

## REVIEW OF TYLOPHORA INDICA- AN ANTI-ASTHMATIC PLANT

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### ABSTRACT

There is an increasing demand for plant based medicines to control many of the diseases. *Tylophora indica* is one of the important medicinal plants of India. It is traditionally used to control asthma and allergic reactions. There is growing research on isolation and identification of bioactive constituents of plants. The present review highlights on morphology, medicinal uses, chemistry and other aspects of *Tylophora indica*.

**KEYWORDS:** *Tylophora*, Morphology, Medicinal Importance, Chemical Constituents, Biotechnological approach.

### INTRODUCTION

Asthma is a chronic condition, characterized by respiratory symptoms caused due to smoking, environmental pollution, family history, and exposure to allergens. Plant based remedies have always been an integral part of traditional medicine throughout the world. In ancient Indian system of medicine, a number of drugs from indigenous plant source have been described for asthma, allergic disease. *Tylophora indica* is one of the medicinal herbs having anti-asthmatic properties. In our present discussion we have highlighted the brief account of *Tylophora indica* i.e. morphology, chemistry, medicinal importance, uses etc.

### Morphology

*Tylophora indica* (Burm.F) Merill, commonly known as Indian Ipecoe or Antmool belongs to family *Asclepiadaceae*. The plant is perennial, small, slender, a twining or climbing herb. Leaves are Ovate to elliptic (6.0-10.5\*3.8-6.0 cm), petioles are up to 12mm long. Flowers are minute (1-1.5cm across) and orolla is greenish yellow or greenish purple in color. Fruit is a follicle [1, 2].

### Habit and Habitat

*Tylophora indica* is found in planes, hilly slopes and forests. It forms dense patches in the forests in moist, humid conditions in open hill slopes and narrow valley. The plant grows in the area with lesser rainfall. *Tylophora* grows in wide range of well-drained soil and prefers scanty localities [3].

### Distribution

It is a twining perennial plant distributed throughout southern and eastern part of India in plains, forests and hilly places. It is indigenous to India and inhabits up to an elevation of 1260m in the sub Himalayan tract. It also grows in planes and hilly places of India up to an attitude of 1000m in Bengal, Assam, Odisha and Southern India [4]. About 60 species found in tropical, sub-tropical Asia, Africa and Australia and about 35 species are reported from China. Some species found in India are *Tylophora indica/asthmatica*, *Tylophora rotundifolia*, *Tylophora fasciculata*, *Tylophora apiculata*, *Tylophora anomala*, *Tylophora sylvatica*, *Tylophora hetero-phylla*, etc.

### Chemistry

*Tylophora* plant has been reported to contain 0.46% of alkaloids viz Tylophorine, Tylophorinine, Tylophorinidine, Septicine, Isotylocrebrine, Tylophoricine, sterols, flavanoids, wax, resins and tannins [5]. Actually, the major constituent of *Tylophora* is Tylophorine, responsible for a strong inflammatory action. The active constituents of *Tylophora indica* B are phenanthroindolizidine, alkaloids. Recently some rare alkaloids namely tyloindicines A, B, C, D, E, F, G, H, I, and J, desmethyltyloph-orine, desmethyltylophorinine, isotylocrebrine, anhydroustylophorinine, anhydrous-dehydrotylophorinine,  $\gamma$ -fagarine, skimmianine, 14-hydroxyiso tylocrebrine, 4,6- desmethylisdroxy-o-Methyltylophorinidine have been reported.

The non-alkaloidal compounds isolated from *Tylophora indica* are kaempferol, quercetin,  $\alpha$ - and  $\beta$ - amyryns, tetratriacontanol, octaosanyl octacosanoate, sigmasterol,  $\beta$ -sitosetrol, tyloindane, cetyl-alcohol, wax, resin, couthone, pigments, tannins, glucose, calcium salts, potassium chloride, quercetin and kaempferol. Steam distillation of an alcoholic extract of the air-dried root powder gave *p*-methoxy salicylaldehyde and a small amount of oily Smatter. The non-alkaloidal compounds isolated from *Tylophora indica* are kaempferol [4, 6-8].

### Medicinal Properties

*Tylophora* has been traditionally used for the treatment of bronchial asthma, jaundice and inflammation. It has antitumor, immunomodulatory, antioxidant, antiasthmatic, muscle relaxant. Although the leaf and root of this plant are widely used for treating jaundice in northern Karnataka, there is a paucity of scientific evidence regarding its usage in liver disorder. The other reported activities include immune-modulatory activity, anti-inflammatory activity, anticancer activity, antihistaminic and antireumatic.

*Tylophora* is traditionally used as folk remedy in certain regions of India for the treatment of bronchial asthma, inflammation [6, 9] bronchitis, allergy and dermatitis [12, 19]. *Tylophora* also seems to be a good remedy in traditional medicine as anti-psoriasis [10].

The leaves and roots of *Tylophora* are used as a source of bioactive material [11]. It is reported to have laxative, expectorant, diaphoretic, purgative, stimulant, emetic and cathartic properties [2]. It has also been used for the treatment of allergies, cold, dysentery, hay fever and arthritis. It has reputation as alterative and as a blood purifier often used in rheumatism. It is an expectorant and administered in respiratory infection, bronchitis and whopping cough [3]. Dried leaves are emetic diaphoretic and expectorant. It is regarded as one of the best indigenous substitutes for Ipecacuanha. The leaves and roots are also used in hydrophobia. Leaves are employed to destroy worms and the leaf extract act as anti-tumor. The roots are suggested to be a good natural preservative of food.

