

# Soap bark tree

## Quillaia

### Q. Saponaria



Soap bark tree has a long history of medicinal use with the Andean people who used it as a **treatment for various chest problems**. It is the source of quillaia, the extract of which is used as a food additive and as an ingredient in pharmaceuticals, personal care products, and fire-fighting foam.

No reliable clinical trials support use of quillaja for any indication. Quillaja has been used orally in traditional medicine to relieve cough and bronchitis, and topically to relieve scalp itchiness and dandruff. Reports show that quillaja can depress cardiac and respiratory activity and induce localized irritation and sneezing.

## Toxicology

Quillaja is approved for use in the United States as a natural flavoring or substance in conjunction with flavors. It is likely safe when used in amounts found in food. Quillaja is toxic when ingested orally in large amounts. Severe toxic effects following the ingestion of large doses of the bark include liver damage, gastric pain, diarrhea, hemolysis, respiratory failure, convulsions and coma.

## Scientific Family

Rosaceae

## Botany

Quillaja is a large evergreen tree with shiny, thick leaves that grows to 18 m by 6 m. Roner 2010 The generic name is derived from the Chilean word quillean, meaning "to wash," due to the bark's use as a cleansing aid. It has an acrid, astringent taste. Although quillaja is native to Chile and Peru, it is

now widely cultivated in southern California. The inner bark is separated from the cork and collected for commercial use.



## History

Quillaja has been used orally in traditional medicine to relieve cough and bronchitis, and topically to relieve scalp itchiness and dandruff. The bark has been used in South America to aid in washing clothes. Quillaja extracts are approved for food use and are used as foaming agents in some carbonated beverages and cocktail mixes, typically in concentrations of approximately 0.01%. Leung 1980 Saponins were first studied in 1925 as an adjuvant to enhance antibody response against diphtheria and tetanus. Currently, they are used as adjuvants in vaccinations.

### Uses and Pharmacology

#### Antimicrobial Effects

The use of saponins may produce virucidal activity through interaction of the viral envelope, causing destruction of the cell membrane and a loss of viral binding sites. Roner 2007

#### Animal/In vitro data

In mice, quillaja saponin was found to enhance the immune response by stimulating macrophages. Naknukool 2011 In an in vitro study, saponins from *Q. saponaria* demonstrated activity against *Trichomonas vaginalis*, with maximum cytotoxicity noted at 0.025%. Rocha 2012 Another in vitro study, quillaja saponin extracts exerted antibacterial effects against *Staphylococcus aureus* and also demonstrated hemolytic activity.

In another in vitro study, quillaja extracts were found to possess antiviral activity against cells infected with rotavirus and reovirus. Specifically, these effects were noted at concentrations 1,000-fold lower than concentrations that demonstrate cytotoxicity. In addition, cells treated with quillaja were resistant to infection for 16 hours after removal of quillaja exposure. However, 24 hours after being removed from quillaja, infection rates were similar to those of untreated cells, demonstrating a lack of sustained effect after quillaja treatment.

In a separate in vitro study, *Q. saponaria* did not inhibit the growth of *Escherichia coli* strains, but instead increased multidrug-resistant strains of *E. coli* at quillaja concentrations between 6 and 12 mcg/mL. Quillaja also enhanced *E. coli* growth in the presence of antibiotics tested. Arabski 2012

#### Clinical data

No clinical data exist regarding the use of *Q. saponaria* for its antimicrobial effects.



#### Cancer

Because of toxicity concerns, *Q. saponaria* fractions have been converted into stable nanoparticles that have been studied for their cytotoxic effects. Hu 2010

#### Animal/In vitro data

The nanoparticulate quillaja saponin blocking and balancing effect particles selectively induced caspase activity and apoptosis in a renal cell carcinoma cell line. Hassan 2013

In another in vitro study of human leukemia cells, killing and growth-inhibiting particles, as well as blocking and balancing effect particles, exerted cytotoxic effects. Specifically, the killing and growth-inhibiting particles demonstrated cytotoxic effects against 9 of 10 cells lines, while blocking and balancing effect particles demonstrated cytotoxic effects in only 1 of 10 cell lines. Hu 2010

#### Clinical data

No clinical data exist regarding the use of *Q. saponaria* for its effects against cancer.

