Why Artemisia stems are more important than leaves for antimalarial infusions.

There are many anecdotic reports indicating that including stems and twigs with dried Artemisia leaves augments the power of the infusion. Operators of a palm oil plant in Burundi only drink infusions made with stems and stay malaria free.

Dried Artemisia annua herb of Chinese origin and sold in European pharmacies contains at least 70 % of stems.

High vitamin E and magnesium contents are detrimental during a malaria infection. Artemisia annua leaves contain 22.63 mg/kg of vitamin E and only 1.19 mg/kg in stems. Leaves contain 7.1 ppm of magnesium and stems only 1.7 ppm.


Bicarbonate contents are much higher in roots and stems than in leaves. Bicarbonate enhances the inhibition of hemozoin by Artemisia plants. This inhibition is also the key mechanism of quinine efficacy. For Artemisia infusions it is stronger for stems than for leaves.

Artemisia plants are rich in the ambiphilic surfactant saponin. Based on literature data on vegetables and medicinal plants our best estimate for saponins in Artemisia plants is around 1% versus 0.4 % in vegetables. There are many anecdotic claims that *Artemisia annua* stems are richer in saponins than leaves.

Often the concentration of potassium is higher in stems than in leaves, in artichoke for example, in rice, in tomatoes.


US patent 6337095 finds a concentration of 0.3 % of scopoletin in the stems and only 0.2 % in the leaves of *Artemisia annua* and uses the stems for commercial scopoletin extraction.

A more recent paper from Iran finds 340 mg/100 g of condensed tannins in *Artemisia annua* leaves and only 30 mg/100g in stems,

Mazandarani, M.; Majidi, Z.; Zarghami-Moghaddam, P.; Abrodi, M.; Hemati, H.; Fathiazad, F *Essential oil composition, total phenol, flavonoid, anthocyanin and antioxidant activities in different parts of Artemisia annua L. in two localities (North of Iran).* Journal of Medicinal Plants and By-Products 2012 Vol.1 No.1 pp.13-21 ref.50

The presence of tannins in Artemisia plants may explain the surprisingly high solubility of other constituents in tea infusions. As it is the case for the solubility of resveratrol in wine and not in pure water. Tannins also contribute to the inhibition of CYP3A4 which enhances the efficiency of many drugs. The University of Brussels has shown that Artemisia infusions dramatically inhibit CYP3A4, even more than the known strong inhibitor grapefruit.


Lazaridi Kristina. *Invloed van de chemische samenstelling van Artemisia annua op CYP3A4-activiteit en antioxidant vermogen.* Tesis VUB 2014

Artemisia plants are rich in fungal endophytes with a great variety in species. Different fungal communities colonize stems and leaves. This may explain why it is claimed that it is important to keep twigs and stems in dried *Artemisia annua* for tea infusions.

I Purwantini, R Asmah, Isolation of Endophytic Fungi from Artemisia annua and identification of their antimicrobial compound. Internat J Phar and Pharmaceut Sc, 2015 7,12,

There are more chlorogenic & caffeoylquinic acids in stems than in leaves. This is also the case for other plants.

Characterization of phenolic constituents and evaluation of antioxidant properties of leaves and stems of Eriocephalus africanus. MD Catarino, A.Silva, Arabian Journal of Chemistry. Volume 11, 1, 2018, 62-69

The cytotoxicity of Artemisia absinthium ethanolic stem extract is much higher than that of leaves against A375 melanoma cells and against MCF7 human breast adenocarcinoma cells.