Journal of Experimental Sciences 2012, 3(3): 28-31
ISSN: 2218-1768
Available Online: http://jexpsciences.com/

journal of experimental sciences

Qualitative phytochemical screening of indian witchweed: *Striga asiatica* (L.) O. Ktze - an unexplored medicinal parasitic plant

Kakpure M. R* and Rothe S. P.

Botany Research Lab, Department of Botany, Shri Shivaji College, Akola – 444 001 (M.S.) India.

Abstract

Many herbal remedies have been employed in various medical systems for the treatment of different diseases. The parasitic plant *Striga asiatica* (L.) O. Ktze commonly known as witch weed belongs to family Scrophulariaceae has been used in different system of traditional medicine for curing various diseases and ailments of human beings. The present study deals with the qualitative phytochemical screening of *Striga asiatica* (L.) O. Ktze of whole plant powder in six different extracts (i.e. petroleum ether, benzene, chloroform, acetone, ethanol and water). The extracts showed the prominently presence of phytoconstituents like carbohydrates, cardiac glycosides, alkaloids, flavonoids, tannin, phenolics, steroids, coumarins and saponin. However anthroquinone glycosides and quinone are totally absent in all extracts. Most of the phytoconstituents from *Striga asiatica* (L.) O. Ktze lacks the reports of pharmacological activities, which support its further pharmacological studies.

Keywords: *Striga asiatica*, phytochemical screening, medicinal and parasitic plant.

INTRODUCTION

Traditional knowledge regarding of medicinal plants and their use by indigenous cultures are not only useful for conservation of cultural traditions and biodiversity but also for community healthcare and drug development in the present and future. Therapy with synthetic tropical applications have most side effects and cannot be afford by the people due to import cost of the drug, to overcome this problem plants growing around us are utilized without scientific validation. The use of higher plants and their extracts to treat infections is an age-old practice. Traditional medicinal practice has been known for centuries in many parts of the world. Herbal medicines are gaining interest because of their cost effective and eco-friendly attributes (Trivedi, 2006).

Medicinal plants have been an integral part of the ethno-botanical aspects of the people. The modern medicine has evolved from folk medicine and traditional system only after thorough chemical and pharmaceutical screening. Thus, plants remain the major source of medicinal compounds. UNESCO (1998) estimated that 20,000 plant species are used for medicinal purposes (Koua, 2011).

For a long period of time, plants have been a valuable source of natural products for maintaining human health, especially in the last decade, with more intensive studies for natural therapies. According to World Health Organization (WHO), medicinal plants would be the best source to obtain a variety of drugs and more than 80% of the world's population relies on traditional medicines for their primary health care needs (Hosamath, 2011). The medicinal value of plants lies in some chemical substances that produce a definite physiologic action on the human body. The most important of these bioactive compounds of plants are alkaloids, flavonoids, tannins and phenolic compounds. The phytochemical research based on ethno-pharmacological information is generally considered an effective approach in the discovery of new anti-infective agents from higher plants (Mukharjee, 2002).

A witch-weed, *Striga asiatica* (L.) O. Ktze is an herbaceous flowering root parasitic plant locally known as Talakh, Taukla and it is considered as a hemi-parasitic plant. The plant *S. asiatica* belongs to the family Scrophulariaceae is deemed to be one of the most ubiquitous parasitic weed of food crops, e.g., rice (*Oryza sativa* L.), maize (*Zea mays* L.) and sorghum (*Sorghum bicolor* L. Moench) roots. *S. asiatica* plant beside its well-known devastating impacts on the most important food cereal crops in Africa, India, Asia, some parts of USA and is deemed to be one of the main factors that threatens the food security in these continents; but it does also have a beneficial side in the tradition medicine for the African people (Koua, 2011). *S. asiatica* has a wide range of medicinal uses; appetizer, hypertension, sexual heatiness, stimulant, breaks down of fats, strengthen body (Adirukmi, 1994, Anonymous, 1986 and Ong, 2011) and the pharmacological antifertility effect (Hiremath, 1997), antibacterial, antifungal and antihelmintic activity have been approved (Hiremath, 1994). The whole plant, crude drug has been used as a remedy for peevishness in unweaned infants and also for Icterohepatitis in China (Nakanishi, 1985).

Despite the intense uses of *S. asiatica* as medicinal plant and the researches concerning the agricultural importance of this plant, the thorough phytochemistry knowledge still scarce (Frick *et al*., 1996). However no phytochemical report on this plant in India has previously been made. So, in the present study an attempt has been made the laboratory evaluations to assess the analytical and phytochemical screnning of *Striga asiatica* (L.) O. Ktze.

Received: Feb 05, 2012; Revised: March 02, 2012; Accepted: March 22, 2012.

