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# TECHNICAL INFORMATION

**HOROPITO**  
*(Pseudowintera colorata)*

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**Botanical Name:**

*Pseudowintera colorata*

**Common Name:**

Horopito

**Botanical Family:**

Winteraceae

**Part Used:**

Leaf

**Dosage:**

10ml to 30ml per week of a 1:2 liquid extract

**Common Names:** New Zealand Pepper Tree, New Zealand Pepperwood, Peppertree, Maori Painkiller, Mountain Horopito, Ramarama, Red Horopito

**Taste:** Hot, Peppery<sup>1,2</sup>

**Actions:**

- Analgesic
- Antiallergy
- Antibacterial
- Antifungal
- Anti-inflammatory
- Astringent
- Circulatory stimulant
- Gastroprotective
- Insecticidal
- Nutritive
- Rubefacient

**Indications:**

- Arterial insufficiency
- Bacterial infections
  - Gram positive: *Bacillus subtilis*, *Staphylococcus aureus*
  - Gram negative: *Escherichia coli*, *Neisseria gonorrhoeae*, *Salmonella choleraesuis*
- Chilblains, intermittent claudication, Raynaud's syndrome
- Diarrhoea
- Fungal infections
  - *Candida albicans*, *Candida krusei*, *Candida lipolytica*, *Candida tropicalis*, *Candida utilis*, *Cryptococcus neoformans*, *Penicillium marneffeii*, *Saccharomyces cerevisiae*, *Trichophyton mentagraphytes*, *Trichophyton rubrum*
- Insect repellent
- Scurvy
- Stomach pain
- Respiratory tract conditions (cough, cold, asthma)
- Toothache
- Topically for inflammatory muscle or joint pain

## Traditional Use:

Horopito is a member of the Winteraceae family of flowering plants comprising of around 90 species of trees and shrubs that are almost exclusively southern hemisphere plants<sup>2,3</sup>. Horopito is commonly known as New Zealand Pepperwood due to the hot, peppery flavour of its leaves. Traditionally, the indigenous Maori population used the leaves and berries as a flavouring agent for food and medicinally for a variety of diseases including sexually transmitted infections, ringworm, chafed skin and skin diseases<sup>4</sup>. Skin complaints were historically treated using bruised leaves or inner bark, which had been steeped in water or chewed before application<sup>5,6</sup>. Early European settlers to New Zealand used Horopito both internally and topically for a range of medicinal and nutritive purposes as it was known to have a high antioxidant capacity and be a rich source of vitamin C. The bark was regarded to be as effective as the South American tree Winter's Bark (*Drimys winteri*) or Sarsaparilla (*Smilax* spp.) as a treatment for scurvy<sup>7</sup>. More recently, modern herbalists from New Zealand and Australia have used Horopito effectively for the management of digestive and skin conditions. It is also the featured ingredient in products marketed for the treatment of fungal infections as it has been shown clinically to be particularly effective against *Candida albicans*<sup>8</sup>. Horopito leaf extracts have also been shown to display strong antifeedant activities against insects and helminths, specifically sea squirt larvae (ascidian) and the sheep worm parasite (*Trichostrongylus colubriformis*)<sup>9,10,11</sup>.

## Phytochemistry:

Many active constituents have been identified in Horopito such as tannins, volatile oils, anthocyanins, flavonols, dihydroflavonols, and hydrocinnamic acids<sup>1</sup>. The most thoroughly researched therapeutic constituent is the bicyclic sesquiterpene dialdehyde polygodial, which is also responsible for Horopito's hot, peppery flavour<sup>2</sup>. The red coloured leaves of Horopito are enriched with anthocyanins, flavonols and dihydroflavonols, all of which are known to have strong antioxidant activity<sup>12</sup>. Other sesquiterpene compounds, tannins, and essential oils such as eugenol are also understood to be in part responsible for the therapeutic activity of Horopito<sup>1</sup>.



## Research:

### Circulatory System

#### **Circulatory stimulant:**

Polygodial's vasorelaxant effect on blood vessels is concentration-dependent and appears to be mediated through the release of nitric oxide from the vascular endothelium<sup>13,14,15</sup>. This suggests there may be possible benefits in conditions of circulatory insufficiency, such as arterial insufficiency, chilblains, intermittent claudication and Raynaud's syndrome<sup>1</sup>. Whilst both in vitro and human studies are limited, polygodial has been shown in vitro to induce relaxation of rabbit corpus cavernosum through nitric oxide release, thus suggesting it may be of potential benefit for treating erectile dysfunction in men<sup>16</sup>.

