavoring properties of different local Thai vegetables either using freeze-dried (-70°C) or hot air ovens (55°C) methods were investigated. Twelve local Thai vegetables including garlic (*Allium sativum* Linn.), shallot (*A. ascalonicum* L.), garlic chives (*A. tuberosum* Rottler ex Spreng), sweet leaves (*Sauropus androgynus*), spinach (*Amaranthus viridis*), mulberry (*Morus alba* L.), moringa (*Moringa oleifera* Lam.), cowa fruit (*Garcinia cowa*), soap pod (*Acacia rugata* Merr.), tamarind (*Tamarindus indica* L.), roselle (*Hibiscus sabdariffa* L.), and macrofungus (*Lentinus polychrous* Lev.) were analyzed the color (L* a* and b*), sodium chloride, protein, and amino acids contents. It was significantly differed in higher L*, a*, and b* values ($P<0.05$) when those vegetables were dried at freezing temperature (-70°C). Sodium chloride analysis demonstrated significant differences ($P < 0.05$) in content, influencing the taste profile of the vegetables. The observed sodium chloride content in the dry weight ranged from 3.33% to 46.81%, impacting flavor development. Proximate analysis revealed variations in moisture, protein, and ash content, providing insights into the nutritional composition of these vegetables. Amino acid analysis highlighted substantial differences ($P < 0.05$) in essential and non-essential amino acids, showing the unique profiles of each vegetable type. The study also revealed the influence of drying conditions on the flavor-enhancing properties of non-essential amino acids, with glutamic acid content varying significantly ($P < 0.05$) among vegetables. These findings are not only contributed to understand the sensory attributes of local Thai vegetables but also offered valuable insights into their potential application in diverse culinary contexts. Drying conditions were found to be important for preserving the color, taste, and nutritional quality of these regional vegetables. Thai vegetables might be used to add flavor by looking at their color, sodium chloride content, chemical compositions, and amino acid profiles using cold or hot drying methods.

Keywords: Thai local vegetables, Flavoring properties, Drying methods

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Introduction

Thailand's population increases, the utilization of herbs is not only for culinary purposes but also for their essential role in traditional medicine (Sisawasdi *et al*., 2022). The global spread of Thai culinary culture has heightened the demand for genuine Thai herbs beyond Thailand's borders (Anju and Kumar, 2018). Thai flavors, known for their adaptability and ability to complement a variety of dishes, have become staples in fusion cuisines, offering a diverse array of tastes (Padoongpatt, 2017). The food industry has long been intrigued by natural taste enhancers to improve the overall flavor and appeal of food in the realm of flavor enhancement (Floros *et al*., 2010). Natural taste enhancement often revolves around amino acids. Thai local vegetables, with their rich flavors and nutrient profiles, present an intriguing avenue for exploring natural flavor enhancement. The chemical reactions occurring within taste receptors (Muñoz-González *et al*., 2018) are attributed to the unique taste sensations of salty, sweet, sour, and bitter, as well as the fifth taste, umami. The growth of Thailand's seasoning exports, reaching $851 million in 2020, reflects the country's pivotal role in the global seasoning industry. This demand has spurred the need for high-quality Thai herbs to recreate the unique flavors, resulting in a burgeoning industry that reached a value of $442 million in 2019 (Radetzki and Warell, 2020; Jaroensathapornkul, 2021).

Interesting in natural flavor enhancement is concerned in using Thai local vegetables to explore the potential application of these unique flavors in global cuisine through a comprehensive analysis of color, sodium chloride content, proximate composition, and amino acid profiles. The study aimed to explore the flavors, nutritional content, and potential therapeutic benefits of twelve different varieties of Thai local vegetables to understand the complexities of Thai local vegetables' flavor profiles for their application as natural flavor enhancers in the food industry, and to investigate the nutrient content and therapeutic qualities aligns with the broader goal of promoting sustainable and health-focused culinary practices.

