Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research

J. Chem. Pharm. Res., 2011, 3(5):28-34

ISSN No: 0975-7384
CODEN(USA): JCPRC5

Phytochemical screening of *Thespesia populnea (L.) Soland* and *Tridax procumbens L.*

N. Savithramma, M. Linga Rao and G. Bhumi

Department of Botany, S.V. University, Tirupati, A.P. India. Andhra Pradesh, INDIA

ABSTRACT

Thespesia populnea and Tridax procumbens are medicinally important plant species used to treat different diseases. The present work is aimed to screen these medicinal plants for phytochemical studies. Leaf powder of these plants were dissolved in different solvents and screened for secondary metabolites. Leaves of Thespesia populnea revealed that the presence of flavonoids, tannins, steroids, glycosides, saponins, phenols, terpenoids, alkaloids, anthocyanins, carbohydrates and proteins; and absence of reducing sugars, anthraquinons, leucoanthocyanins and emodins. Whereas the leaves of Tridax procumbens showed that the presence of flavonoids, tannins, steroids, phenols, terpenoids, alkaloids, carbohydrates and proteins; and absence of glycosides, saponins, reducing sugars, anthocyanins, anthraquinons, leucoanthocyanins and emodins. Both the plants showed variation in synthesis of secondary metabolites. Thespesia accumulates more number of secondary metabolites than that of Tridax. Aqueous and methanol extracts are suitable for extraction of secondary metabolites than the alcohol, chloroform, petroleum ether, diethyl ether, ethyl acetate and hexane solvents for both Thespesia and Tridax species. The findings of the present study will be helpful to the phytochemists and pharmacologists for identification of new active principles.

Keywords: Medicinal plants, Secondary metabolities, *Thespesia populnea*, *Tridax procumbens*, Solvent extraction.

INTRODUCTION

Since ancient times, people have been exploring the nature particularly plants in search of new drugs. This has resulted in the use of large number of medicinal plants with curative properties to treat various diseases [1]. Nearly 80% of the world's population relies on traditional medicines for primary health care, most of which involve the use of plant extracts [2]. In India, almost 95% of the prescriptions were plant based in the traditional systems of Unani, Ayurveda, Homeopathy and Siddha [3]. The study of plants continues principally for the discovery of novel

secondary metabolites. Around 80% of products were of plant origin and their sales exceeded US $65 billion in 2003 [4].

Phytochemical constituents are the basic source for the establishment of several pharmaceutical industries. The constituents present in the plant play a significant role in the identification of crude drugs. Phytochemical screening is very important in identifying new sources of therapeutically and industrially important compounds like alkaloids, flavonoids, phenolic compounds, saponins, steroids, tannins, terpenoids etc., [5]. Previously the crude drugs were identified by comparison with the standard descriptions available, but recently due to advancement in the field of pharmacognosy various techniques have been following for the standardization of crude drugs [6].

Medicinal herbs have been used in one form or another under indigenous systems of medicine. Dubey *et al* [7] mentioned that the complete phytochemical investigations of medicinal plants of India should be carried out, because these secondary metabolites are responsible for medicinal activity of the plant. Number of plants were screened for primary and secondary metabolites for their medicinal values *Clitoria ternatea*, *Guazuma ulmifolia* and *Madhula indica* [8], *Maytenus emarginata* [9], *Artemisia annua* [10], *Nardostachys jatamamsi* [11], *Thymus vulgaris* [12], *Allium giganteum* [13], *Cephalotaxus koreana* [14], *Boswellia ovalifoliolata* [6], *Nerium oleander* and *Momordica charantia* [15] and *Jatropha* [16].

Thespesia populnea is a large tree belongs to the family Malvaceae, found in tropical regions and coastal forests of India. Various parts of this plant are found to possess useful medicinal properties. The leaves are applied locally in swollen joints for their anti-inflammatory effects and also for skin diseases, hepatitis, jaundice, ulcers, wounds, psoriasis, scabies, urinary tract infections, diabetes, cholera, cough, asthma and guneaworm infections [17]. The fruits of the plant are used in Ayurveda for the control of diabetes [18]. The barks and flowers possess astringent, hepatoprotective and antioxidant activity [19]. *Tridax procumbens* (Asteraceae) is traditionally used in the treatment of general fever and typhoid fever, cough, asthma and diarrhoea [20] and wound healing activities, the whole plant is made into past and applied on fresh cuts [21].

Several species of medicinal plants were screened for secondary metabolites, such studies are not performed so far in these plants though they are widely using for medicinal purpose. Hence in the present study these two taxa were selected for phytochemical screening.

