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**Bitters are Best**  
**the bitter principle in Phytotherapy**

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# *Bitters are Best*

## *the Bitter principle in Phytotherapy*

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## The 5 primary tastes

- Sweet
- Salt
- Sour
- Bitter
- Umami

### Bitters

Up-regulation of parasympathetic tone →  
relaxant and anxiolytic  
thymoleptic

Digestive aid

Bitters “are considered as tonic and stomachic, and to improve the appetite when taken in moderation. The best time is early in the morning, or an hour before meals. An excessive use of bitters tends to weaken the stomach. They should not be taken for a longer period than a fortnight at one time, allowing a similar period to elapse before again having recourse to them.”

Dick's Encyclopedia of Practical Receipts and Processes (1872)

- angostura bark (*Angostura trifoliata* Willd.)
- cinchona (quinine) bark (*Cinchona* spp.),
- gentian root (*Gentiana lutea* L.),
- quassia chips (*Quassia amara* L.)
- wormwood (*Artemisia absinthium* )

Czech Republic	- Becherovka
France	- Amer Picon, Dubonnet,
Germany	- Underberg
Hungary	- Unicum
Denmark	- Gammel Dansk
Netherlands	- Boonekamp
Trinidad	- Angostura
Italy	- Amaro Montenegro, Campari, Cynar, Ramazotti Amaro, and Fernet-Branca

## Swedish bitters

Aloe (aloe barbadensis)	10g
Angelica root (Angelica archangelica)	10g
Anise seed (Pimpinella anisum)	8g
Camphor (Cinnamomum camphora)	5g
Carlina thistle root (Carlina acaulis)	5g
Fennel seed (Foeniculum vulgare)	8g
Galangal root (Alpinia officinarum)	3g
Licorice root (Glycyrrhiza glabra)	5g
Manna (Fraxinus ornus)	10g
Myrrh (Commiphora molmol)	3g
Bitter Orange (Citrus aurantium)	5g
Rhubarb root (Rheum palmatum)	10g
Senna pods (Cassia senna)	5g
Zedoary (Curcuma zedoaria)	10g

Bitters are indicated for use in:

- anemia
- excessive gas
- poor appetite
- indigestion
- intestinal cramps
- irritable bowel syndrome
- loss of energy and vitality
- excessive craving for sweets, fats, and carbohydrates
- digestive weakness due to mental overwork
- weakness due to chronic illness

Bitter taste receptors are not restricted to the oral cavity. They are expressed in the gut, including the stomach, and in cell lines originating from gastrointestinal tissue.

In fact, it is now recognized that the whole upper gastrointestinal tract is a tasting organ, not just the tongue, with taste receptors also present for the sweet and umami (savory) tastes.

Bitter receptors have been found on enteroendocrine cells and their activation promotes the release of gut peptides, in particular cholecystokinin (CCK).

This triggers the secretion of pancreatic enzymes and bile and regulates stomach function, appetite and acid production.

Activation of bitter receptors is also thought to indirectly improve the elimination of absorbed toxins from the gut epithelium.

Lower in the gut, bitter receptors exert a different effect. Bitter compounds applied to the colonic epithelium induce fluid secretion, suggesting a mild laxative effect.

When isolated stomach cells were exposed to different levels of an extract of gentian root, a concentration-dependent rise in gastric acid production was observed. Significant effects for gentian extract were observed at concentrations of 10 to 100 mcg/mL, a concentration range that can be readily achieved by normal doses of gentian.

Gebhardt R. Stimulation of acid secretion by extracts of *Gentiana lutea* L. in cultured cells from rat gastric mucosa. *Pharm Pharmacol Lett*, 1997;7(2-3):106-108.

A multicenter, uncontrolled study of gentian capsules involving 205 patients. 10 Patients took on average about five capsules per day, each containing 120 mg of a 5:1 dry extract of gentian root, and achieved rapid and dramatic relief of symptoms, including constipation, flatulence, appetite loss, vomiting, heartburn, abdominal pain and nausea.

Wegener T. Anwendung eines Trockenextraktes aus *Gentiana lutea* radix bei dyspeptischem Symptomenkomplex. *Z Phytother*, 1998;19:163-164.

There is a role for bitter herbs in glucose homeostasis and insulin resistance (since CCK is involved in glucose homeostasis).

In support of this, 94 patients with prediabetes exhibited improvements in BMI, glycemic control and body fat when given just 16 to 48 mg/day of isohumulones (hop bitter acids) as capsules in a double-blind, placebo-controlled clinical trial.

