Review: The Potential of Sarang Semut (*Myrmecodia* spp) as Medicinal Plants

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**Abstract.** Sarang semut (*Myrmecodia* spp) is a plant that attached and hangs on to other larger plant. The stem is bubbling, and there are many spaces or cavities inhabited by ants inside. Sarang semut contain chemical compounds from the flavonoid and tannin groups which are known to be able to cure various diseases. This study aims to gather information about the efficacy of Sarang semut as a medicinal plant. The study conducted during April-May 2019 at Darmaga Campus of IPB. The method used is a literature study. One example of Sarang semut species found in Indonesia is *Myrmecodia pendans*. *Myrmecodia pendans* is one of the epiphytic medicinal plants and has the potential to be an antioxidant and to cure cancer. The crude extract of Sarang semut has an antibacterial effect on both grams positive and negative bacteria, including the bacteria *S. aureus*, *K. pneumonia*, and *S. dysentriae*. The extracts, fractions, and isolates of Sarang semut tubers proved to have antibacterial activity, antioxidant activity, immune modulator, and anticancer. Sarang semut has the potential as a medicinal plant. Sarang semut is sufficient to treat cancer, tumors, nosebleeds, stomach ulcers, hemorrhoids, heart diseases, tuberculosis, rheumatism, gout disorders, strokes, ulcers, kidney, and prostate dysfunction.

1. Introduction

Sarang semut (*Myrmecodia* spp) is a plant that attached and hangs on to other larger plant. The stem is bubbling, and there are many spaces or cavities inhabited by ants inside. Sarang semut (*Myrmecodia* spp) grow in Kalimantan, Sumatera, Papua New Guinea, Philippines, Cambodia, Malaysia, Cape York, Solomon Islands, and Papua. This plant is known as the *periok hantu*, *peruntak*, and *sembuku* in Malaysia; *by ki nan*, *ki nam gai*, and *ki nam kin* in Vietnam. While in Papua, it is known as *nongon*, *lokon*, and *suhendep*; in Kalimantan as *angkis*; in Java as *urek-urek* and *ulek-ulek polo*; in Sumatra as *Kepala beruk* and *Rumah semut* [1].

Sarang semut (*Myrmecodia* spp) belongs to the Rubiaceae family with five genera. The use of *Myrmecodia* spp as medical plants obtained from the practical experience of several residents in Papua. Generally, the part used as medicine is hypocotyl (tubers) by drinking the boiled tissue in water (decoctum) [2]. Sarang semut (*Myrmecodia* spp) contain chemical compounds from the flavonoid and tannins, which are known to be able to cure various diseases [3].

The potential of Sarang semut (*Myrmecodia* spp) as medicinal plants needs to be assessed based on the results of previous studies. Data and information about the efficacy of Sarang semut (*Myrmecodia* spp) have not well documented. This study aims to gather information about the efficacy of Sarang semut (*Myrmecodia* spp) as medicinal plants.
2. Method
The study was held in April to May 2019 at the Darmaga Campus of IPB, Bogor, West Java. The method used in this research is the literature study. This study collects data and information on the efficacy of Sarang semut plants (*Myrmecodia* spp.) derived from the results from previous studies.

3. Results and discussions
Sarang semut is part of the family Rubiaceae. *Myrmecodia, Anthorrhiza, Hydnophytum, Myrmephytum*, and *Squamellaria* are five genera belong to Rubiaceae family which has bulbs and is home for ants. The *Myrmecodia* genus is the second-most in the world, after the genera *Hydnophytum*. It estimated that the number of species of *Myrmecodia* genera is 26 species [4].

Sarang semut is usually attached to the host plant to survive. The growth of Sarang semut is highly dependent on the host plant. The more slippery the stem of the plant, the harder this plant will be found. There will be no Sarang Semut found in Slippery stem plants [5]. Conversely, Sarang Semut will be found if the stem of the plant is rough.

