BITTER MELON

Momordica charantia L.

Family

Cucurbitaceae, known as the gourd family which includes cucumber, pumpkin and zucchini. This family is characterised by creeping vines and often produces edible fruits rich in water and nutrients.[1]

Parts Used

Fruit.

Description

Native to tropical Asia but now naturalised across Africa, the Americas and northern Australia, bitter melon is a tropical perennial vine that produces distinctive, deeply ridged fruit with a warty exterior and a pronounced bitter taste. The plant is fast-growing and climbing, with deeply lobed, dark green leaves and yellow flowers. The generic name *Momordica* means “to bite” referring to the jagged edges of the leaf, which appear as if bitten. Its odd fruit resembles a distorted cucumber making it one of the strangest looking of all vegetables. The fruit is bright green when immature, turning bright yellow-orange as it ripens, at which point it splits open to reveal seeds encased in vivid red arils. The number and shape of the bumps on their skin is characteristic of different varieties, as is the overall shape, and various ethnic groups have strong favourites in this regard. For example, the short, dark green and sharply lumpy bitter melons favoured in Vietnam look quite different to the longer, smoother and light green varieties grown in Japan. Fruit increase in bitterness as they mature, becoming inedible if left until they start to turn yellow. They are usually picked when green-mature, at about 15 to 25cm long.[2,3]

Sustainability

No major sustainability concerns are currently associated with bitter melon. It is widely cultivated as a food crop and grows readily in a range of environments. However, due to its hardy fast-growing, vining habit, escaped cultivation has led to invasive spread in some subtropical regions of Australia. Responsible cultivation and harvesting are recommended, especially when sourcing wild material.[4]

Traditional and Empirical Use

Despite its culinary use in various cultures, bitter melon, also known as bitter gourd, bitter apple or balsam pear, is most prized for its medicinal potential particularly in traditional systems of medicine such as Ayurveda, traditional Chinese medicine (TCM) and Unani. In these systems the seeds, fruit, leaves and root of the plant have been used to treat a variety of ailments including digestive disorders (such as diarrhoea and colic), fever, skin conditions, microbial infections, menstrual stimulation, wound healing, inflammation, hypertension and as a laxative and emetic. The fruit is also used as a blood purifier and in managing diabetes, where it has earned significant recognition. Like so many other bitter plants, it is traditionally used as a digestive and appetite stimulant, as well as to support balanced blood sugar and lipid levels.[5,6]

In TCM it is known as *ku gua* and is considered a bitter, cooling herb entering the heart, lung, spleen and liver meridians. It is used to cleanse the blood, clear liver heat, cool summer heat, nourish the blood, move Qi, eliminate inflammation and tonify the liver. Bitter melon soup is a traditional remedy for summer heat, liver fire and diabetic symptoms.[7]

In Ayurveda bitter melon is known as *karela* and classified as *tikta* (bitter) and *katu* (pungent) in taste. This pungency works hand-in-hand with the bitter quality to stimulate digestion, a quality known in Ayurveda as *deepana* (stoking *agni*, the digestive fire). Because Ayurveda considers bitter plants to be cooling in nature, and pungent plants to be heating, bitter melon is recognised as a somewhat energetically balanced herb that may be appropriate for all doshas (vata, pitta and kapha) if given in the appropriate dose and circumstance. It is contraindicated in cases of pronounced coldness, deficiency or dryness where its intense bitterness may be too depleting.[8]

Bitter melon entered Western herbal discourse primarily through ethnobotanical studies and clinical interest in its glycaemic effects. One of the first case reports published in a mainstream medical journal described a 40-year-old Pakistani woman with diabetes, whose urine sugar levels were reportedly reduced after incorporating bitter melon into her regime. Prior to this she had struggled to control her diabetes with conventional drug therapy (chlorpropamide) and dietary restrictions. The addition of bitter melon allowed her to reduce her dose of chlorpropamide, prompting physicians to be cautious of potential food-drug interactions, especially among Indian and Pakistani diabetic patients who may also be consulting herbal practitioners. Beyond metabolic syndrome, bitter melon's uses have expanded to include immunomodulation, antiviral activity and liver support. Today many practitioners use it as an adjunct in treating insulin resistance, polycystic ovary syndrome and even mild autoimmune conditions with metabolic overlap. In culinary traditions, bitter melon is not only valued for its distinct taste but also for its ability to stimulate digestion and appetite, particularly in hot, humid climates where stagnation and damp-heat conditions are common.[9]