### Folk or traditional uses

In Ayurveda, the plant has been used in treatment of asthma. The alkaloid of *Tylophora* in powder form, about 400-500milligrams given once daily to asthmatic patients for six days to cure asthma [12]. Traditionally, doses of 250 milligrams 1-3 times daily, standardized to 0.1% of tylophorine per dose have been used. Some clinical trial reports using 350 milligrams of *Tylophora* leaf placed in a capsule and given once daily for seven days. Some experts have used *Tylophora* leaf taken in the amount of 200-400 milligrams dried herb daily. Another clinical trial reports the use of 40mg of alcoholic extract of *Tylophora indica* daily for six days. The alcoholic extract of crude *Tylophora* leaves in 1gm of glucose had comparable effects to that of chewing crude *Tylophora* leaves. The root or leaf powder is used in diarrhoea, dysentery and intermittent fever [13].

### Commercial demand and formulations

*Tylophora* species are now in great demand in worldwide because of their proven efficacy against asthma. An ayurvedic nutraceuticals, Sabina Corporation, a U.S. company produced standardized extract of *Tylophora indica* having composition of 0.1% alkaloid used for respiratory

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disorders. Ayush Herbs Inc. company marketed *Tylophora* Plus capsules is an Ayurvedic herbal formulation designed to support the lungs. The combination of *Tylophora indica*, *Piper longum*, Ginger and *Embolia officinalis* have been shown to support the body's immune function. Another drug produced commercially is Geriforte Aqua used for delayed hypersensitivity by Himalaya group of companies.

### Cultivation practices

*Tylophora* is conventionally propagated through the seeds. The seeds show good germination percentage, but fruit set is rare. Seeds start germination in 10 days and the germination will complete in 3 weeks. After germination the 3 months old plantlets are ready to transplanting in the field but the transplantation should be done in rainy season and plant distance should also be maintained. The annual rainfall required for *Tylophora* plant is 1000 -1500mm. The plant prefers partial shade condition of the forest and soil rich in humus. It needs the support of host vegetating for climbing to a sunny location. For its cultivation, loamy soil to clay and supplemented with farmyard manure, ambient conditions of temperatures and sunlight are desirable.

### Biotechnological approach for the propagation

Plant raised through the seeds shows tremendous genetic variation which is not suitable for commercial cultivation. Vegetative propagation is difficult in *Tylophora* due to low seed viability and germination rate [14]. In addition, the destruction caused by harvesting the roots as a source of drug has threatened the survival of the plant. Thus, large-scale demand necessitates rapid multiplication of *Tylophora*. Biotechnological investigation was aimed to develop rapid micropropagation protocol *in vitro* through tissue culture. Micropropagation is one of the important methods for enhancing the rate of multiplication. Through this technique, large number of plant can be raised from a small part of plant tissue within a short span of time.

Plant tissue culture has been extensively utilized for the improvement of many medicinal plants. In *Tylophora indica* many tissue culture studies have reported for successful representation protocols. Somatic embryogenesis has been reported from mature leaves of *Tylophora indica* [16, 18]. Another protocol has been developed for high-frequency shoot regeneration and plant establishment of *Tylophora* from petiole-derived callus [9]. New and efficient transformation system for *Tylophora indica* using *Agrobacterium rhizogenes* to infect excised leaf and stem explants and intact shoots were also reported [8]. Root explants cultured on MS medium supplemented with 6-benzyladenine (BA) produced organogenic nodular meristemoids (NMs) within four weeks [17]. Protoplast culture and plant regeneration of *Tylophora* was achieved through callus regeneration [9].

### HPLC Studies

Plant material obtained from different heterogeneous sources will lead to variation in therapeutic values and variation in phytochemistry. The HPTLC-Fingerprinting profile is very important parameter of herbal drug standardization for the proper identification. Some are available on finger printing of the medicinal plants to determine the quality and purity of the plant material [18].

### RAPD analysis

Usually, in medicinal plants genetic homogeneity is tested through analysis of secondary metabolites. Molecular tools are more reliable than phenotypic observations for evaluating variations. Recently the RAPD technique has been reported to be a powerful tool to analyze variation. In *Tylophora*, RAPD studies have been conducted to confirm the genetic uniformity of *in vitro* regenerated plants [19].

### CONCLUSION

According to WHO Asthma is a chronic disease characterized by recurrent attacks of breathlessness and wheezing. It is one of the most common chronic diseases among children, involving about 235 million people. Nowadays, the market is flooded with synthetic drugs to control asthma, but they show many side effects during long-term usage. There is an increasing trend for the usage of herbal drugs to control major diseases including asthma. *Tylophora indica* is an important antiasthmatic medicinal plant used in several Ayurvedic preparations. The present review of *Tylophora* is useful for the isolation, purification and effective

utilization of bioactive compounds. Strengthening the research on medicinal and pharmaceutical actives and development plant based drugs is useful in commercial and industrial utilization of this important medicinal plant.

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