*Corresponding Author

Kakpure M. R
Botany Research Lab, Department of Botany, Shri Shivaji College,
Akola – 444 001 (M.S.) India

Email: manojkakpure@rediffmail.com

Habit of *Striga asiatica* (L.) O. Ktze.

MATERIALS AND METHODS

Collection and identification of plant materials

The plant *Striga asiatica* (L.) O. Ktze was collected from Akot, Patur and Telhara tehsil areas of Akola district, Maharashtra during September 2010-November 2010. The collected plants were identified with help of standard floras (Cooke, 1967; Kamble and Pradhan, 1988; Naik, 1998; Singh *et. al.* 2001) and herbarium specimens were deposited in Herbarium of Department of Botany, Shri Shivaji College, Akola.

Extraction of plant materials

The collecting plant materials were washed and shade dried. The dried plant material is powdered using mixer grinder and subjected to Soxhlet extraction with petroleum ether, benzene, chloroform, acetone, ethanol and distilled water respectively for 18h in the order of increasing polarity of solvents. The condensed extracts were used for preliminary screening of phytochemicals (Anonymous, 2009 and Kokate, 1998).

Table 1.Organoleptic evaluation of *Striga asiatica* (L.) O. Ktze.

S.N.	Particulars	Observation
1	Colour of Powder	Pale Green
2	Odour	None
3	Taste	Bitter
4	Texture	Rough
5	Special features	Root parasite on Jowar, Calyx tube 10 ribbed, Flowers white.

Table 2. Successive solvent extraction of whole plant powder of *Striga asiatica* (L.) O. Ktze

Sl. No.	Solvent	Colour constitency	Average extractive values (in % w/w on dry wt. basis)
1	Petroleum ether	Green oily mass	1.8
2	Benzene	Pale green sticky mass	2.4
3	Chloroform	Pale green mass	16.2
4	Acetone	Pale green mass	20.2
5	Ethanol	Green dry mass	19.0
6	Water	Green dry mass	20.56

Preliminary phytochemical screening

It involves testing of different classes of compounds. The methods used for detection of various phytochemicals were followed by qualitative chemical test to give general idea regarding the nature of constituents present in crude drug (Kokate, 2005; Harborne, 1998; Sadashivan and Manickam, 2005 and Wallis, 1990).

Tests for carbohydrates
Fehling's Test

1 ml Fehling's A solution and 1 ml of Fehling's B solution were mixed and boiled for one minute. Now the equal volume of test solution was added to the above mixture. The solution was heated in boiling water bath for 5-10 minutes. First a yellow, then brick red precipitate was observed.

Benedict's test

Equal volumes of Benedict's reagent and test solution were mixed in a test tube. The mixture was heated in boiling water bath for 5 minutes. Solution appeared green showing the presence of reducing sugar.

Molisch's test

Equal volumes of Molisch's reagent and test solution were mixed in a test tube. The mixture was heated in boiling water bath for 5 minutes. Appearance of violet or purple colour ring showing the presence of reducing sugar.

Tests for proteins
Biurret Test

To the small quantity of extract 1-2 drops of Biurret reagent was added. Formation of violet colour precipitate showed presence of proteins.

Million's Test

To the small quantity of extract 1-2 drops of Million's reagent was added. Formation of white colour precipitate showed presence of proteins.

Tests for Anthraquinone glycosides: Borntrager's Test

To the 3ml of extract, dil. H_2SO_4 was added. The solution was then boiled and filtered. The filtrate was cooled and to it equal volume of benzene was added. The solution was shaken well and the organic layer was separated. Equal volume of dilute ammonia solution was added to the organic layer. The ammonia layer turned pink showing the presence of glycosides.

Tests for Cardiac glycosides (Keller- Killiani Test)

To the 5ml of extract, 1ml of conc. H_2SO_4, 2ml of Glacial acetic acid and 1 drop of $FeCl^3$ solution was added. Appearance of Brown ring shows the presence of cardiac glycosides.

Tests for Coumarins

To the 2ml of extract 10% NaOH was added and shake well for 5 min shows the yellow colour.

Tests for Quinone

To the 2ml of extract conc. H_2SO_4 was added and shake well for 5 min shows the Red colour.

Test for steroids
Salkowski Test

To 2 ml of extract, 2 ml of chloroform and 2 ml of conc. H_2SO_4 was added. The solution was shaken well. As a result chloroform layer turned red and acid layer showed greenish yellow fluorescence.

Tests for alkaloids
Hager's Test

To the 2-3 ml of filtrate, 1ml of dil. HCl and Hager's reagent was added and shake well. Yellow precipitate was formed showing the presence of alkaloids.

