

Medicinal plants of India with special reference to Indian Ginseng

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India is one of the 12 mega biodiversity centers having 45,000 plant species. Knowledge of these plants for medicinal purposes in India is amassed over millennia by tribals. The scientific studies of such plants are carried out all over in India since vedic times (i.e. more than 6000 years B.C.). This science is known as Ayurveda (i.e. Ayu means life and veda means knowledge. Thus, this science is called knowledge of life, in sanskrit "Ayurveda"). This traditional knowledge is being exploited by the modern developments in science and technology to provide quick relief for ailments in the form of purified single component medicines. Plants had been the source for many lead molecules in the drug industry. World wide the use of phytopharmaceuticals is increasing at the rate of 12% as against 5% for modern pharmaceuticals. *Withania somnifera* is commonly known as ashwaganda is also known as Indian ginseng belongs to the family Araliaceae. The root of this plant is used in a similar fashion as that of *Panax ginseng*. It can be envisaged that, both these plants gained importance as plants with potential medicinal properties at almost the same time of evolution of traditional medicinal systems independently in the Chinese system and Ayurveda of Indian system. The roots have been traditionally prescribed for gynaec disorders, bronchitis, arthritis, rheumatism, inflammation, fevers, skin diseases, etc. Clinical trials and animal research support the use of ashwaganda for anxiety, cognitive and neurological disorders, inflammation, and Parkinson's disease. Therapeutically ashwaganda is used as an adaptogen for patients with nervous exhaustion, insomnia, and debility due to stress, and as an immune stimulant. Much of the pharmacological properties can be attributed to the presence of secondary compounds categorized as steroidal alkaloids and steroidal lactones present in the roots and leaves of withania. In the recent years, a resurgence in the exploitation of the potential of plant secondary compounds as alternate source of medicinal compounds has been witnessed mainly because of the harmful side effects caused by synthetic drugs. Native to India, Ashwaganda is distributed throughout the drier parts of India. The annual domestic market demand is estimated to be 7,000 tones, whereas the production is only up to 1,500 tones. To meet the increasing demands of this important medicinal crop, culturing of roots *in vitro* the sole source of drug is an attractive alternate. This will also provide raw material of superior quality without any seasonal constrain. Adventitious roots have been established from leaf explants of withania. Adventitious roots have the advantage over hairy roots in being native and true to type of explant without introduction of any new genes. Studies are underway to maximize the yield of *in vitro* adventitious roots, and to determine the stage of secondary metabolite accumulation. In this study, an attempt has been made to utilize the benefits of genomics approach to improve the yield and quality of secondary metabolites in withania. Expressed sequence tags were generated from two months old roots and leaves of withania seedling. Of the total 2081 EST's sequenced, 14.23% and 17.21% of genes coded for primary metabolic process in leaves and roots respectively. Only 0.57% of the genes in leaves and 0.97% of the genes in roots coded for secondary metabolic process. Further analysis of these EST's in developmental stages of roots and *in vitro* roots will throw light into withanolide biosynthetic pathway providing an opportunity to manipulate the genes involved to overproduce the secondary compound of interest.