Cooking Tips

Bitter melon is used extensively in several Asian cuisines. All parts of the plant, including the fruit, are extremely bitter. They need to be prepared correctly to avoid an unpleasant eating experience. Bitter melons are not normally peeled, although any rough parts on the skin may be scraped off. It is important to remove the internal pith and seeds. The seeds especially should never be eaten as they can have purgative effects. Some of the bitterness can be removed by generously salting the flesh, leaving for at least 10 minutes and then rinsing in cold water to remove the bitter juice (similar to eggplant). It may be simply boiled or steamed, added to curries, stir fried or even sliced thinly for use in salads. A popular recipe involves stuffing the hollowed-out gourd with pork mince and baking. They are best when

combined with other strongly flavoured ingredients such as black bean paste, garlic or chilli.[10]

Here is a typical recipe for bitter melon popular in Bangladesh.

Bitter Melon Fry with Potato

Ingredients:

- Bitter melon (finely chopped): 100g
- Potato (finely chopped): 1-2 (whole potato)
- Onion: 1 full (finely chopped)
- Garlic paste: 1/2 tablespoon
- Hot chilli: 2 pieces
- Turmeric powder: 1/2 tablespoon
- Oil (avocado): 1-2 tablespoon
- Salt: to taste

First fry the chopped onion, garlic and chilli together with avocado oil in a pan. Add some turmeric powder and salt and fry gently. After finishing this stage add chopped bitter melon and potato into the fried onion and fry until the potato and bitter melon brown on their surface. Serve it with warm rice or paratha bread.[11]

Constituents

Cucurbitane-type triterpenoids (charantin, momordicines), cucurbitane-type triterpene glycosides (goyaglycosides), proteins and peptides (such as polypeptide-p, a plant insulin), flavonoids (luteolin, quercetin, kaempferol), phenolic acids (gallic acid, caffeic acid), sterols (beta-sitosterol, stigmasterol), alkaloids (mormordicine), vitamins and minerals, fatty acids and volatile oils.[12]

Actions

Hypoglycaemic, anti-inflammatory, antioxidant, antibacterial, antiviral, antifungal, digestive aid, hepatoprotective, hypoglycaemic, adaptogen, cholagogue, vermifuge, immunomodulatory, emmenagogue (in high doses).

Pharmacological Activity

Much of the modern research on bitter melon has focused on its potential role in managing type 2 diabetes and metabolic syndrome. Although human clinical trials are few in number, and often limited by small sample sizes and varying extract preparations, some show promise. Short-term studies indicate that bitter melon juice, capsules or aqueous extracts can modestly reduce fasting blood glucose and postprandial glucose levels in individuals with impaired glucose tolerance or type 2 diabetes. Animal and *in vitro* studies have consistently demonstrated that extracts of bitter melon can lower blood glucose levels, enhance insulin secretion, increase glucose uptake by cells and improve lipid metabolism.[13]

Evidence for lipid-lowering effects, liver protection and cancer-preventive activity is still preliminary and largely based on *in vivo* models. Preclinical studies suggest that bitter melon also possesses antioxidant and anti-inflammatory properties, helping to mitigate oxidative stress and inflammatory cytokine production, mechanisms involved in chronic diseases including atherosclerosis, non-alcoholic fatty liver disease and diabetic complications. Some preclinical studies have reported antimicrobial activity against pathogens such as *Escherichia coli, Staphylococcus aureus, Candida albicans* and certain parasitic worms, supporting its traditional use for gastrointestinal and skin infections.[14,15]

