

Economic Botany

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Drug yielding plants



Biological source:

Dried bark of cultivated trees of *Cinchona calisaya*
Cinchona officinalis
Cinchona succirubra
Cinchona ledgeriana

Family : *Rubiaceae*

CINCHONA

- **Synonyms:** Cinchona Bark, Peruvian Bark, Cinchonae Cortex
- **Botanical source:** Cinchona consists of the dried bark of various species, races and hybrids of Cinchona, particularly of *Cinchona succirubra* Pavon (Red Cinchona), *Cinchona calisaya* Weddell (Yellow Cinchona), *Cinchona ledgeriana* Moens, and *Cinchona officinalis* Linn. Cinchona species are large trees. They belong to the family Rubiaceae.
- **Geographical source:** Cinchona is indigenous to Colombia, Ecuador, Peru and Bolivia and cultivated commercially in Java (Indonesia) and India.

Cinchona

Geographical source :

- Native of South America
- Cultivated in Indonesia (Java), Zaire, India, Sri Lanka, Kenya, Bolivia, Columbia, Ecuador, Guatemala
- In India in Annamallai hills and Nilgiri hills in Tamil naidu, Darjeeling of West Bengal, Karnataka, Assam and Sikkim



Fig.52.2 Cinchona plant

Drug yielding plants

- Cinchona

- Morphology
- Evergreen shrub/tree
- Leaves-opposite, simple, entire
- Flowers- small, fragrant borne in terminal panicles
- Fruit-oblong to ovoid-lanceolate capsule with numerous seeds

Cinchona



Cinchona



Cultivation, Collection and Preparation

- A plant of the moist tropics, where it is found at elevations from 1,500 - 3,000 metres.
- It grows best in areas where annual daytime temperatures are within the range 14 - 23°C, but can tolerate 7 - 27°C.
- It can be killed by temperatures of 7°C or lower.
- It prefers a mean annual rainfall in the range 2,500 - 3,500mm, but tolerates 1,400 - 4,000mm.

Cultivation and collection

- Most of the cinchona found in tropical & sub tropical regions about 1000-3000 m.
- Rainfall required are uniform 250-380 cm/year .Favorable growth is achieved at 60-75°F.
- Cinchona requires light well drained forest soil with rich organic matter.
- The acidic soil having a P^H of 4 -5.6 and small amount of nitrogen imp for favorable growth.
- It requires high humidity and slopping situation, protection from wind.
- The propagation is done by seeds or budding or layering.
- The seeds of cinchona are very small, light in weight (1 gm = 3500 seeds).
- Germination takes place in 3-6 weeks.
- The seedlings with 2 pairs of leaves are transplanted and space of 6 – 10 cm, at a distance of 2 x 2 meters .
- Plants of 4 to 20 years are selected for harvesting, bark is collected by coppicing method, dried at 175 °F.(care to be take to avoid fermentation) .

Cinchona cultivation in North Bengal



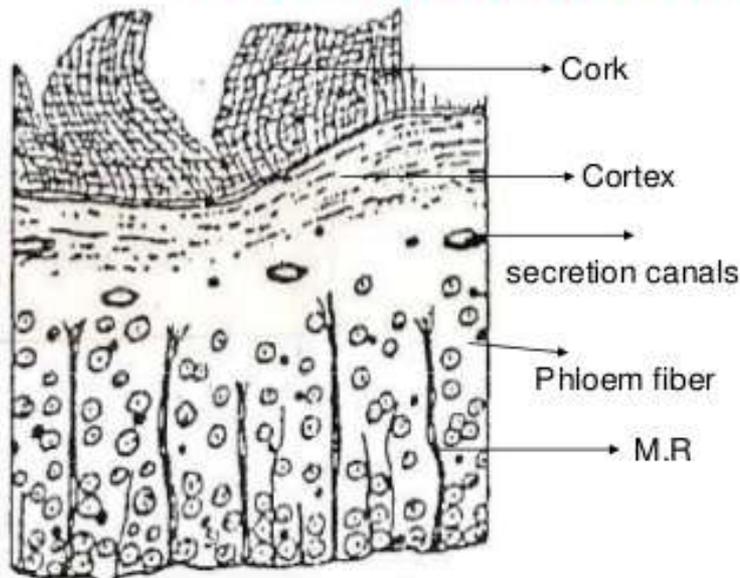
Plantation Work



Bark of Cinchona



T.S. in Cinchona bark



1. Cork: 5-8 layers of thin walled flattened cells with reddish brown content (cinchotannic acid).

2. Cortex: Thin wall parenchyma cell contain rounded starch granules, micro prisms of calcium oxalate, secretion canals (laticiferous cells) which secretes latex and tannins appear oval in T.S.

3. Phloem: Characterized by phloem fibers.

- **Description of fiber:** Fusiform lignified fiber having striated walls and funnel shaped pits.

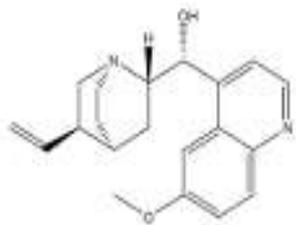
- **Phloem parenchyma:** Thin walled parenchyma with scattered calcium oxalate prisms.

Uses and Health Hazards

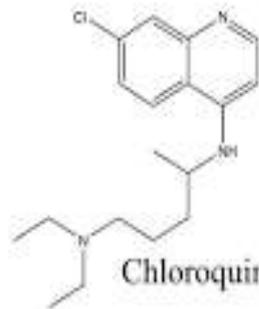
- The bark of the tree (about 12 yrs old) is the source of drug quinine.
- The bark contains about 30 alkaloids. Some are cinchonine, quinidine, cinchonidine etc.
- It also contains cinchotannic acid, quinic acid, tannins, gums, starch and volatile oils.

