

The Production of Fruits of *Zanthoxylum piperitum* in Japan and the Quality - Laying Stress on a Strain of *Z. piperitum* Called "Budo-Zanshou" -

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There are two agricultural species of *Zanthoxylum piperitum* DC called "Budo-Zanshou" and "Asakura-Zanshou" in Japan, they are multiplied on the grafting method. The stock of "Budo-Zanshou" is used *Z. schinifolium* Sieb. et Zucc. or *Z. planispinum* Sieb. et Zucc because their roots are deep and they are resistant to dryness and blight. The slips are collected in branches heavily laden with fruits.

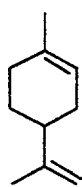
The grafts are planted permanently in the fall, being the defoliation time, to the spring being before germination time, without hard frost season. The graft plants in the fall strike more roots than the plants in the spring. The best cultivated area is the incline at 400 - 500 meters above sea level having the duration of sunshine except the afternoon sun. The standard density of cultivation is three meters square and the area being flat or rich requires larger density than it. The plants need less amount of manure than usual fruit trees and it is good that the great part is made of organic fertilizer. The pruning is the cutting at high growing branches and make the branches to stretch on all sides. The close-clipped branches do not bear well.

The fruits of those plants are harvested as fresh unripe fruits and dry ripe pericarps. At the present, the crop of fresh fruits of "Budo-Zanshou" is about 150 tons a year in about 50 ha, their cultivation area is found in Shimizu-Cho, Wakayama Prefecture. The amount of 40 tons is gathered as fresh unripe fruits in late May, so the rest is harvested as the ripe fruits from

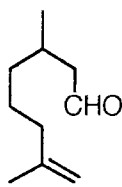
middle July to middle August and the yield of dry pericarps is 40 tons because of drying and removal of the seeds and the carpophores.

The pericarps of the fruit of "Budo-Zanshou" are thicker, the oil cavities are bigger than those of "Asakura-Zanshou" but there is no difference in components between the both. The greenness pericarps are considered articles of good and the reddish ones are poor.

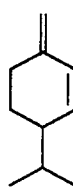
As regards the essential oil content of the pericarps, the present study found that an average content of 2.9 ml of essential oil contained in 30 g directly after the harvest time declined to 1.8 ml after storage for three years at 10 - 35 degrees, although it is generally said that the essential oil content would decrease to the level below 1.0 ml, which is requirement of Japanese Pharmacopoeia, after two to three years of storage.



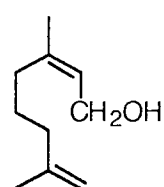
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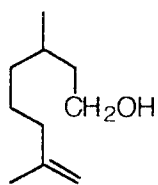
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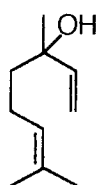
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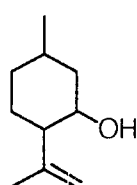
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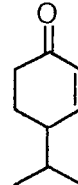
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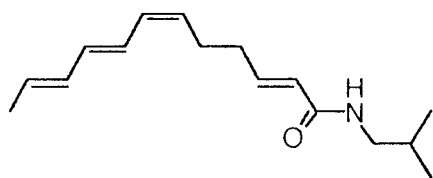


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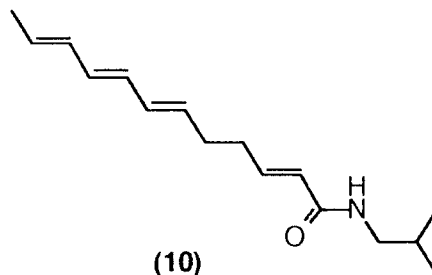


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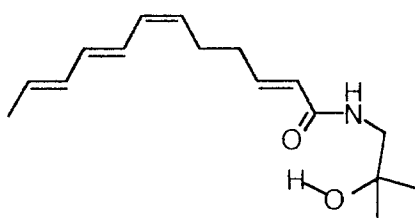
The essential oil is contained limonene (1), as the main constituent, citronellal (2), β -phellandrene (3), geraniol (4), citronellol (5), linalool (6), isopulegol (7), cryptone (8) and others. The distinctive smell of Fruits of *Z. piperitum* is considered from 2.



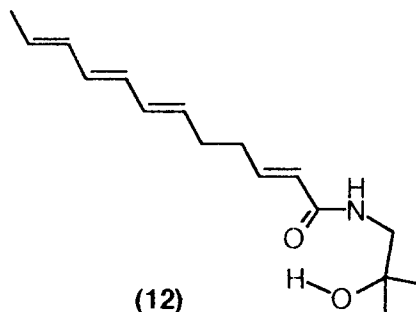
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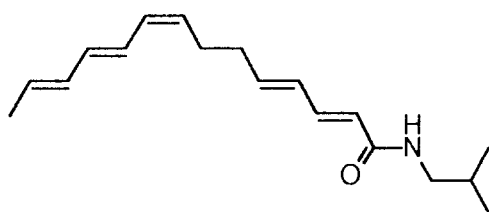
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(12)



(13)



(14)

The pungent principles in the pericarps are unsaturated aliphatic acid amides, α -sanshool (9), hydroxy α -sanshool (11), γ -sanshool (13) and hydroxy γ -sanshool (14), but β -sanshool (10) and hydroxy β -sanshool (12) have no pungency (Table). The change of taste is caused by the transition of the geometry at double bonds, from *cis* to *trans*. The pungency is often lost to the pericarps on standing, and the reason is considered that the principles take such transition of the structures during long storage.

The evaluation of the fruits of *Zanthoxylum piperitum* is presently performed on the bases of the form, the color, the luster, the taste and the smell, but it is necessary to determine the

quantity of these components.

Table The Pungency of Unsaturated Aliphatic Acid Amides

| Compound | Molecular Formula | Geometry | Minimum Value of Pungency(M) ¹⁾ |
|----------|---|----------------------|--|
| 9 | C ₁₆ H ₂₅ NO | 2E, 6Z, 8E, 10E | 4.5 × 10 ⁸ |
| 13 | C ₁₈ H ₂₇ NO | 2E, 4E, 8Z, 10E, 12E | 3.3 × 10 ⁷ |
| 11 | C ₁₆ H ₂₅ NO ₂ | 2E, 6Z, 8E, 10E | 1.6 × 10 ⁶ |
| 14 | C ₁₈ H ₂₇ NO ₂ | 2E, 4E, 8Z, 10E, 12E | 3.0 × 10 ⁶ |
| 10 | C ₁₆ H ₂₅ NO | 2E, 6E, 8E, 10E | N.P. ²⁾ |
| 12 | C ₁₆ H ₂₅ NO ₂ | 2E, 6E, 8E, 10E | N.P. |

1) Minimum Value of Pungency is tasted in 0.2 M Sucrose Solution

2) No Pungency

Reference

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