Mayer's Test

To the 2-3 ml of filtrate, 1ml of dil. HCl and Mayer's reagent was added and shake well. Formation of yellow precipitate showed the presence of alkaloids.

Dragendroff's Test

To the 2-3 ml of filtrate, 1ml of dil. HCl and Dragendroff's reagent was added and shake well. Formation of orange-brown precipitate showed the presence of alkaloids.

Tests for flavonoids
Shinoda Test

To the extract, added 5 ml of 95% ethanol and few drops of conc. HCl. To this solution 0.5 g of magnesium turnings were added. Observance of pink coloration indicated the presence of flavonoids.

With Lead Acetate

To the small quantity of extract lead acetate solution was added. Formation of yellow precipitate showed the presence of flavonoids.

Tests for Tannins and Phenolic compounds
$FeCl_3$ Solution Test

On addition of 5% $FeCl_3$ solution to the extract, deep blue black colour appeared.

Lead Acetate Test

On addition of lead acetate solution to the extract white precipitate appeared.

Test for Saponin: Foam Test

To 1ml extract 20ml distilled water was added and shakes well in measuring cylinder for 15 min. Then 1cm layer of foam was formed.

Table 3.Qualitative phytochemical screening of various extract of *Striga asiatica* (L.) O. Ktze.

Sl. No.	Constituents	Chemical Tests	Extracts					
			Petroleum ether	Benzene	Chloroform	Acetone	Ethanol	Water
1	Alkaloids	Hager's Test	-	-	-	+	+	-
		Mayer's Test	-	-	-	+	-	+
		Wagner's Test	-	-	+	+	-	+
		Dragendroff's Test	+	-	-	+	+	+
2	Carbohydrates & Glycosides	Fehling's Test	-	-	+	-	+	+
		Benedict's test	-	-	+	+	-	+
		Molisch's Test	+	+	+	+	+	+
3	Steroids	Salkowski Test	+	-	-	+	-	+
4	Saponin	Foam Test	-	-	-	+	+	+
5	Phenolics & Tannin	$FeCl_3$ Sol. Test	-	-	-	+	+	+
		Lead Acetate Test	-	-	-	+	+	+
6	Fixed oil & Fats	Spot Test	-	-	-	+	-	+
7	Proteins	Biurret Test	-	-	+	-	-	+
		Million's Test	-	-	-	-	+	+
8	Anthraquinone glycosides	Borntrager's Test	-	-	-	-	-	-
9	Cardiac glycosides	Keller-Killiani Test	-	-	+	+	-	+
10	Flavonoids	Shinoda Test	+	+	-	+	+	+
		Lead Acetate Test	-	+	+	+	+	+
11	Quinone		-	-	-	-	-	-
12	Coumarins		-	+	-	+	-	+

Note: '+' = Present and '-' = Absent

RESULTS AND DISCUSSION

In the present investigation, organoleptic evaluation plays an important role in judging the censoring acceptability or rejection of crude drug in the market. The Organoleptic evaluation of *Striga* *asiatica* (L.) O. Ktze shown in (Table 1).

However on the basis of polarity of solvents, successive solvent extractive values of *Striga asiatica* (L.) O. Ktze in various organic solvents was observed as Petroleum ether 1.8%, Benzene 2.4%, Chloroform 16.2%, Acetone 20.2%, ethanol 19% and water 20.56% respectively (Table-2).

The qualitative phytochemical screening of *Striga asiatica* (L.) O. Ktze in six different extracts i.e. petroleum ether, benzene; chloroform, acetone, ethanol and water showed that there is presence of carbohydrates, glycosides, proteins, alkaloids, saponin, coumarins, tannins, phenolics compounds. However anthroquinone glycosides and quinone were totally absent in all extracts. Ethanol extract of *Striga asiatica* was accounted for the presence of carbohydrates, glycosides, alkaloids, saponin, proteins, flavonoids, phenol, and tannin. While, Acetone and Water extract shows the presence of carbohydrates, glycosides, alkaloids, saponin, coumarins, tannins, phenolics compounds. All the six extracts have flavonoids, Carbohydrates and glycosides compounds (Table-3). This could make, this plant useful for treating different ailments as having a potential of providing useful drugs of human use. This is because of pharmacological activity of any plant is usually traced to a particular compound. Earlier studies have shown that drugs containing flavonoids are known to have an antifertility activity (Hiremath, 1997). So, the present study suggests that *Striga asiatica* (L.) O. Ktze is a potential resource of flavonoids, proteins, phenols, tannins, sterols, saponin compound and may be useful for the identification and preparation of a monograph of the plant. Thus, this type of qualitative phytochemical screening is the first step towards understanding the nature of active principles in medicinal plants and this type of study will be helpful for further detailed research.

