***Role of Ethnobotany in modern medicine***

***1. Artemisia annua***

*Fig 1: Artemisia annua*

The Sweet Wormwood plant *Artemisia annua* (qing hao in Chinese) belonging to Asteraceae family is used in traditional and folk medicines of many Asian countries including India. It is being used as a treatment for fevers and chills in China for more than 2,000 years but it was not until 1972 that the active compound Artemisinin (qing hao su, in Chinese) was extracted by the Chinese scientist Tu Youyou and later identified as a potent antimalarial drug. This effort was part of a systematic examination of indigenous plants at that time in China as sources of new medicines. More soluble derivatives such as Artemether , Arteether and Artemotil have been developed in recent years. These medicines, in combination with other antimalarials such as Mefloquine, have proved highly effective in treating malaria, particularly the most deadly form caused by *Plasmodium falciparum* which has become increasingly resistant to the first-line treatments chloroquine and sulfadoxine-pyrimethamine in Asia, South and Central America, and Africa. Given that malaria, despite intensive efforts by the world community, continues to kill between one and three million people each year, approximately three-fourths of whom are African children, and cripple economies around the world, the importance of Artemisinin and other effective antimalarials cannot be underestimated.

Another possible use of Artemisinin is in the treatment of cancer. Its antimalarial activity is thought to be due to its interaction with iron, present in very high concentrations in the malarial parasite. Since some cancer cells, particularly leukemia cells, also have high iron concentrations, they may also be killed by artemisinin, as has been demonstrated in some initial studies with cancer cells in tissue culture. The potential of artemisinin and its derivatives as cancer

chemotherapeutic agents is being actively investigated in a variety of anticancer screens.

The combination of a high demand for artemisinin-based antimalarials and limited commercial-scale production of Artemisin (in only a few localities in China and Vietnam) has left artemisinin-based therapies in short supply. The World Health Organization has stepped in to develop a plan to boost production.

### *2. Rauwolfia serpentina*

*Rauwolfia serpentine* commonly known as the Indian snakeroot or sarpagandha is native to the Indian sub-continent and East Asia. It is a species of flowering plant in the family Apocynaceae .

The extract of the plant has been used for centuries in India for treatment of snake-bites, poisoning, hypertension, mental illness and as tranquilizers. The use of this plant in the treatment of different ailments by the tribals or the aboriginals is important as a part of their ethno-medical system. Different ethnic groups use this plant to treat snake, insect and animal bite, mental illness, schizophrenia, hypertension, blood pressure, gastrointestinal diseases, circulatory disorders, pneumonia, fever, malaria, asthma, skin diseases, scabies, eye diseases, spleen diseases, AIDS, rheumatism, body pain, veterinary diseases etc. This plant is also being used to prepare fermented food products. There are many folk-lores about the strong medicinal properties of this plant, one of which is that a mongoose would first chew upon its leaves to gain power before combating a cobra.

*Fig 2:Rauwolfia serpentina*

*R. serpentina* holds an important position in the pharmaceutical world due to the presence of various alkaloids in the roots. About 80 alkaloids are isolated from *Rauwolfia* species, among them Reserpine is most important principal active constituent which was isolated in 1952. Alkaloids of this plant have a great medicinal importance to treat cardiovascular diseases, high blood pressure, hypertension, various psychiatric diseases, mental disorders, breast cancer and human promyelocytic leukemia like diseases. Reserpine was earlier used to treat symptoms of dyskinesiain patients suffering from Huntington's disease, but alternative medicines are preferred today. Reserpine is also used as sedative for horses.

***3. Withania somnifera*:**

*Withania somnifera* , commonly known as Ashwagandha or Winter cherry belongs to the family Solanaceae .It is an important medicinal plant that has been used in Ayurvedic and indigenous medicine systems of India for more than 3,000 years.

*Fig 3: Withania somnifera*

Since ancient times various parts of this plant i.e. roots, shoots, seeds and berries are being used in daily tonics to increase longevity and vitality.In Ayurveda it is considered to be male rejuvinative tonic. It is also used in various home remedies to improve overall health. Some herbalists refer to Ashwagandha as Indian ginseng. The biologically active chemical constituents are alkaloids, steroidal lactones such as withaferins, glycosides such as saponins and many withanolides. The plant bioactive compounds have antioxidant, anti-inflammatory, and immunomodulatory activities. The plant extract and its bioactive compounds are used in the prevention and treatment of many

diseases, such as arthritis, impotence, amnesia, anxiety, cancer, neurodegenerative and cardiovascular diseases, and others.

Preclinical studies have clearly shown that ashwagandha possesses anti-inflammatory, anti-tumor, anti-stress, antioxidant, immunomodulatory, haemopoietic and rejuvenating properties. It also appears to exert a positive influence on the endocrine, cardiopulmonary and central nervous systems. In vitro and in vivo studies have also shown that ashwagandha extract and its phytochemicals prevent/protect against neurodegenerative diseases such as Parkinson's disease and Alzheimer's disease . Ashwagandha is proposed to be a potential herbal medicine for the treatment of Alzheimer's disease and the withanamides isolated from the ashwagandha fruits are reported to be effective in protecting against beta-amyloid-induced neurotoxicity. Modern scientific research has confirmed the benefits of this ancient medicine for its anti-stress, antioxidant, analgesic and anti-inflammatory activity. The most abundant compound in *W.somnifera* extract is Withaferin A which has a strong anti-cancer activity. Other withanolides have the ability to inhibit growth of human cancer cells, act as immune-modulators, immune-stimulants, anti-spasmodic and cardio-protective agents. Many researchers have worked on its anti-tumour activity and they suggest that this plant has the potential to be used as novel complementary therapy for integrative oncology care.