Materials and methods

Preparation of Thai local vegetable samples

The young leaves of 12 types of Thai local vegetables including garlic (*Allium sativum* Linn.), shallot (*A. ascalonicum* L.), garlic chives (*A. tuberosum* Rottler ex Spreng), sweet leaves (*Sauropus androgynus*), spinach (*Amaranthus viridis*), mulberry (*Morus alba* L.), moringa (*Moringa oleifera* Lam.), cowa fruit

(*Garcinia cowa*), soap pod (*Acacia rugata* Merr.), tamarind (*Tamarindus indica* L.), roselle (*Hibiscus sabdariffa* L.), and macrofungus (*Lentinus polychrous* Lev.) were collected from Sakon Nakhon Province, Thailand in winter (December-March) and rainy (July-October) seasons. Samples of Thai local vegetables were washed under running water and underwent 2 drying conditions either in a freeze dryer at -70°C or in a hot air oven at 55°C. for 24-48 hours. The dried material was then ground to a fine powder, stored in polythene bags, and stored for further Phytochemical analysis (Figure 1).

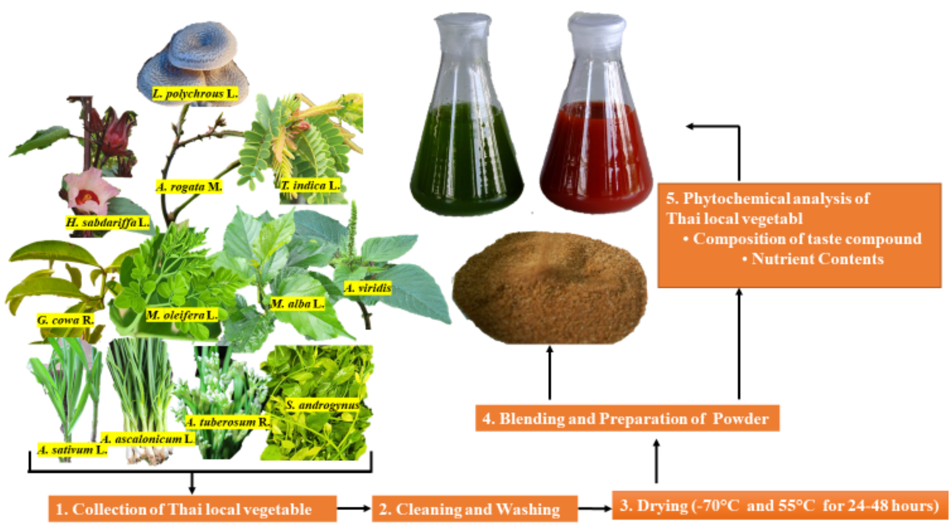

Figure 1. Phytochemical analysis

Color measurement

The ground Thai local vegetables were used to measure the color (L*, a*, and b*) using the CIE colorimeter (CX 1498, Hunter Lab). The color value would explain the following: L* indicates darkness to lightness (0-100), a* indicates greenness to redness (-a*, +a*), and b* indicates blueness to yellowness to (-b*, +b*).

Sodium Chloride (NaCl) measurement

Determination of Sodium Chloride (NaCl) in 12 types of Thai Local Vegetables at both temperatures (-70°C and 55°C) was modified from Mohr's method, which was titration using a colored sediment formation indicator. A total of 2 g. of ground sample were dissolved in 200 mL of distilled water, adjusted pH to 6-8, and then took the sample solution to a volume of 250 mL. The solution was then filtered with Whatman Filter Paper No. 4, and a 5% solution of potassium chromate to 1 mL of titration with a 0.1 M silver nitrate standard solution until the end was brick-red precipitation.

Proximate analysis

The proximate analyses were determined using the standard procedure established by AOAC (2002). The moisture, ash, and protein contents of samples were determined using the weight difference method. The nitrogen value, which is the precursor for a substance's protein, was determined using the Kjeldahl method. The nitrogen value was converted to protein by multiplying a factor of 6.25.