EXPERIMENTAL SECTION

Plant Materials: The fully matured leaves of *Thespesia populnea* and *Tridax procumbens* were collected from Tirumala hills, Chittoor District of Andhra Pradesh, India during December 2010. The leaves were washed thoroughly and shade dried. The dried leaf powder were used for experiments.

Extraction of Plant Material

Aqueous extraction: 10 g of air dried powder was added to distilled water and boiled for 2 hours. The supernatant was collected and this procedure was repeated twice. The collected supernatants at an interval of every 2 hours were pooled together and concentrated to make the final volume into one-fourth of the original volume. It was then autoclaved at 121^0C and at 15 lbs pressure and stored at 4^0C [22].

Preparation of other extracts:
10 g of air dried powder were taken in 100 ml of hexane, chloroform, diethyl ether, ethyl acetate, petroleum ether, methanol, alcohol. Plugged with cotton wool and then kept on a rotary shaker at 190-220 rpm for 24 hours. After 24 hours the supernatants were collected and the solvents were evaporated to make the final volume into one-fourth of the original volume and stored at 4^0C in air tight containers [22].

Preliminary Phytochemical Screening
The condensed extracts were used for preliminary screening of phytochemicals such as flavonoids [23], steroids [24], terpenoids [25], tannins [26], Saponins [27], alkaloids [24], phenols [24], carbohydrates [28] and proteins [29], glycosides [25], reducing sugars [30], anthocyanins [31], anthraquinons [32], leucoanthocyanins and emodins [26].

RESULTS AND DISCUSSION

The phyotochemical screening and qualitative estimation of *Thespesia populnea* and *Tridax procumbens* showed that the leaves are rich in proteins, terpenoids and flavonoids (Table 1). Proteins are contribute to the structure and functions of the living cell, they occur as independent units as well as in combination with lipids, nucleic acids, carbohydrates and many other compounds [33]. Terpenoids are attributed for analgesic and anti-inflammatory activities and flavonoids are have been reported to possess many useful properties, including anti-inflammatory, oestrogenic, enzyme inhibition, antimicrobial, antiallergic, antioxidant, vascular and cytotoxic antitumour activity [34-35]. Anthocyanins are present in aqueous, methanolic, chloroform, alcoholic and ethyl acetate extracts of *Thespesia* and totally absent in *Tridax*. Anthocyanins help the human immune system to work more efficiently to protect against viral infections. It is little bit more complex, specific types of anthocyanins may have a direct effect in decreasing influenza viruses infectivity by decreasing the ability of the virus itself to get into the human cell or to be related from infected cells or by having a viricide effect [36]. Alcoholic extract of *Thespesia* showed anthraquinons which are absent in *Tridax*. Anthraquinones are used as better stomachache and in the treatment of diarrhoea [33] and these are an important chemical raw material and organic intermediates that are broadly applied in the field of dyestuff, papermaking, medicines, agricultural chemicals etc., [37]. Emodins and leucoanthyconins are totally absent in both the plants. All the extracts except diethyl ether showed the glycosides in *Thespesia* whereas these are absent in *Tridax*. Glycosides, flavonoids and alkaloids have hypoglycemic activities [38]. Tannin compounds are present in all extracts of *Tridax* but only aqueous, methanol and chloroform extracts showed these compounds in *Thespesia*. The growth of many fungi, yeasts, bacteria and viruses was inhibited by tannins [39]. Apart from this tannins contribute the property of astringen activity i.e. faster the healing of wounds and inflamed mucous membrane [40] due to high content of tannin the *Tridax* leaves are mainly used for wound healing. Saponins are present in aqueous and methanolic extracts of the *Thespesia* and absent in other solvents as well as in the leaves of *Tridax*. Traditionally saponins have been extensively used as detergents, as pesticides and molluscicides, in addition to their industrial applications as foaming and surface active agents and also have beneficial health effects [41]. Steroids compounds are of importance and of interest in pharmacy due to their relationship with sex harmones [15], these compounds are found in all extracts of the *Thespesia* but absent in chloroform and hexane extract of *Tridax*. Reducing sugars are absent in all extracts of both the plants except aqueous extract of the *Thespesia*. Carbohydrates are found in the *Thespesia* leaf extracts of aqueous, methanolic, chloroform, akoholic and hexane. These compounds absent in the chloroform and methanolic extracts of *Tridax*. Being the primary product of photosynthesis carbohydrates are the key intermediates in the metabolism of green plants. Practically all the