Hypoglycaemic and Weight Loss Activity

Bitter melon may help lower the body's blood sugar. This is because it has properties that act like insulin which helps bring glucose into the cells for energy. While results are promising, small study sizes, shorter duration of treatments, variability in preparation and dosing remains a confounding factor across clinical trials.[16]

The results of a June 2025 randomised, placebo-controlled study suggest that bitter melon extract may help maintain healthy glucose levels in individuals with prediabetes, with the high-dose regime offering more substantial benefits. Seventy-five adults were divided into three groups: a low-dose (300mg/day), high-dose (600mg/day) and a control group. The results showed that both bitter melon groups experienced smaller increases in blood glucose levels compared to the control group at 12 weeks, with the high-dose group demonstrating a significant reduction in glycated haemoglobin levels. Specifically, the high-dose group showed a median decrease of -0.20%, while the control group showed no significant change.[17]

Earlier clinical studies on bitter melon show mixed results for blood sugar control in people with impaired glucose tolerance or prediabetes. A small trial found no effect on glucose or insulin after a single dose, while a larger 12-week study reported reduced blood glucose levels after a glucose challenge but no improvements in insulin or related markers. The 12-week randomised, placebo-controlled clinical trial evaluated bitter melon extract in 65 Korean adults with prediabetes. Participants taking bitter melon extract showed significantly lower postprandial glucose levels during an oral glucose tolerance test, with the most notable reduction at 30 minutes and sustained improvement at 120 minutes compared to baseline. This effect appeared linked to reduced glucagon secretion rather than changes in insulin resistance or secretion. The findings suggest bitter melon may help improve postprandial glucose regulation in prediabetes through modulation of glucagon levels. However, the reliability of these findings is limited by methodological issues including lack of statistical correction for multiple comparisons.[18,19]

A 2024 meta-analysis reviewed the effects of bitter melon on glycaemic control and lipid profiles in individuals with type 2 diabetes mellitus. Eight randomised controlled trials (n=423) were included in the analysis, which revealed that bitter melon supplementation led to significant reductions in fasting blood glucose, postprandial glucose and glycosylated haemoglobin A1c (HbA1c). Additionally, total cholesterol levels were notably reduced, while no significant changes were observed in triglycerides, high-density lipoproteins (HDL) or low-density lipoproteins (LDL). These findings suggest that bitter melon may offer a beneficial role in managing glycaemic control and lipid profiles in type 2 diabetes mellitus patients.[20]

A meta-analysis of 10 low-quality studies on patients with type 2 diabetes found that taking bitter melon in doses of 0.5 to 12g daily for 4-16 weeks reduced fasting blood glucose (FBG) by 13 mg/dL (milligrams per decilitre), postprandial glucose by 26mg/dL, and HbA1c by 0.26% compared with placebo. Another meta-analysis of seven trials showed a modest reduction in HbA1c by 0.3% and FBG by 14mg/dL when compared to no treatment. However, a separate analysis of two trials indicated that bitter melon did not improve these outcomes compared with oral antidiabetic drugs. Additionally, a meta-analysis of three trials showed no significant improvement in FBG or HbA1c with bitter melon supplementation (1-6 grams daily for 4-12 weeks) compared to placebo.[21]

A very small clinical study in patients with obesity found that taking bitter melon (1g twice daily for 12 weeks) did not improve weight or body composition compared to baseline. However, when compared to placebo, participants lost approximately 4kg in weight and 1.6 kg/m^2 in BMI, while the placebo group showed increases suggesting a potential regulatory effect on weight gain.[22]

Gastrointestinal Activity

Bitter melon enhances bile secretion and improves lipid digestion. Traditional use as a vermifuge aligns with studies showing efficacy against intestinal parasites. Some preclinical evidence suggests bitter melon may promote epithelial regeneration and reduce intestinal permeability, making it relevant in irritable bowel syndrome with diarrhoea and dysbiosis.[23]