Amino acids determination

The amino acid in 12 types of Thai local vegetables was analyzed by modifying the method of Mdachi *et al.* (2004). Dried specimens of Thai local vegetables were prepared with crushed liquid nitrogen. A total of 2 mg/sample of 6 N HCl was hydrolyzed at 110°C for 24 hours. Speed vacuum drying dissolved dry samples of Thai local vegetables with 0.02 N HCl, centrifuged 10,000 rpm for 15 min and filtered through a 0.45 m filter membrane. Dry samples of Thai local vegetables were injected through column Shim-pack CLC-ODS (6.0 mm x 150 mm) at a temperature 45°C flow rate of 1 ml/min, about 1 hour per sample. Analysis of results using Amino acid standard as internal standard and method was calculated amino acid content (%) as follows:

$$\text{Amino acid concentration} = \frac{\text{The area under the sample graph x Internal standard concentration}}{\text{The area under the graph of the Internal standard}}$$

$$\text{Amino acid (\%)} = \frac{\text{Amino acid concentration x 100}}{\text{Total concentration of Amino acid}}$$

Statistical analysis

The data were statistically analyzed using SPSS version 23 (SPSS Inc., Chicago, IL, 2015). Tukey’s test was used to compare and separate treatment means when the main effects were significant ($P < 0.05$).

Results

Color measurement

Twelve different varieties of Thai local vegetables were examined for color quality under two different drying conditions: freeze drying at -70°C and hot air oven drying at 55°C, by utilizing the L*a*b* color space to measure the Thai local vegetables' color, the investigation concentrated on their physical characteristics. The findings showed that there were statistically significant color differences (P < 0.05) between the 12 types of Thai local vegetables. Under -70°C drying conditions, the values of *M. oleifera* Lam, L*, a*, and b* were 52.66, 1.54, and 29.94, respectively. But as the temperature rose from -70°C to 55°C, the a* decreased while the L* and b* increased, with values of 45.82, 23.71, and 1.74, respectively. *L. polychrous* Lev. dried at -70°C had L*, a*, and b* values of 66.42, 1.67, and 34.54, respectively, while at drying conditions of 55°C L*, a*, and b* equaled 63.52, 2.73, and 28.59, respectively, Furthermore, *A. rugata* Merr. dried at -70°C had L*, a*, and b* equaled 59.89, 2.82, and 23.53, respectively; the values of the L*a*b* under drying conditions at 55 °C were 56.95, 2.97, and 21.85, respectively. Similarly, *T. indica* L. had 58.39, 4.13, and 30.91, respectively, under drying conditions of -70°C. and 54.63, 2.59, and 20.60, respectively, under drying conditions of 55°C. Because of the high energy imparted to Thai local vegetables, the rate of color paled with the hot air oven drying at 55°C. The Thai local vegetables lost less of their green hue as a result of the freeze-drying process. (Table 1).

Table 1. Color quality of Thai local vegetables under two different drying conditions either freeze drying at -70°C or hot air oven drying at 55°C

Thai local vegetables	Color measurement					
	L*		a*		b*	
	-70 °C	55 °C	-70 °C	55 °C	-70 °C	55 °C
A. sativum Linn.	63.99^{c}	54.45^{g}	4.20^{de}	0.99^{i}	27.00^{e}	23.71^{d}
A. ascalonicum L.	63.64^{d}	56.03^{de}	4.17^{e}	0.58^{j}	26.86^{f}	25.70^{b}
A. tuberosum Rottler ex Spreng	61.9e	45.21^{j}	4.20^{cde}	0.31^{k}	28.05^{d}	22.57^{f}
S. androgynus	61.24^{f}	56.01^{e}	4.16^{e}	0.24^{l}	27.75^{de}	23.58^{e}
A. viridis	64.50^{b}	68.18^{a}	0.81^{i}	2.59^{f}	22.11^{i}	19.39^{h}
M. alba L.	47.24^{l}	45.78^{i}	3.81^{f}	1.88^{g}	24.30^{h}	24.36^{c}
M. oleifera Lam.	52.66^{i}	45.82h^{ij}	1.54^{h}	1.74^{h}	29.94^{c}	23.72^{d}
G. cowa	52.20^{j}	45.12^{k}	7.85^{a}	6.05^{a}	25.34^{g}	15.44^{ij}
A. rugata Merr.	59.89^{g}	59.95^{c}	2.82^{g}	2.97^{c}	23.53^{h}	21.85^{g}
T. indica L.	58.39^{h}	54.63^{f}	4.13^{e}	2.59^{ef}	30.91^{b}	20.60^{hi}
H. sabdariffa L.	51.02^{k}	44.12^{l}	6.80^{b}	4.78^{b}	23.74^{h}	14.32^{j}
L. polychrous Lev.	66.42^{a}	63.52^{b}	1.67^{h}	2.73^{d}	34.54^{a}	28.59^{a}
SEM[1]	0.06	0.02	0.05	0.02	0.30	0.04

Different letters in the same column indicate statistical differences (P<0.05). [1]SEM: standard error of the mean.