This plant is used traditionally in Malaysia and Indonesia as an alternative treatment for cancer and tumors, especially for breast, liver, lungs, ovaries, and brain cancers. In addition, this plant can also be used to reduce glucose levels in the blood [6]. Ethnopharmacologically, the Sarang semut has been used as medicine by rural Papuan communities, including inflammation healers, strengthening the body's immunity, and overcoming muscle pain. Local people use the tuber (hypocotyl) powder of Sarang semut as a brewed drink like tea [7]. One of the main properties is to help treat various types of tumors and cancers such as brain cancer, breast cancer, nose cancer, liver cancer, lung cancer, colon cancer, uterine cancer, skin cancer, prostate cancer, and leukemia.

Sarang semut are also useful in helping to cure various other diseases, such as heart problems, ambient (hemorrhoids), rheumatism, mild stroke or severe stroke, stomach ulcers, impaired kidney and prostate function, aching rheumatic pain, increasing the amount of breast milk, blood circulation, and restore sexual arousal [8]. People often use only a few species of this genera as medicinal plants. Plant parts often used as medicine are the tubers which have cavities as Sarang semut.

Crude extracts of the tubers of that Sarang semut have an antibacterial effect on both grams positive and negative bacteria, including *S. aureus*, *K. pneumonia*, and *S. dysentriae* [9]. Extracts, fractions, and isolates of Sarang semut tubers have been proven to have antibacterial activity and antioxidant, immune modulator, and anticancer activity [10, 11].

One example of Sarang semut species found in Indonesia is *Myrmecodia pendans*. *Myrmecodia pendans* is an epiphytic medicinal plant and has the potential to be an antioxidant and cancer treatment [12]. Boiled extract in water from the Sarang semut tubers can cure various diseases such as nosebleeds, peptic ulcers, hemorrhoids, tumors, cancer, heart disease, tuberculosis, rheumatism, gout disorders, strokes, ulcers, impaired kidney, and prostate function. In addition, it has been proven to facilitate breast milk, increase sexual arousal for men and women, and facilitate menstruation and overcome vaginal discharge [2]. The multi efficacy of Sarang semut (*Myrmecodia pendans*) strongly suspected to be related to the content of its active compounds. Especially from the flavonoid, tannins, tocopherols, multi-minerals (Ca, Na, K, P, Zn, Fe, Mg) and polysaccharides [13].

Flavonoid act as antibiotics and antivirus [14]. The mechanism of action of flavonoid compounds in overcoming cancer is by making carcinogens inactive, inhibiting cell cycles, and induction of apoptosis. Flavonoids can play a direct role as antibiotics by disrupting the function of bacterial or viral microorganisms [2]. Flavonoids also act as antioxidants that can form cell defence mechanisms against free radical damage [15]. Flavonoids can function as antimicrobial agents by forming complex bonds with cell walls and damaging membranes [16]. This compound is antimicrobial because of its ability to form complexes with dissolved extracellular proteins and microbial cell walls. Lipophilic flavonoids will damage the microbial membrane [17]. So that flavonoid compounds can inhibit the growth of Gram-positive and Gram-negative bacteria [18].

Tannins have antibacterial activity. Tannin toxicity can damage bacterial cell membranes. Tannin astringent compounds can induce the formation of a complex of binding compounds against microbial
enzymes or substrate. The formation of a tannin binding complex against metal ions can increase the toxicity of the tannin itself [19]. The mechanism of action of tannin compounds in inhibiting bacterial cells. That is by denaturing bacterial cell proteins, inhibiting cell membrane function (transporting substances from one cell to another cell) and inhibiting nucleic acid synthesis so that bacterial growth can be inhibited [20].

In addition, Myrmecodia pendans also contains tocopherol, which has a cervix and powerful effect. Tocopherol functions as an antioxidant in counteracting free radicals and as an anticancer. The judging from the womb, the Sarang semut can almost overcome various types of cancer [21]. Sarang semut are medicinal plants used to treat various types of cancer and tumors, such as brain, nose, breast, liver, lung, intestine, uterus, skin, prostate, and blood cancer [2].

4. Conclusion
Sarang semut (Myrmecodia spp) has potential as a medicinal plant. Sarang semut plant (Myrmecodia spp) is efficacious for treating cancer, tumors, nosebleeds, peptic ulcers, hemorrhoids, heart disease, tuberculosis, rheumatism, gout disorders, stroke, ulcers, impaired kidney, and prostate function.

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