biochemical compounds are directly or indirectly derived from them. Apart from this, they function as storage food, mechanical framework and sometimes modify many physical and chemical characters of various other groups of compounds by combining with them [33]. Phenols are present only in aqueous extract of *Tridax procumbens* and methanolic extract of *Thespesia.* Primarily phenolic compounds are of great importance as cellular support material because they form the integral part of cell wall structure by polymeric phenolics [42], bioactive polyphenols have attracted special attention because they can protect the human body from the oxidative stress which may cause many disease, including cancer, cardiovascular problems and ageing [43]. Aqueous and methanolic extract of *Tridax* and aqueous, alcoholic and hexane extracts of *Thespsia* are showed the alkaloid compounds. These are produced by large variety of organisms including bacteria, fungi, plants and animals; and are part of the group of natural products, some alkaloids have a bitter taste while many to toxic to other organisms [42].

Proteins, flavonoids, steroids and terpenoids are found to be rich in *Thespesia*. Whereas tannins and terpenoids are found to be rich in *Tridax* along with proteins and flavonoids. The presence of bioactive compounds indicate the medicinal value of the plants. Antioxidants and antimicrobial properties of various extracts from many plants have recently been of great interest in both research and in the food industry, because their possible use as natural additives emerged from a growing tendency to replace synthetic antioxidants and antimicrobials with natural ones [44]. Preliminary qualitative test is useful in the detection of bioactive principles and subsequently may lead to drug discovery and development [45].

According to previous studies leaves of *Albizzia lebbeck* [46], *Ocimum americanum* [47], *Nerium* and *Momordica* [15] and *Acalypha ornate* [48]; stem bark of *Pyrus pashim* [49], roots of *Strychnons potatorum* [45]; root tuber of *Curculigo* [50]; and roots and leaves of *Hyptis suaveolens* [51] and *Echiumpynathm pommel* [52]; and leaves, bark, root and galls of *Pistacia* [53] and leaves, stem, roots and seeds of *Jatropha* [16] are rich in secondary metabolites.

In order to promote Indian herbal drugs, there is an urgent need to evaluate the therapeutic potentials of the drugs as per WHO guidelines [54]. Patwardhan *et al* [4] mentioned that 30% of the world wide sales of drugs is based on natural products. Traditional indigenous medicine is limited to small tribal and geographical areas called “little traditions” are an excellent repository of knowledge about medicinal properties of botanical sources. Bioactive extracts should be standardized on the basis of phytochemical compounds [55]. Phytochemical screening of medicinal plants is very important in identifying new sources of therapeutically and industrially important compounds. It is imperative to initiate an urgent steps for screening of plants for secondary metabolites. The present communication attempt to assess the status of phytochemical properties in leaves of *Thespesia populnea and Tridax procumbens* to improve the health status of people and also to use in pharmaceutical and nutraceutical products of commercial importance.

CONCLUSION

Thespesia populnea and *Tridax procumbens* are widely used in traditional medicine to combat and cure various ailments thus appear to be rich in secondary metabolites. The anti-inflammatory, astringent, asthma and diarrhoea activities of these two plants can be attributed to their high flavonoids, steroids, alkaloids, tannins, terpenoids and saponins. Exploitation of these pharmacological properties involves further investigation and identification of these active ingredients by implementation of techniques like extraction, purification, separation and crystallization.

Table 1: Phytochemical screening of *Thespesia papulnia* and *Tridax procumbens*

Chemical Name	Aqueous extract	Methanolic extract	Chloroform extract	Alcoholic extract	Petroleum ether extract	Diethyl ether extract	Ethyl acetate extract	Hexane extract
Thespesia populnea								
Flavonoids	+	+	+	+	+	+	+	+
Tannins	+	+	+	-	-	-	-	-
Steroids	+	+	+	+	+	+	+	+
Glycosides	+	+	+	+	+	-	+	+
Saponins	+	+	-	-	-	-	-	-
Phenols	-	+	-	-	-	-	-	-
Terpenoids	+	+	+	+	+	+	+	+
Alkaloids	+	-	-	+	-	-	-	+
Reducing sugars	+	-	-	-	-	-	-	-
Anthocyanins	+	+	+	+	-	-	+	-
Anthraquinons	-	-	-	+	-	-	-	-
Carbohydrates	+	+	+	+	-	-	-	+
Lucoanthocyanins	-	-	-	-	-	-	-	-
Proteins	+	+	+	+	+	+	+	+
Emodins	-	-	-	-	-	-	-	-
Tridax procumbens								
Flavonoids	+	+	+	+	+	+	+	+
Tannins	+	+	+	+	+	+	+	+
Steroids	+	+	-	+	+	+	+	-
Glycosides	-	-	-	-	-	-	-	-
Saponins	-	-	-	-	-	-	-	-
Phenols	+	-	-	-	-	-	-	-
Terpenoids	+	+	+	+	+	+	+	+
Alkaloids	+	+	-	-	-	-	-	-
Reducing sugars	-	-	-	-	-	-	-	-
Anthocyanins	-	-	-	-	-	-	-	-
Anthraquinons	-	-	-	-	-	-	-	-
Carbohydrates	+	+	-	-	+	+	+	+
Lucoanthocyanins	-	-	-	-	-	-	-	-
Proteins	+	+	+	+	+	+	+	+
Emodins	-	-	-	-	-	-	-	-