Sodium Chloride (NaCl) contents

The study examines the sodium chloride levels presented in twelve different Thai local vegetable varieties in both drying conditions. A freeze dryer calibrated at -70°C and a hot air oven calibrated at 55°C. When Thai local vegetables had been dried at these temperatures, there was a statistically significant difference ($P < 0.05$) in sodium chloride contents. The Thai local vegetables had an average of sodium chloride contents ranging from 3.33% to 46.81% of the dry weight. The highest average level of sodium chloride for *A. tuberosum* Rottler ex Spreng was observed at -70°C (29.12%) and 55°C (46.81%). On the contrary, the sodium chloride levels in *L. polychrous* L. averaged 16.08% and 16.47% at -70°C and 55°C, respectively. The study also found an interesting Thai local vegetable variation in the sour taste, which correlates with the sodium chloride levels. Thai local vegetables had the lowest sodium chloride concentration at 1.37% and 2.33% in dry weight, respectively. While *A. rugata* M. and *T. indica* L. had the lowest average sodium chloride concentration (Table 2).

Table 2. Sodium chloride contents of Thai local vegetables under two different drying conditions either freeze drying at -70°C or hot air oven drying at 55°C

Thai local vegetables	Sodium Chloride Content (% Dry Weight)	
	-70°C	**55°C**
A. sativum Linn.	13.13^{d}	17.68^{d}
A. ascalonicum L.	12.11^{e}	18.03^{c}
A. tuberosum Rottler ex Spreng	29.12^{a}	46.81^{a}
S. androgynus	9.21^{f}	16.75^{e}
A. viridis	17.76^{b}	20.25^{b}
M. alba L.	4.26^{h}	6.55^{j}
M. oleifera Lam.	5.57^{g}	7.89^{h}
G. cowa	5.57^{g}	8.86^{g}
A. rugata Merr.	1.37^{k}	4.69^{k}
T. indica L.	2.56^{j}	2.33^{l}
H. sabdariffa L.	3.93^{i}	7.72^{i}
L. polychrous Lev.	16.08^{c}	16.47^{f}
SEM[1]	0.03	0.02

Different letters in the same column indicate statistical differences ($P<0.05$). [1]SEM: standard error of the mean.

Proximate analysis contents

The moisture, ash, and protein contents of twelve different types of Thai local vegetables under varied drying conditions are shown in Table 3. There was a statistically significant difference in the moisture content of Thai local vegetables ($P < 0.05$). The highest moisture content of *A. viridis*, averaging 7.36 g/100 g dry weight, was determined while dried at -70°C. The lowest moisture content was observed in *A. ascalonicum* L. dried at 55°C, at a mean of 4.33 g/100 g dry weight. Based on the protein content analysis, *L. polychrous* Lev. dried at 55°C had the highest average protein content of 34.60 g/100 g dry weight. Sweet-tasting Thai local vegetables (*S. androgynus*, *A. tuberosum* Rottler ex Spreng, *A. sativum* Linn., *M. alba* L., *M. oleifera* Lam., and *A. viridis*) contained protein contents of 33.19, 31.31, 28.26, 26.83, 24.48, and 23.45 g/100g dry weight, respectively. These Thai local vegetables had a sour taste. The average protein contents of *A. rogata* M., *G. cowa* R., *T. indica* L., and *H. sabdariffa* L. were 13.38, 12.49, 12.23, and 10.92 g/100g dry weight, respectively. An analysis of the ash content of Thai local vegetables dried at 55°C was conducted. The species with the highest average ash content were *A. viridis*, *S. androgynus*, and *G. cowa*. These averaged about 3.56, 3.09, and 3.04 g/100 g dry weight, respectively.