Obara K, Mizutani M, Hitomi Y, et al. Isohumulones, the bitter component of beer, improve hyperglycemia and decrease body fat in Japanese subjects with prediabetes. *Clin Nutr*, 2009;28(3):278-284.

The bitter herb *Andrographis paniculata* has demonstrated antidiabetic activity in several experimental models and lowered glycated hemoglobin and fasting insulin levels in a small, uncontrolled pilot trial involving patients with type 2 diabetes

Agarwal R, Sulaiman SA, Mafauzy SA. Open label clinical trial to study adverse effects and tolerance to dry powder of the aerial part of *Andrographis paniculata* in patients with type 2 diabetes mellitus. *Malay J Med Sci*, 2005;12(1):13-19.

Graded doses of Nature Cure Bitters (NCB) were administered daily (100, 200 and 400 mg/kg p.o) to rats for 28 days and the effects on body weight, organ weight, clinical signs, gross pathology, haematology, histology and serum biochemical parameters were evaluated. The relative weights of the heart, liver and testes of treated rats were unaffected in contrast to a significant increase in the relative weights of the lungs, kidneys and spleen. The packed cell volume and haemoglobin concentrations were significantly reduced whereas total leucocyte counts and glucose levels were remarkably increased.

A significant decrease in alkaline phosphatase occurred in all the groups but alanine inotransferase and albumin levels were significantly elevated. NCB elicited hypocholesterolaemic effects in addition to lowering urea, uric acid, BUN and total protein concentrations. Histological findings did not reveal any treatment-related effects. The calculated therapeutic index was >37.5. These preliminary results suggest that NCB was not likely to produce severe toxicological effects on organ weights, haematological and biochemical indices when given at normal therapeutic doses

Toxicity studies in rats fed nature cure bitters, *Afr. J. Biotechnol.* Vol.4(1), pp. 72-78, January 2005, Stanley O. Aniagu, Florence C. Nwinyi, David D. Akumka, Gloria A. Ajoku, Sunday Dzarma, Kazeem S. Izebe<sup>2</sup> Matthew Ditse, Patrick E. C. Nwaneri, Charles Wambebe and Karynius Gamaniel

The bitter substances are mostly of terpenoid structure, especially the sesquiterpene lactones, monoterpene iridoids and the secoiridoids.

Iridoids - *Gentianaceae*, *Cichorium intybus* (chicory), dandelion, *Valeriana officinalis* (valerian), wild lettuce (*Lactuca virosa*), and quassia bark.

**Sesquiterpenes** - Artemisia genus, Cnicus benedictus (blessed thistle), and ginkgo biloba (ginkgo).

**Diterpene bitters** - columbo root (jateorrhiza palmata) or white horehound (Marrubium vulgare).

**Triterpenoids** - Curcubitaceae family

Many alkaloids also contribute to the bitter taste as in the protoberberine isoquinoline alkaloids of golden seal (Hydrastis canadensis), and Berberis, the morphine alkaloids, the quinoline alkaloids of quinine and angostura and the purine alkaloids ( in coffee).

In addition to this, many miscellaneous compounds like ketones and amino-acids are responsible for the bitterness, as found in hops.

Gastrointestinal and Liver Disease Nutrition Desk Reference  
edited by Gerard E. Mullin, Laura E. Matarese, Melissa Palmer

### **Bitters**

**Stimulate appetite, digestive juices (acid, mucus, enzymes, bile), peristalsis**

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**Stimulate appetite, digestive juices (acid, mucus, enzymes, bile), peristalsis**

**Establish parasympathetic dominance (relaxation state)**

### **Bitters in Humoral medicine**

**Cold and dry  
Earth element, melancholic temperament  
Descending, introverted, isolated  
Astringing, clarifying, toning**

**Cools the digestive fire, congeals fluids, tightens tissues, restrains the mind**

### **Bitters in Ayurvedic medicine**

**Ayurveda describes six rasas, or types of taste. Taste applies not only to the perception of taste buds located on the tongue, but to the final reaction of food in the acid medium of the stomach.**

**The six tastes (rasas) are:**

<b>Madhura – sweet</b>	<b>Amla – sour</b>
<b>Lavana – salty</b>	<b>Katu -- hot</b>
<b>Tikta – bitter</b>	<b>Kashai -- astringent</b>

Internally the bitter taste helps to balance pitta and kapha. It decreases water retention and is used for a tonic for a congested liver. It is cleansing and helps to take away burning and itching sensations. In excess it can aggravate vata and dehydrate the body.