Note : *'+' indicates presence '-' indicates absence*

REFERENCES

[1] R. Verpoorte, Chemodiversity and the Biological Role of Secondary metabolites, some thoughts for selecting plant material for drug development. Proc Phytochem Soc Europe, Kluwer Publishers, **1998,** 43; P. 11-24.
[2] B. Sandhya, S. Thomas, W. Isabel, R. Shenbagarathai, Complementary and alternative medicines, **2006,** 3: 101-114.
[3] G.V. Satyavati, A.K. Gupta, N. Tandon, Medicinal plants of India, Indian Council of Medical Research, New Delhi, India, **1987**.
[4] B. Patwardhan, A.D.B. Vaidhya, M. Chorghade, *Curr Sci*, **2004**, 86:789-799.
[5] A.J. Akindele, O.O. Adeyemi, *Fitoterapia*, **2007**, 78: 25-28.
[6] N. Savithramma, P. Venkateswarlu, D. Suhrulatha, S.K.M. Basha, C.H. Venkataramanadevi, *The Biosc*, **2010,** 5: 359-362.
[7] N.K. Dubey, R. Kumar, P. Tripathi, *Curr Sci*, **2004**, 86: 37-41.
[8] N. Shekhawat, R. Vijayvergia, *J Chem Pharm Res*, **2010**, 2:168-171.
[9] S. Sagwan, D.V. Rao, R.A. Sharma, *J Chem Pharm Res*, **2010**, 6: 46-50.

[10] R.S. Bhakuni, D.C. Jain, R.P. Sharma and S. Kumar, *Curr Sci*, **2001**, 86: 35-46.
[11] P.U. Rani, M.U.R. Naidu, *Phytomedicine*, **1998**, 5: 253-257.
[12] A. Bazylko, H. Strzelecka, *Fitterapia*, **2007**, 78: 391-395.
[13] D. Stajner, N. Milic – Demarino, J. Chanadanovic – Brunet, M. Stajner, B.M. Popovic, *Fitoterapia*, **2006**, 77: 268-270.
[14] K. Bae, Yi Jin Wen, P.T. Thoung, B.S. Min, M.K. Na, Y.M. Lee, S.S. Kang, *Fitoterapia*, **2007**, 78: 409-413.
[15] R. Santhi, G. Lakshmi, A.M. Priyadharshini, L. Anandaraj, *Inter Res J Pharm*, **2011**, 2: 131-135.
[16] A. Nwokocha, I.O. Blessing, Agabagwa, B.E. Okoli, *Res J Phytochem*, **2011**, 1-8.
[17] Anonymous, the wealth of India, publication and information Directorate (CSIR), New Delhi, **1995**.
[18] T. Satyanarayana, T.Saritha, M. Balaji, A. Ramesh, M.K. Boini, *Saudi Pharma J*, **2004**, 12:107-111.
[19] R. Ilavarasan, M. Vasudevan, S. Anbazhagan, S. Venkataraman, *J Ethnopharmacol*, **2003a**, 87: 227-230.
[20] A. Mann, N.U. Abdukadir, G. Muhammad, Medicinal and Economic plants of Nupeland, Juber Evans books and Publication, **2003**, 78.
[21] U. Dhar, U.K. Singh, Amiruddin, Ethnobotany of Bhuyans and Juangs of Orissa In: U.K. Singh, J.N. Gouil, S. Hashmi, G. Singh, eds: Recent progress in medicinal plants. USA. Stadium Press LLC, **2008**, 200.
[22] Parekh Jigna, C.V. Sumitra, *Turk J Biol*, **2007**, 31: 53-58.
[23] K. Peach, M.V. Tracey, Modern methods of plant analysis. Vol.3, Springer Verlag, Berlin, **1956**.
[24] R.D. Gibbs, Chemotaxonomy of Flowering Plants. Vol.1, McGill Queen's University Press, Montreal and London, **1974**.
[25] G.A. Ayoola, H.A.B. Coker, S.A. Adesegun, A.A. Adepoju – Bello, K. Obaweya, E.C. Ezennia, T.O. Atangbayila, *Trop J Pharm Res*, **2008**, 7: 1019-1024.
[26] G.E. Treare, W.C. Evans, Pharmacognosy 17th edn, Bahive Tinal, London, **1985**, 149.
[27] A. Kumar, R. Ilavarasn, T. Jayachandran, M. Decaraman, P. Aravindhan, N. Padmanaban, M.R.V. Krishnan, *Pak J Nutri* **2009**, 8: 83-85.
[28] M. Dubois, K.A. Gills, J.K. Hamilton, P.A. Rebers, F. Smith, *Anal Chem*, **1956**, 28: 350-351.
[29] O.H. Lowry, N.J. Rosebrough, A.L. Farr, R.J. Randall, *J Biol Chem*, **1951**, 193: 265-275.
[30] U. Sathyanarayana, Biochemistry, published by New Central Book Agency (P) Ltd., 1999, p. 16.
[31] R. Paris, H. Moyse, Precis de matiere medicinale. Paris: Masson, **1969**.
[32] ASEAN countries. Standard of ASEAN herbal medicine, Vol.1 Jakatra: Aksara Buena Printing, **1993**, p. 116-28.
[33] S.D. Sabnis, M. Daniel, A. Phytochemical approach to economic Botany, Kalyani Publishers, New Delhi, **1990**, 15, 65.
[34] B. Havesteen, *Eur J Clin Microbiol Infect Dis*, **1990**, 9: 455-61.
[35] J.B. Harborne, C.A. Williams, *Phytochemistry*, **2000**, 55: 481-504.
[36] A.L. Liu, *et al.*, *Planta Med*, **2009**, 75: 337-9.
[37] Research report on Chinese Anthraquinons Industry, 2010-2011 by China research and intelligence. www.schri.com.
[38] B. Oliver, *J Ethnopharmacol*, **1980**, 2: 119-127.
[39] K.T. Chung, T.Y. Wong, C.L. Wei, Y.W. Huang, Y. Lin, *Criti Rev Food Sci Nutr*, **1998**, 6: 421-64.
[40] D.E. Okwu, C. Josiah, *Afri J Biotech*, **2006**, 5: 357-361.