Table 3. Sodium chloride contents of Thai local vegetables under two different drying conditions either freeze drying at -70°C or hot air oven drying at 55°C

Thai local vegetables	Moisture (g/100 g dry weight)		Protein (g/100 g dry weight)		Ash (g/100 g dry weight)	
	-70°C	55°C	-70°C	55°C	-70°C	55°C
A. sativum Linn.	7.08^{bc}	5.82^{d}	17.68^{g}	20.26^{c}	1.33^{f}	2.70^{ef}
A. ascalonicum L.	6.56^{ef}	4.33^{g}	22.11^{e}	24.56b^{c}	2.28^{e}	2.88^{cde}
A. tuberosum Rottler ex Spreng	7.00^{c}	5.46^{f}	21.75^{f}	25.31b^{c}	2.34^{de}	1.81^{g}
S. androgynus	6.75^{d}	5.82^{d}	30.41^{b}	33.19^{a}	2.48^{cde}	3.09^{bc}
A. viridis	7.36^{a}	5.70^{de}	17.33^{h}	23.45b^{c}	2.54^{bcd}	3.56^{a}
M. alba L.	7.20^{ab}	6.35^{b}	24.76^{c}	26.83^{b}	2.59^{bc}	2.97^{bc}
M. oleifera Lam.	6.94^{c}	5.56^{ef}	22.37^{d}	24.48^{b}	2.59^{bc}	2.94^{bd}
G. cowa	5.92^{g}	6.07^{c}	11.00^{k}	12.49^{de}	2.61^{b}	3.04^{bc}
A. rugata Merr.	6.72^{de}	6.61^{a}	11.57^{i}	13.38^{de}	2.62^{bc}	2.91^{bcd}
T. indica L.	6.41^{f}	6.30^{b}	11.12^{j}	12.23^{e}	2.63^{bc}	2.94^{bc}
H. sabdariffa L.	5.96^{g}	6.35^{b}	11.54^{i}	10.92^{e}	2.69^{bc}	2.74^{def}
L. polychrous Lev.	5.99^{g}	6.36^{b}	31.48^{a}	34.60^{a}	3.98^{a}	2.62^{f}
SEM[1]	0.06	0.07	0.01	0.97	0.07	0.06

Different letters in the same column indicate statistical differences ($P<0.05$).
[1]SEM: standard error of the mean.

Amino acids contents

A study on the amino acid contents of 12 types of Thai vegetables dried at two different temperatures is shown in Table 4. An analysis of amino acids, both essential and non-essential amino acids, was found in Thai local vegetables. A statistically significant difference (P<0.05) of various amino acids was observed essential amino acids such as arginine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, and valine. The arginine content in Thai local vegetables was the highest in *A. viridis* (10.87% dry weight). Histidine was highest in *G. cowa*, *A. rugata* M., and *H. sabdariffa* L. (18.73%, 18.72%, and 15.91% dry weight, respectively). Isoleucine was the highest in *A. tuberosum* R. and *L. polychrous* Lev. (5.79% and 5.49% dry weight, respectively). Leucine was the highest in *M. alba* L. (8.84% dry weight). Lysine was highest in *A. tuberosum* Rottler ex Spreng (8.85% dry weight). Methionine had the highest in *L. polychrous* L. (6.67% dry weight). Phenylalanine was the highest in *A. viridis* (10.51% dry weight). Threonine was highest in *A. ascalonicum* L. (6.86% dry weight). Valine was highest in *T. indica* L., *G. cowa*, and *A. rugata* M. (16.00%, 14.98%, and 14.98% dry weight, respectively). Tryptophan was not detected in the analysis, likely due to its destruction during the preparation process involving digestion with 6 N HCl and heating the fiber at 110°C for 24 hours. A variety of non-essential amino acids were found, with glutamic acid being particularly notable for its flavor-enhancing properties. Glutamic acid content was highest in *A. sativum* Linn. (16.55% dry weight) and lowest in *A. rugata* M. (6.33% dry weight), with a statistically significant difference (P<0.05) (Table 5).