Cardiovascular Activity

Through its impact on glycaemic control, lipid profiles and antioxidant activity, bitter melon may reduce cardiovascular risk markers. Clinical trials show modest reductions in LDL, triglycerides and blood pressure in metabolic syndrome cohorts.[24]

Adaptogenic Activity

Preliminary clinical research in ten male tennis players participating in high-intensity training in high summer temperatures shows that taking at hot water extracted bitter melon drink supplement orally (100mL six times daily for 4 weeks) improves biomarkers of fatigue and physical fitness parameters, including balance, flexibility and cardiorespiratory fitness. Additionally, levels of adrenocorticotropic hormone and cortisol were decreased, suggesting a reduction in exercise-induced stress and supporting potential adaptogenic effects.[25,26]

Indications

- Diabetes, insulin resistance, metabolic syndrome, polycystic ovarian syndrome, mild autoimmune conditions (where metabolic dysregulation is present)
- Weight management
- Liver and gallbladder support, hepatitis, non-alcoholic fatty liver disease
- Sluggish digestion, indigestion, bloating, constipation, poor appetite, chronic dysbiosis, especially in hot, damp constitutions or climates
- Skin conditions such as acne, eczema and boils, particularly when associated with 'heat' or internal toxicity
- Parasitic and microbial infections: Traditional use for intestinal worms and skin infections
- Viral infections (adjunctive)

Energetics

Bitter melon is classified as bitter, cooling, drying, purgative and strongly detoxifying. It is commonly used in excess heat conditions such as inflammation and fever. It helps cool and detoxify the body making it useful in inflammatory and metabolic disorders or hepatic excess.[27]

Use in Pregnancy

Not recommended during pregnancy due to its potential to stimulate uterine contractions and induce miscarriage.[28]

Contraindications and Cautions

Bitter melon is generally considered safe.

In rare cases, in sensitive individuals, bitter melon may cause mild gastrointestinal symptoms such as abdominal cramping or diarrhoea, due to its bitter compounds, especially when taken in large doses or on an empty stomach. It should be taken with caution by individuals with sensitive stomachs or gastrointestinal issues. Overuse of the juice can cause headaches and possible fevers.

It is also unsuitable for individuals with pronounced deficiency states, particularly those who are underweight, fatigued or have a cold digestive constitution, as its intense bitterness may aggravate these conditions.

People with Glucose-6-Phosphate Dehydrogenase (G6PD) deficiency may develop haemolytic anaemia from ingesting bitter melon seeds due to the presence of vicine, a compound related to those in fava beans. It is advised that patients with G6PD deficiency avoid bitter melon. G6PD is a genetic condition where the body lacks enough of the enzyme G6PD, which plays a key role in protecting red blood cells from damage.[29]

Drug Interactions

Caution with antidiabetic drugs: Bitter melon can lower blood glucose levels and may have additive effects when used with antidiabetic drugs. This could increase the risk of hypoglycaemia in some patients. Close monitoring of blood glucose levels is advised.[30]

Caution with P-glycoprotein (P-gp) substrates: Bitter melon may inhibit the P-gp intestinal pump, potentially increasing levels of P-gp substrates. *In vitro* studies show that 1-monopalmitin, a bitter melon compound, raises daunomycin levels. Bitter melon may increase levels of pazopanib (a cancer medicine that is used to treat patients with kidney cancer (advanced renal cell carcinoma)), potentially raising the risk of adverse effects. A case report describes a 65-year-old patient who developed acute pancreatitis after consuming 100-150mL of bitter melon juice daily while on pazopanib. Symptoms improved after discontinuing both bitter melon and pazopanib. Researchers believe bitter melon inhibited P-gp, leading to higher pazopanib levels and triggering pancreatitis.[31]

Caution with anticoagulants/antiplatelets: *In vitro* inhibition of platelet aggregation warrants caution.[32]