### Gastrointestinal System

#### **Gastroprotective:**

Polygodial displays potent gastroprotective effects in rat models as well as a reduction in colon permeability in malnourished mice. It is theorised that the modulation of endogenous prostaglandins and nitric oxide are responsible for this activity<sup>9,17</sup>. Horopito has been traditionally used to treat painful abdominal conditions and, based on current in vitro evidence, it is theorised that polygodial allows relaxation of smooth muscle and thus alleviates abdominal discomfort by producing a concentration-dependent antagonism of gut contraction induced by inflammatory mediators such as bradykinin and tachykinins<sup>13,14</sup>.

### Immune System

#### **Antibacterial:**

Traditionally, Maori populations used Horopito leaves as a poultice for wounds and the sap was used to treat *Neisseria gonorrhoeae* and various skin diseases<sup>26</sup>. Antibacterial activity has been exhibited by leaf extracts and polygodial has been shown to illicit moderate antibacterial activity against both Gram-positive (*Bacillus subtilis* and *Staphylococcus aureus*) and Gram-negative bacteria (*Escherichia coli* and *Salmonella choleraesuis*)<sup>27,28,29</sup>. A 2017 study identified Horopito as having growth inhibitory bioactivity against a panel of bacterial triggers of autoimmune inflammatory diseases, therefore indicating the potential for Horopito to be used as both a preventative and a treatment in genetically susceptible individuals<sup>2</sup>.