[41] J. Shi, K. Arunasalam, D. Yeung, Y. Kakuda, G. Mittal, Y. Jiang, *J Med Food*, **2004**, 7: 67-78.
[42] V.K. Gupta, G.D. Singh, S. Singh, A. Kaul, Medicinal Plants: Phytochemistry, Pharmacolgoy and Therapeutics, Daya Publishing House, Delhi, **2010**.
[43] K. Robards, P.D. Prernzler, G. Tucker, P. Swatsitang, W. Glover, *Food Chem*, **1999**, 66: 401-36.
[44] F. Deba, T.D. Xuan, M. Yasuda, S. Tawatu, *Food Control*, **2008**, 19: 346-352.
[45] P.B. Mallikharjuna, L.N. Rajanna, Y.N. Seetharam, G.K. Sharanabasappa, *E-J Chem*, **2007**, 4: 510-518.
[46] C. Rahul, P. Pankaj, S.K. Sarwan, J.K. Mahesh, *J. Chem. Pharm. Res*, **2010**, 2: 476-484.
[47] D.S.K. Sarma, V.S. Babu, *J. Chem. Pharm. Res*, **2011**, 3: 337-347.
[48] P.A. Onocha, G.K. Oloyede, G.S. Olasumkanmi, *J. Chem. Pharm. Res*, **2011**, 3: 457-466.
[49] V. Arya, R. Gupta, V.K. Gupta, *J. Chem. Pharm Res*, **2011**, 3:447-456.
[50] A.K. Agrahari, S.K. Panda, A. Mehra, A.R. Padhan, M. Khaliquzzam, *J Chem Pharm Res*, **2010**, 2: 107-111.
[51] R.A.U. Nwobu, I.C. Uzochnkwu, E.L. Okoye, *Medicinal plants: Phytochemistry, Pharmacology and therapeutics*, **2010**. Vol. 1, P. 390-396.
[52] T. Chouche, F. Haddouchi, F.A. Bekkra, *Der Pharmacia Lettre*, **2011**, 3: 1-4.
[53] G. Uddin, A. Rauf, T.U. Rehman, M. Qaisar, *Mid-East J Sci Res*, **2011**, 7: 707-711.
[54] WHO, General guidelines for methodologies on research and evaluation of traditional medicine. World Health Organization, Geneva, **2000**.
[55] V.P. Kamboj, *Curr Sci*, **2000**, 78: 35-39.