Effect of different drying temperatures on the rehydration of the fruiting bodies of Yu Muer (Auricularia cornea) and screening of browning inhibitors

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Abstract
In this study, the color of the dry fruiting bodies, drying ratio, amino acids, and total phenolics, which are of nutritional or commercial interest, were compared among different drying temperature treatments. The effect of rehydration methods and color protection reagents on the fruiting body-color, polyphenol oxidase (PPO) activity, and browning inhibition rate were evaluated. The results showed that drying with hot air at 65°C was quickest and resulted in a better color without compromising the drying ratio and rehydration ratio of the fruiting bodies. Furthermore, some reactions that occurred under high temperatures increased the content of protein, amino acids, and total phenolics. Soaking after boiling was the most suitable rehydration method, leading to the lowest PPO activity (39.87±1.35 U/g). All of the four analyzed color protection reagents could significantly inhibit the browning of Yu Muer fruiting bodies under room temperature water rehydration conditions.

Full-text
Due to technical limitations, full-text HTML conversion of this manuscript could not be completed.

However, the manuscript can be downloaded and accessed as a PDF.

Tables

Table 1 (a and b)
The effect of different drying temperatures on the drying time and water loss ratio.

| Drying temperature | Drying time (h) | 0.5 | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 |
|-------------------|----------------|-----|---|-----|---|-----|---|-----|---|
| 35°C              |                |     |   |     |   |     |   |     |   |
|                   | 22.96±0.72b    | 13.52±2.72c | 12.19±1.15c | 11.22±1.79a | 10.20±0.73a | 8.87±0.64b | 8.57±1.70a | 4.96±0.77a |
| 45°C              | 25.57±1.67b    | 20.08±2.55b | 13.76±2.05b | 12.87±0.68a | 9.41±0.99a  | 7.91±1.04a | 5.17±0.91b | 2.1±0.40b  |
| 55°C              | 28.97±4.92b    | 19.50±1.59b | 16.03±1.42ab | 12.97±1.10a | 8.72±1.23a  | 6.59±2.33a | 3.26±1.27b | 1.70±0.90b |
| 65°C              | 40.15±5.99a    | 25.38±2.10a | 17.06±1.24a | 10.91±1.82a | 3.96±0.86b  | 1.79±0.15b | 0.42±0.10c | 0.11±0.01c |

| Drying temperature | Drying time (h) | 5.5 | 6 | 6.5 | 7 | 7.5 | 8 | 8.5 | 9 |
|-------------------|----------------|-----|---|-----|---|-----|---|-----|---|
| 35°C              | 0.91±0.24a     | 0.55±0.14a | 0.34±0.10a | 0.23±0.08a | 0.15±0.09 | 0.12±0.07 | 0.07±0.05 | 0.04±0.02 |
| 45°C              | 0.38±0.02b     | 0.25±0.13b | 0.08±0.04b | 0.06±0.01a | 0.05±0.01 | 0.08±0.04 | -      | -    |
| 55°C              | 0.32±0.27b     | 0.17±0.15b | 0.11±0.11b | 0.20±0.16a | -          | -      | -    | -    |
| 65°C              | -              | -      | -      | -      | -          | -      | -    | -    |
Note: Data (mean ± standard deviation) followed by the same letter are not significantly different (p > 0.05).

Table 2
The effect of different rehydration methods on the color of fruiting bodies and the rehydration water, and the PPO activity.

| Rehydration methods | Wrap       | Water color       | White wood ear color   | PPO activity |
|---------------------|------------|-------------------|------------------------|--------------|
| Cold water          | Unwrapped  | Reddish brown     | Dark reddish brown     | 87.23:       |
|                     | Film-wrapped  | Reddish brown     | Dark reddish brown     | 71.89:       |
| Boiling water       | Unwrapped  | Light reddish brown | Light reddish brown   | 42.29:       |
|                     | Film-wrapped  | Light reddish brown | Light reddish brown   | 37.62:       |
| Boiled              | Unwrapped  | Light yellow      | White                  | 39.87:       |
|                     | Film-wrapped  | Light yellow      | White                  | 36.68:       |

Note: Data (mean ± standard deviation) followed by the same letter are not significantly different (p > 0.05).

Table 3
Effects of different drying temperatures on chroma of dried fruiting bodies and rehydration fruiting bodies.

| Treatments | Dried fruiting bodies | L*       | a*       | b*       | △E      | Drying ratio | Rehydration ratio | L*       | a*       | b*       |
|------------|-----------------------|----------|----------|----------|---------|--------------|-------------------|----------|----------|----------|
| SD         | Fresh                 | 62.99±0.09| -1.82±0.01 | 5.20±0.17| -       | -            | -                 | -        | -        | -        |
| 35°CHD     | 75.54±0.14            | 2.21±0.05 | 19.30±0.04 | -        | -       | 11.15±0.63   | 10.77±1.68       | 61.97±0.73| -1.81±0.01| 6.67±0.03|
| 45°CHD     | 76.58±0.02            | 2.50±0.03 | 19.48±0.04 | 0.34±0.11 | 11.30±0.83 | 10.92±1.64   | 62.25±0.44       | -1.85±0.03 | 6.72±0.03 |
| 55°CHD     | 76.33±0.04            | 2.35±0.03 | 19.64±0.11 | 0.82±0.15 | 10.95±0.15 | 10.83±1.70   | 61.94±0.78       | -1.71±0.03 | 7.86±0.03 |
| 65°CHD     | 75.85±0.08            | 1.71±0.02 | 18.06±0.10 | 1.16±0.10 | 11.02±0.68 | 10.43±1.92   | 62.33±1.45       | -1.72±0.05 | 7.10±0.05 |
| Fresh      | -                     | -        | -        | -        | -       | -            | -                 | -        | -        | -        |
Note: Data (mean ± standard deviation) followed by the same letter are not significantly different (p > 0.05). SD: Sun drying; HD: Hot-air drying.

Figures

Figure 1
Shape of dried fruiting bodies in different drying temperatures SD(a); 35°C HD (b); 45°C HD (c); 55°C HD (d); 65°C HD (e). HD, Hot-air drying; SD: Sun drying.
Effects of different drying methods on the contents of Amino acid, Total phenol, Protein and Total sugar of dried fruiting bodies. The same letters are not significantly different (p > 0.05).
Figure 3

Effects on fruiting bodies’ color with different rehydration methods, fresh fruiting body (a); boiling water rehydration (b); room-temperature water rehydration (c); the fruiting bodies turned red following removal from the rehydration water solution consisting of low-concentration color protection reagents (d); the fruiting bodies turned light red after being removed from the rehydration solution containing low-concentration color protection reagents (e); the fruiting bodies showed no color change after being removed from the rehydration water solution containing appropriate concentrations of color protection reagents (f).
Figure 4

Effects on browning inhibition rate with different concentration of sodium erythorbate, ascorbic acid, L-cysteine and citric acid. The same letters are not significantly different (p > 0.05).

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