Chemical Structure of Some Cinchona alkaloids

Although chloroquine was inspired by the antimalarial activity of quinine, its chemical structure (and pharmacological properties) are quite different from the natural compounds found in cinchona bark.

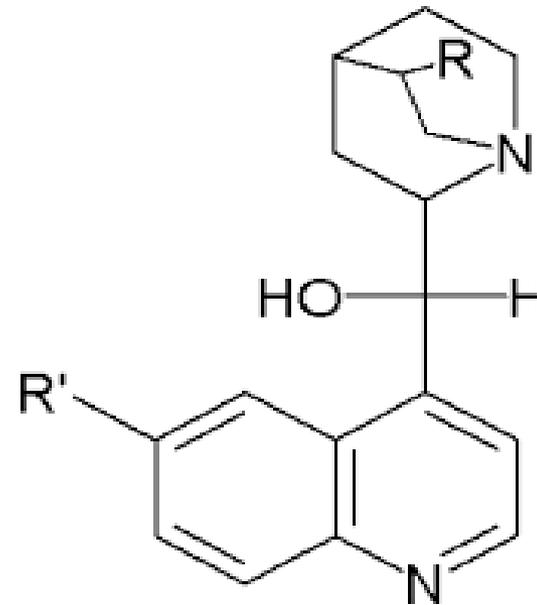


Quinine



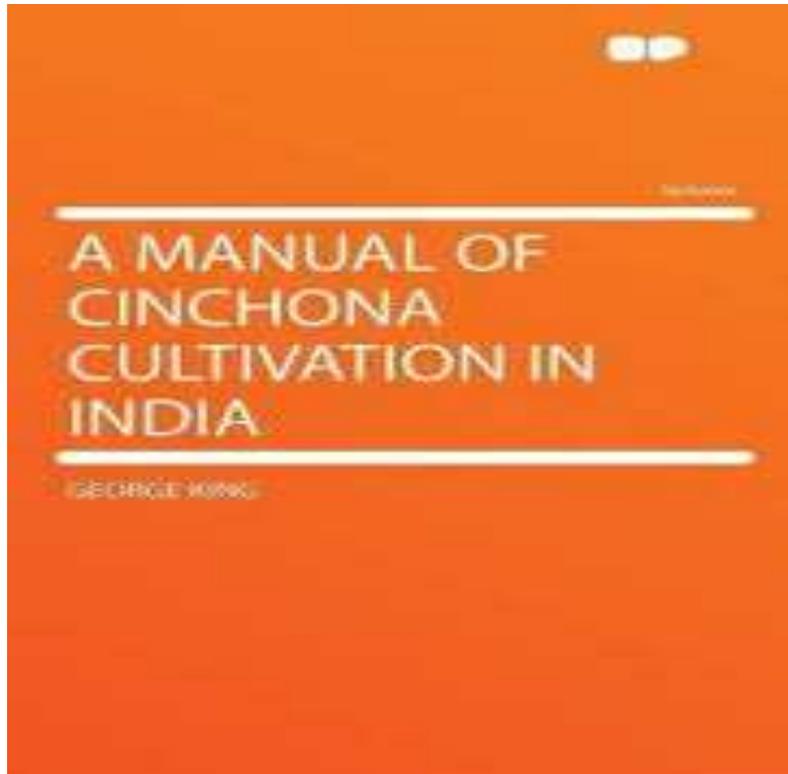
Chloroquine

The different chemical structures of quinine and chloroquine. [Creative Commons](#)

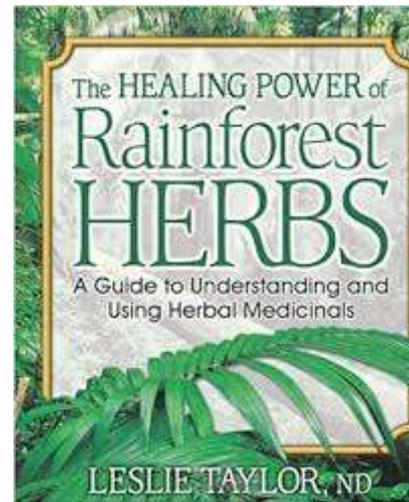
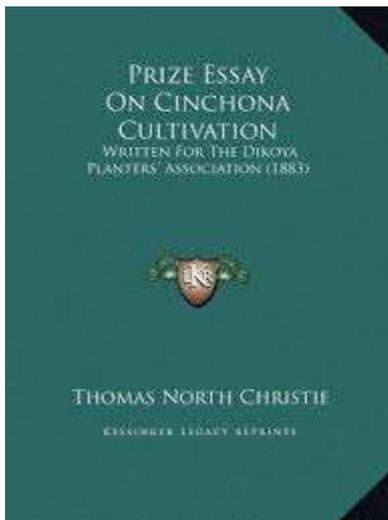


- Quinine is used for the treatment of malarial fevers, whooping cough, hay fever, enlargement of spleen, septic fevers etc.
- Locally used as an antiseptic in abscesses, cavities, ulcers, for gargles in sore throat.
- Quinidine, cinchonidine and cinchonine are used as antipyretics.

References



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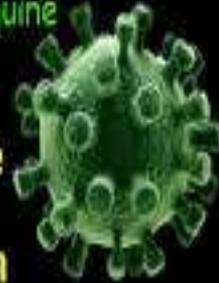


Cinchona to Corona

Chloroquine / Hydroxychloroquine



Watch and Know the
plantation history in
Darjeeling Mungpoo.



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