- Astringent taste - back of tongue linked with Earth & Air
- Salty taste - sides of tongue more to back linked to Water & Earth
- Bitter taste – central tongue to back linked to Air & Ether
- Pungent taste – central tongue linked to Fire & Air
- Sour taste – sides of tongue to front Earth & Fire
- Sweet taste – tip of tongue linked with Water & Earth

- Vata tongue – Small cracks all over the tongue; dry, dark tongue; film over the back of the tongue; rough back area; small dark pimples; and black to brown coloration on the tongue.
- Pitta tongue – Red tongue; white cold sores; bumps or bright red patched areas in the middle of the tongue; greenish or yellowish film on the tongue; and film on the middle section of the tongue.
- Kapha tongue – White thick coating tongue; oily film on the tongue; depressions or bumps on the front portion of the tongue; and tip of the tongue whitish or coated.

#### Bitters in TCM

Yin, downward moving  
Cooling consolidating, drying, hardening  
Sedating



Moves blood  
Disperses excess spleen energy  
Improves assimilation and nourishment  
Tonifies kidneys

Excess bitter can bring coldness that damages lungs and suppresses wei qi

#### **Choleretics**

Increase production of bile

Active hepatic stimulants

- Bitters, depuratives, alteratives

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#### **Cholagogues**

Open the channels, promote flow and elimination

- Relaxants and de-obstruants

## Bitters – secondary actions

- Bitter nervines – hops, lavender, chamomile, passionflower, motherwort
- Bitter anti-microbials – goldenseal, Oregon grape
- Bitter mood elevator – damiana, gentian
- Warming bitter – angelica, calamus
- Cooling bitter – wormwood, feverfew
- Bitter anti-inflammatory – yarrow, chamomile, calendula

## Contra-indicated in

- Pregnancy
- Kidney stones
- Acute gall bladder disease
- Gastro-esophageal reflux or hiatal hernia
- Gastritis
- Peptic ulceration

## Bitter foods

Kale	Turmeric
Dark chocolate	Fenugreek seeds
Nettles	Leafy greens
Dandelion	Barley
Parsley	Basil
Cilantro	Jicama
bitter melon and gourd	Lettuce
Japanese eggplant	

Dietary phytonutrients found in vegetables and fruit appear to lower the risk of cancer and cardiovascular disease. Studies on the mechanisms of chemoprotection have focused on the biological activity of plant-based phenols and polyphenols, flavonoids, isoflavones, terpenes, and glucosinolates. Enhancing the phytonutrient content of plant foods through selective breeding or genetic improvement is a potent dietary option for disease prevention. However, most, if not all, of these bioactive compounds are bitter, acrid, or astringent and therefore aversive to the consumer. Some have long been viewed as plant-based toxins. As a result, the food industry routinely removes these compounds from plant foods through selective breeding and a variety of debittering processes. This poses a dilemma for the designers of functional foods because increasing the content of bitter phytonutrients for health may be wholly incompatible with consumer acceptance. Studies on phytonutrients and health ought to take sensory factors and food preferences into account.

*Am J Clin Nutr* December 2000 vol. 72 no. 6 1424-1435 Bitter taste, phytonutrients, and the consumer: a review, Gomez-Carneros

### The world's most dangerous flavour: How bitter is making a comeback

CHRIS NUTTALL-SMITH The Globe and Mail Published Tuesday, Sep. 16 2014

**Buy some chocolate.** Every day for 10 days, eat a small piece of cheap milk chocolate, followed by a piece of 65 per cent cocoa chocolate, and then a piece of 85 per cent cocoa chocolate (the most bitter), letting them melt slowly on your tongue. "They say it takes 10 tries of a food to adjust your palate,"

**Eat your tea.** Pour hot Earl Grey over prunes, add a piece of orange peel, and let it steep in the fridge for a couple of days. The taste is only slightly bitter – and fabulously complex.

**Cut the bitter with fat.** Braise some endive leaves in butter and a bit of salt until they turn caramelized and golden.

**Eat some walnuts.** Whether in a Waldorf salad, a lightly sweetened cake or as a substitution for pine nuts in Italian pesto, walnuts add a mildly tannic-bitter interest. Just don't peel their skins or blanch them in water first, McLagan warns – it takes away walnuts' goodness.

**Drink a Negroni.** Combine one part each of gin, sweet vermouth and Campari over ice in a glass. Add an orange twist and stir.