Table 4. Essential amino acids contents of Thai local vegetables under hot air oven drying at 55°C

Types of Thai local vegetables	Arginine	Histidine	Isoleusie	Leucine	Lysine	Methionine	Phenylalanine	Threonine	Valine
A. sativum Linn.	2.29^{k}	3.35^{i}	1.82^{j}	6.08^{e}	1.39^{h}	2.76^{f}	5.54^{g}	1.91^{j}	7.81^{d}
A. ascalonicum L.	7.62^{c}	3.40^{i}	3.64^{d}	7.69^{b}	8.27^{b}	2.64^{f}	5.73^{f}	6.86^{a}	7.23^{d}
A. tuberosum Rottler ex Spreng	6.49^{e}	6.95^{f}	5.79^{a}	6.07^{e}	8.85^{a}	2.43^{g}	6.92^{d}	4.39^{f}	6.64^{d}
S. androgynus	5.70^{f}	8.23^{d}	3.50^{e}	4.45^{f}	5.38^{e}	2.04^{h}	8.64^{c}	5.33^{c}	7.36^{d}
A. viridis	10.87^{a}	3.04^{j}	3.94^{c}	6.11^{e}	7.21^{c}	1.41^{i}	10.51^{a}	5.13^{d}	7.34^{d}
M. alba L.	7.06^{d}	7.21^{e}	1.93^{ij}	8.84^{a}	6.87^{c}	1.54^{i}	9.74^{b}	3.50^{i}	6.49^{d}
M. oleifera Lam.	3.36^{h}	5.87^{g}	2.52^{f}	7.34^{c}	6.13^{d}	3.74^{e}	4.37^{h}	4.84^{e}	10.25^{c}
G. cowa	3.59^{g}	18.72^{a}	2.13^{h}	2.93^{g}	3.30^{g}	5.65^{c}	2.40^{k}	3.74^{h}	14.98^{a}
A. rugata Merr.	3.59^{g}	18.73^{a}	2.13^{h}	2.93^{g}	1.50^{h}	5.65^{c}	2.40^{k}	3.74^{h}	14.98^{a}
T. indica L.	2.83^{j}	15.79^{c}	2.35^{g}	2.59^{h}	1.50^{h}	5.91^{b}	5.76^{e}	4.00^{g}	16.00^{a}
H. sabdariffa L.	3.21^{i}	15.91^{b}	1.94^{i}	2.73^{g}	1.41^{h}	4.42^{d}	3.76^{i}	4.16^{g}	13.18^{b}
L. polychrous Lev.	8.62^{b}	3.68^{h}	5.49^{b}	6.30^{d}	3.99^{f}	6.67^{a}	3.51^{j}	5.52^{b}	11.40^{c}
SEM[1]	0.02	0.02	0.02	0.05	0.08	0.03	0.01	0.03	0.23

Different letters in the same column indicate statistical differences (P<0.05). [1]SEM: standard error of the mean.

Table 5. Non-essential amino acids contents of Thai local vegetables under hot air oven drying at 55°C

Thai local vegetables	Alanine	Asparagine	Glutamin	Glycine	Serine	Tyrosine
A. sativum Linn.	12.64^{d}	1.21^{e}	16.55^{a}	1.40^{gh}	6.72^{c}	24.99^{a}
A. ascalonicum L.	13.18^{c}	0.80^{f}	8.53^{e}	1.14^{ij}	6.63^{c}	16.81^{e}
A. tuberosum Rottler ex Spreng	9.86^{g}	0.65^{g}	7.30^{i}	0.99^{j}	5.22^{f}	25.12^{a}
S. androgynus	9.34^{h}	1.70^{c}	7.85^{fg}	2.70^{g}	7.05^{b}	19.80^{d}
A. viridis	13.64^{b}	0.68^{g}	11.81^{b}	1.22^{hi}	5.13^{fg}	14.88^{g}
M. alba L.	14.69^{a}	0.74^{fg}	9.81^{d}	3.67^{f}	5.73^{e}	21.35^{c}
M. oleifera Lam.	10.05^{g}	1.65^{d}	10.74^{c}	4.64^{d}	4.16^{i}	24.63^{b}
G. cowa	11.37^{f}	1.91^{b}	7.98^{f}	13.10^{a}	5.00^{g}	6.98^{k}
A. rugata Merr.	12.57^{de}	1.68^{cd}	6.33^{j}	12.18^{c}	4.82^{h}	8.41^{i}
T. indica L.	11.43^{f}	1.60^{d}	7.17^{i}	12.44^{b}	4.00^{j}	7.39^{j}
H. sabdariffa L.	12.39^{e}	1.86^{b}	7.71^{g}	12.10^{c}	5.99^{d}	8.89^{h}
L. polychrous Lev.	9.21^{h}	3.68^{a}	9.84^{d}	3.70^{e}	8.10^{a}	15.13^{f}
SEM[1]	0.03	0.02	0.04	0.03	0.02	0.03

Different letters in the same column indicate statistical differences ($P<0.05$). [1]SEM: standard error of the mean.