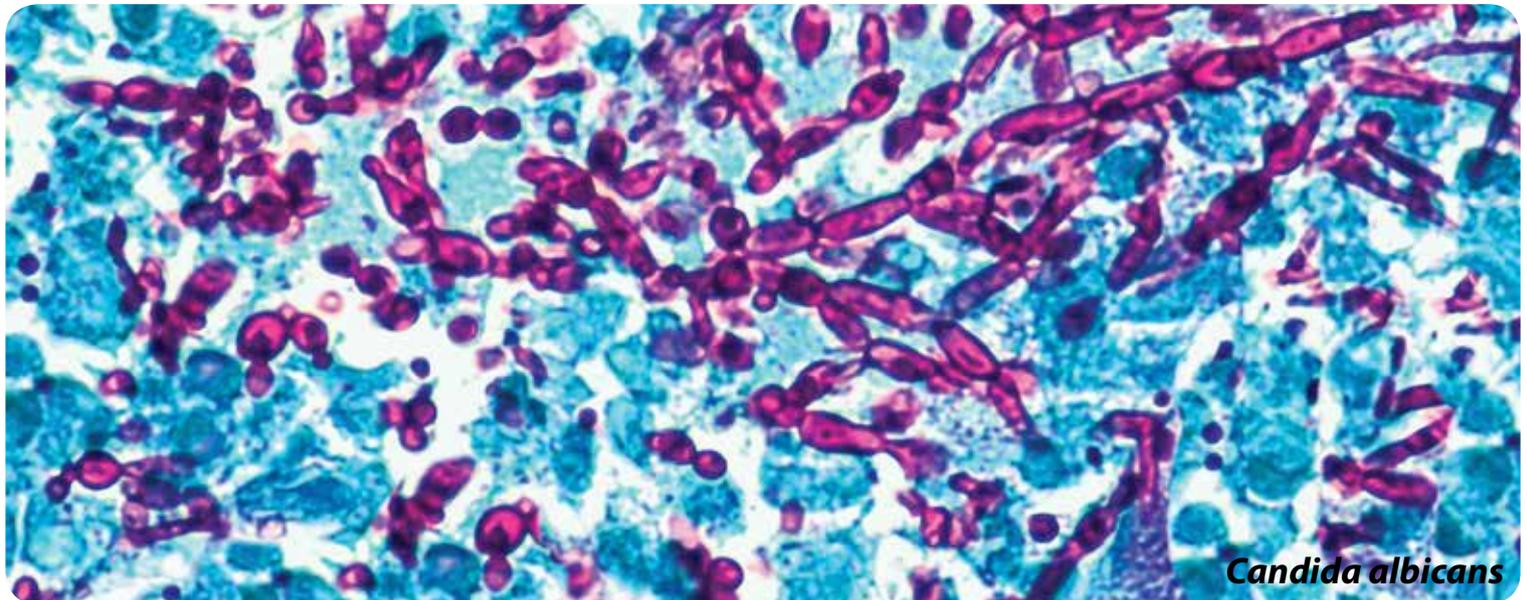
#### **Antifungal:**

Sesquiterpene dialdehyde polygodial isolated from Horopito has exhibited growth inhibition of *Candida albicans* in vitro, with activity comparable to that of the antifungal drug amphotericin B and more effective than sodium caprylate<sup>30,31</sup>. In vivo, polygodial extracts displayed larger zones of inhibition against *Candida albicans* and were effective from day one whereas the inhibitory effect of amphotericin B against *Candida albicans* required three to four days incubation to achieve similar results<sup>29</sup>. Polygodial's activity against *Candida albicans* has been shown to be potentiated by combining it with the aniseed constituent anethole<sup>32</sup>. Furthermore, a tableted preparation containing 10mg of Horopito oleoresin (30% polygodial) together with trace amounts of olive leaves, compared favourably to the antifungal drug itraconazole for the long-term treatment of women with recurrent vulvo-vaginal candidiasis<sup>33,34</sup>. Moreover, a 2011 randomised clinical trial with 82 female participants experiencing recurrent vulvo-vaginal candidiasis underwent an oral treatment regime of either Kolorex® Horopito softgels or the antifungal pharmaceutical itraconazole for a period of six months. This was followed by an observation period of six months where no treatment was given. Despite itraconazole patients benefiting from earlier symptom relief, after six months the results were similar. After a total of 12 months (six months treatment followed by six months observation) there were twice as many Kolorex® Horopito softgel treated patients who were free of the *Candida albicans* infection compared with itraconazole patients. This study also identified that the use of Kolorex® Horopito softgels reduced the growth of azole-resistant *Candida* species which were present in the itraconazole patients with recurrent infections<sup>34</sup>.

Additionally, researchers have found polygodial to be effective against a myriad of other yeast-like fungi including *Candida krusei*, *Candida lipolytica*, *Candida tropicalis*, *Candida utilis*, *Cryptococcus neoformans*, and *Saccharomyces cerevisiae*, and also filamentous fungi *Trichophyton mentagraphytes*, *Trichophyton rubrum* and *Penicillium marneffe*<sup>35,36</sup>.

**Clinical Note:** In vitro, in vivo, and human studies, alongside traditional use of Horopito, provides significant evidence for its clinical suitability for the treatment of fungal infections both internally and topically.

**Clinical Tip:** Horopito combines well with Holy Basil (*Ocimum tenuiflorum*) for treating *Candida* spp. infections. This is because Holy Basil inhibits the transition of yeast to hyphae and thus makes it easier to eradicate the fungi in its simpler form. *Candida* spp. often grow as yeast-like cells for proliferation in the body fluids but convert to hyphae for invasion of the tissues. Holy Basil inhibits this conversion, and furthermore, disrupts fungal cell membrane integrity by inhibiting ergosterol biosynthesis, reduces fungal virulence factors, modulates quorum sensing systems (influences cell to cell communication), and inhibits biofilm formation.



### **Anti-inflammatory:**

Traditionally, Horopito has been used for a myriad of inflammatory conditions including respiratory, gastrointestinal and skin diseases<sup>4,26,28</sup>. Furthermore, anti-inflammatory and antiallergic activity is apparent with polygodial contributing to inhibition of allergic symptoms triggered by inflammatory mediators, prostaglandin E<sub>2</sub> (PGE<sub>2</sub>) and bradykinin, in mouse models<sup>28</sup>.

## **Nervous System**

### **Analgesic:**

Polygodial has been shown to have pronounced and long-lasting antinociceptive activity in mouse models<sup>18,19,20</sup>. It is believed these effects may be related to Horopito's possible influence on serotonergic, opiate, and  $\alpha$ -1-adrenoceptors, along with the modulation of glutaminergic neurotransmission<sup>20,21,22</sup>. Topical Horopito applications seem to exhibit similar counter-irritant properties to other hot and pungent spices such as chilli, ginger, and mustard. Furthermore, the topical application of polygodial in rat models led researchers to predict that the mechanism for the sensory changes in primary afferent nerve fibres responsible for pain transmission is transient receptor vanilloid 1 (TRPV1) agonist activity<sup>23,24,25</sup>.

## **Safety:**

Horopito is considered a very safe phytomedicine when appropriately prescribed. Moreover, at this time, the only adverse reaction noted in the literature is a single case report of contact vulvitis in a 16-year old patient following vaginal application of a Horopito-containing cream<sup>37</sup>.

## **Safety in Pregnancy and Lactation:**

Safety in pregnancy and lactation has not been established, therefore use is not recommended<sup>1</sup>.

## **Caution:**

Avoid large doses in acute gastritis and peptic ulcers<sup>1</sup>.

Polygodial inhibits glutamate uptake by rat brain slices, suggesting a potential increase in extracellular glutamate levels and possible increased brain cell excitability. Whilst these in vitro findings have not been further explored, polygodial-rich Horopito preparations should be used with caution in epileptic patients<sup>21</sup>.

## **Interactions:**

No known herb-drug or herb-nutrient interactions have been identified.



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