Caution with CYP450 substrates: There is limited evidence regarding interactions with other pharmaceuticals but theoretical concerns exist around combining bitter melon with medications that are sensitive to alterations in liver enzyme activity, especially CYP450 substrates. Preliminary data suggests modulation, especially CYP3A4. Further study is needed.[33]

Caution with fertility medications: Animal data shows antifertility effects so avoid if conception is desired.[34]

Bitter Melon and GLP-1 Agonists (e.g. Ozempic): There is no documented major interaction on Ozempic, but case reports and small studies suggest additive effects. If a patient is well-controlled, adding bitter melon could tip the balance especially in those with variable dietary intake or concurrent medications.

- Potential for synergistic glucose-lowering
- Overlapping gastrointestinal effects (nausea, reduced appetite
- Use cautiously and with individualised assessment

Bitter melon may exert additive hypoglycaemic effects when used alongside GLP-1 receptor agonists such as Ozempic (semaglutide). While Ozempic lowers blood glucose by enhancing insulin secretion, delaying gastric emptying and reducing appetite, bitter melon works through insulin-mimetic action (polypeptide-p), increased peripheral glucose uptake and improved hepatic insulin sensitivity. Combined, these actions may increase the risk of hypoglycaemia, particularly if used with additional antidiabetic agents.

Clinical Consideration: Monitor patients closely when combining bitter melon with Ozempic or similar medications. Consider starting with a low dose of bitter melon and assess for signs of hypoglycaemia or excessive appetite suppression. Avoid use in constitutionally cold or depleted individuals, especially those experiencing Ozempic-related gastrointestinal symptoms.[35]

Clinical Tips for Practitioners

Monitor Blood Sugar Levels

When prescribing bitter melon for diabetes encourage patients to monitor their blood glucose levels regularly.

Metabolic Support and Blood Sugar Regulation

Bitter melon is a valuable herb for supporting patients with type 2 diabetes or insulin resistance. Its hypoglycaemic effect is best used as part of a broader protocol that includes dietary and lifestyle support. Consider combining with gymnema or cinnamon for enhanced glycaemic control and always monitor for potential additive effects if the patient is on medication.

Skin Conditions with Metabolic or Hepatic Drivers

For patients presenting with acne, boils or eczema associated with poor clearance and systemic inflammation, bitter melon may be included in formulations targeting liver detoxification and blood purification. Combine with burdock or sarsaparilla for best results.

Digestive Sluggishness with Signs of Heat and Damp

Bitter melon may be helpful for those with digestive bloating, heaviness after meals and signs of internal heat, particularly in humid or hot climates. Warming carminatives such as ginger may be included to temper its cold energetics. Consider combining bitter melon with gentian or celandine to improve bile secretion and digestive function.

Parasitic or Microbial Infections

Bitter melon has traditional use for microbial and parasitic infections, particularly of the gastrointestinal tract. It may be included in formulas for intestinal dysbiosis, SIBO or amoebic infections, alongside herbs like garlic or pomegranate fruit peel.

Liver and Metabolic Detoxification

Consider using bitter melon in metabolic detoxification protocols, especially in patients with elevated liver enzymes, fatty liver or metabolic syndrome. Its action is enhanced when paired with hepatics such as schizandra, St. Mary's thistle or turmeric.

Combine Synergistically

For complex presentations, combine with:

- **Gymnema** for synergistic hypoglycaemic action in diabetes protocols
- **Cinnamon** for glucose regulation and warming balance
- **Burdock** for skin and liver conditions where detoxification is needed
- **Schizandra** for hepatic support with adaptogenic benefit
- **Ginger** to stimulate digestion and circulation and to offset bitter melon's cold properties
- **Sarsaparilla** for skin eruptions and rheumatic conditions with toxicity
- **Turmeric** to enhance antioxidant and liver-protective actions
- **St. Mary's thistle** for liver detoxification and protection

Administration and Dosage

Liquid Extract:	1:2
Alcohol:	55%
Weekly Dosage:[47]	20 to 40mL [35]

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