Discussion

Using the L* a* b* for color evaluation, the color quality of twelve different species of Thai local vegetables was dried using two different methods: freeze drying at -70°C and hot air oven drying at 55°C to optimize the drying process while preserving the color and nutritional contents. These approaches aimed to satisfy customers' demands for visually appealing products in addition to sustainable and energy-efficient food processing (Barrett, *et al.*, 2018). The color shift was correlated to different drying temperatures, factors that include moisture content, pigment stability, and enzymatic reactions (Onwude *et al.*, 2017). Temperature affected the color and nutritional value of Thai local vegetables. Therefore, the development of healthier and more efficient food processing methods is to satisfy consumer demands for delicious, aesthetically pleasing, and excellent products.

The study was determined the amounts of sodium chloride in twelve different types of Thai vegetables dried at two different temperatures: -70°C (freeze-drying) and 55°C (hot air oven drying). The results showed that the amounts of sodium chloride in Thai vegetables dried at these different temperatures are similar to those found in vacuum drying and microwave drying studies. The wide range of sodium chloride content (ranging from 3.33% to 46.81% of dry weight) observed across the twelve Thai local vegetable varieties indicated an increasing focus on reducing sodium intake for health reasons

(Rusmevichientong, 2021). It is essential to monitor and manage the salt content of food products. The Thai local vegetable varieties with notably high or low sodium chloride levels at both -70°C and 55°C drying conditions highlighted the potential for optimizing drying processes to control salt content. In contemporary food processing, strategies for reducing sodium content without compromising taste and flavor are of great interest (Nurmilah *et al*., 2022). The relationship between sodium chloride levels and the sour taste of Thai local vegetables is also intriguing. The sodium chloride content influences taste perception. The development of low-sodium food products with desirable taste profiles is a significantly challenge in the food industry (Kongkachuichai *et al.,* 2015; Chotivichien *et al*., 2021). This study's examination of sodium chloride levels in Thai local vegetables under different drying conditions, the findings underscores the importance of monitoring and optimizing salt content in processed foods to align with modern dietary recommendations and consumer preferences for healthier and more flavorful products.

The moisture content of Thai local vegetables dried at -70°C and 55°C reflected the well-established influence of drying conditions on moisture retention in food products. Moisture content is crucial for optimizing food preservation and storage. The highest moisture content in *A. viridis* was observed when dried at -70°C (7.36 g/100 g dry weight) under appropriate drying conditions to retain moisture in vegetables. Higher moisture levels can contribute to improved texture and sensory attributes in products. This finding aligns with modern consumer preferences for minimally processed foods that retain natural characteristics (Saulais *et al*., 2023). Thai local vegetable varieties can have implications for dietary choices and nutrition values. *L. polychrous* Lev. has been identified as having the highest average protein content at 34.60 g/100 g dry weight. Protein-rich vegetables can be valuable dietary sources, especially for individuals with specific nutritional requirements. In nutrition research, there is growing interest in the protein content of plant-based foods and its role in meeting the protein needs of diverse populations (Saupi *et al.,* 2019). The fact that sweet-tasting Thai local vegetables have a high protein content compared to sour-tasting, highlights the potential relationship between taste and nutritional composition. Taste preferences influence dietary patterns. The highest average ash content underscores the potential nutritional benefits of including these vegetables in diets. In nutrition, there is increasing recognition of the role of minerals in supporting overall health and well-being (Schnetzler, 2018).

In conclusion, Thai local vegetables under different drying conditions offer insights into the nutritional composition of these vegetables. The findings are contributed to understand how drying processes can influence the moisture, protein, and mineral content of food products, which is particularly related in the context of evolving consumer preferences and dietary considerations.

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