CONCLUSION

The genus *Striga* is the most economically important member of Scrophulariaceae family of parasitic plants, which attacks several crops particularly Sorghum, Pearl, Millet, Rice, Maize and Sugarcane in Africa, India, Asia, Australia and some part of the USA that threatening the food security in these continents. But it does also have a beneficial side in the traditional medicine for the African people (Koua, 2011). Nevertheless, Koua 2011 stated that several articles concerning the pharmacological application of genus *Striga* in some part of the Africa and India have been released. But the information about the phytochemicals and its pharmacologic effect are still scarce.

The present phytochemical screening of *S. asiatica* plant reveals that it contains rich amount of phytoconstituents like carbohydrates, cardiac glycosides, alkaloids, flavonoids, tannin, phenolics, steroids, coumarins and saponin having the major applications in medical as well as pharmaceutical sciences. Most of the phytoconstituents from *Striga asiatica* (L.) O. Ktze lacks the reports of pharmacological activities, which support its further pharmacological studies. So, more comprehensive research is very required to conclude thoroughly on the intense use of *S. asiatica* plant in the traditional medicine and explore its maximum potential in the field of medical and pharmaceutical sciences. The latter is also a place of prospective researches to be done for more appraisals.

REFERENCES

[1] Adirukmi N.S., Normalawati S. and Salleh M.N. 1994. Phytochemical research on *Striga asiatica* var. *lutea* (L.) O. Kuntz found in Malaysia. ASOMPS, VIII (P. 27, Abstr. No. P.27).

[2] Anonymous.1986.Useful plants in India. Publications and Information Directorate, CSIR, New Delhi.

[3] Anonymous. 2008. The Ayurvedic Pharmacopoeia of India, 1st Edn., Vol. VI, Government of India Publication, New Delhi.

[4] Frick E., Crahne D. and Wegmann K. 1996. Biochemical synthesis of 2,6-dimethoxy-parabenzoquinone: A haustorial stimulant of *Striga asiatica* (L.) Kuntz. *Nat. Prod. Lett*. (9):153-159.

[5] Harborne J. B. 1998. Phytochemical Methods. IIIrd Edn., Chapman & Hall Publication, London.

[6] Hiremath S.P. and Hanumanthrao, S. 1997. Flavones from *Striga lutea*. *J. Ind. Chem. Soc.* Vol. 74(5):429.

[7] Hiremath S.P., Swamy H.K.S., Badami H. and Purohit M.G. 1994. Antibacterial, antifungal and antihelmintic activity of various extract of *S. lutea*. *Fitoterapia*, Vol.65 (4):372-374.

[8] Hosamath P.V. 2011. Evaluation of antimicrobial activity of *Litsea glutinosa*. *Int. J. Pharmc. Appl.* Vol. 2(1):105-114.

[9] Kamble S. Y. and Pradhan S. G. 1988. Flora of Akola District Maharashtra. BSI, Calcutta.

[10] Kokate C. K. 1988. Practical Pharmacognosy. 2nd Edn., Vallabh Prakashan. New Delhi.

[11] Kokate C. K., Purohit A. P. and Gokhale S. B. 2005.Pharmacognosy. Nirali Prakashan, Pune.

[12] Koua F.H.M. 2011. *Striga hermonthica* (Del.) Benth: Phytochemistry and Pharmacological properties outline. *J. Applied Pharmac. Sci.,* 1(7):1-5.

[13] Mukharjee P.K. 2002. Quality Control of Herbal Drugs: An approach to evaluations of Botanicals. Business Horizons Pharmaceutical publications, New Delhi.

[14] Naik V. N. 1998. Flora of Marathwada. Vol. II, Amrut Prakashan, Aurangabad.

[15] Nakanishi T., Ogaki J., Inada A., Murata H., Nishi M. and Yonida K. 1985. Flavonoids of *Striga asiatica*. *J. Nat. Prod.,* Vol. 48(3):491-493.

[16] Ong H.C., Ahmad N. and Milow P. 2011. Traditional medicinal plants used by the Temuan Villagers in Kampung Tering, Nigeri Sembilan, Malaysia. *Ethno. Med.* 5(3):169-173.

[17] Sadashivan S. and Manickam A. 2005. Biochemical Methods. 2nd Edn., New Age International (P) Ltd., Publisher, New Delhi.

[18] Singh N. P., Lakshminarasimhan P., Kartikeyan S. & Prasanna P. V. 2001. Flora of Maharashtra State. Vol. II, Botanical Survey of India, Calcutta.

[19] Trivedi P. C. 2006. Medicinal Plants, Traditional Knowledge. I. K. International Publishing House Pvt. Ltd., New Delhi.

[20] Wallis T. E. 1990. Text Book of Pharmacognosy. Vth Edn., CBS Publishers & distributors, New Delhi.