Copyright © 2014, American-Eurasian Network for Scientific Information publisher

American-Eurasian Journal of Sustainable Agriculture
ISSN: 1995-0748

JOURNAL home page: http://www.aensiweb.com/aejsa.html 2014 January; 8(1): pages 1-9.
Published Online 2014 February 30. **Research Article**

A Survey of Medicinal Plants used by a Village Folk Medicinal Practitioner in Sreemangal Upazila of Maulvibazar District, Bangladesh

Md. Sohel Rana, Md. Mahedul Islam, Shahrear Nazim Bosunia, Shah Riyad Mahmud, Sarmin Akter Santa, Sanjida Haque Snigdha, Mostafi Jumrut Mahal, Mohammed Rahmatullah

Faculty of Life Sciences, University of Development Alternative, Dhanmondi, Dhaka-1209, Bangladesh

Received: 21 January 2013 ; **Received**: 18 February 2014; **Accepted**: 20 March 2014; **Available online:** 4 April 2014

© 2014 AENSI PUBLISHER All rights reserved

ABSTRACT

Folk medicinal practice is common in Bangladesh; the practitioners, otherwise known as Kavirajes, combine a unique blend of various traditional practices along with their individual preferences of medicinal plants. Their medicinal knowledge is usually generational being passed along from one generation to the next, where the practice and knowledge is enriched with every passing generation. As such, any individual Kaviraj may possess a vast knowledge on the medicinal properties of plants around his vicinity and possibly more. The objective of the present survey was to document the medicinal plants used and diseases treated by a Kaviraj practicing in Dalu chara village of Sreemangal Upazila (sub-district) in Maulvibazar district of Bangladesh. The Kaviraj was observed to use a total of 59 plants distributed into 42 families in his various formulations. The various diseases treated included sexual disorders, bed wetting, gastrointestinal disorders, malaria, helminthiasis, respiratory tract infections, anemia, pain, menstrual disorders, tooth and gum disorders, heart disorders, skin diseases, diabetes, malnutrition, burning sensations during urination, eye diseases, tuberculosis, swelling of hands or legs, jaundice, bone fracture, and cuts and wounds. Since plant kingdom has always proved a good source for newer and better drugs, it is expected that documentation of these plants can lead to more scientific research leading to better drug discovery.

Keywords: Folk medicine, Sreemangal, Maulvibazar, medicinal plants, Bangladesh.

INTRODUCTION

The plant kingdom has always proved to be an excellent source for drugs towards cure of various diseases. Human beings have probably used plants as medicines from antiquity. Even in the modern age, many important allopathic drugs have been derived from the plant kingdom, and which drugs include quinine, artemisinin, vincrastine and vinblastine. With the advent of new diseases, emergence of drug-resistant vectors, and occurrence of adverse reactions to many synthetic drugs, there has been a resurgence of interest in searching the plant kingdom for novel and more efficacious drugs. Instead of blind searching and pharmacological activity studies, it is always of interest to look into the traditional medicinal practices, for the practitioners through long acquaintance with plants, have been shown to possess considerable knowledge on the medicinal properties of various plants [4,36].

Folk medicinal practice is a unique blend of many traditional practices combining elements of Ayurveda, Unani, indigenous medicinal practices, and expertise of individual practitioners. As such, the medicinal plants or other items used for treatment of diseases by any individual practitioner are unique. The practitioners are known as Kavirajes or Vaidyas and can be found practicing in most villages and even in urban areas of Bangladesh. Their knowledge is usually generationally derived, i.e. being passed from one practicing member of the family to the next. Each generation may add to the knowledge through practical experiences, and over time, a given Kaviraj may possess exceptional knowledge on plants around his vicinity as well as elsewhere. We had been conducting ethnomedicinal surveys among folk and tribal medicinal practitioners for several

Corresponding Author: Professor Dr. Mohammed Rahmatullah, Pro-Vice Chancellor, University of Development Alternative, House No. 78, Road No. 11A (new), Dhanmondi R/A, Dhaka-1209, Bangladesh
Ph: 88-01715032621 Fax: 88-02-8157339 E-mail: rahamatm@hotmail.com

years [38,39-41,10,17,19,32,33,42-50,2,6-8,16,22,23, 51,52,59,62,11,18,20,25,53-5659,4] and have observed that quite a number of medicinal plants used by the Kavirajes can be validated in their uses on the basis of available scientific evidences.

Our studies so far clearly suggest that that such ethnomedicinal surveys can lead not only in building up a comprehensive data base of medicinal plants of the country but also can lay the groundwork for further relevant scientific studies on various medicinal plants used by the Kavirajes. This is an important point towards conserving both medicinal plant and properly utilizing scientific resources. As such, the present survey was conducted in Dalu chara village of Sreemangal Upazila (sub-district) of Maulvibazar district in Bangladesh

Materials and Methods

There was one practicing Kaviraj at Dalu chara village, named Motaleb Hossain, male by gender, age around 45 years, and practicing by his own admission for about 10 years. Prior Informed Consent was first obtained from the Kaviraj. The Kaviraj was explained the full purpose of our visit and consent obtained to disseminate any information provided in both national and international venues. Actual interviews were conducted with the help of a semi-structured questionnaire and the guided filed-walk method of Martin [28] and Maundu [29]. In this method, the Kaviraj took the interviewers on guided field-walks through areas from where he collected his medicinal plants, pointed out the plants, and described their uses. Plant specimens were photographed and collected on the spot, pressed, dried and brought back to Dhaka to be identified at the Bangladesh National Herbarium. Detailed information was obtained from the Kaviraj in evening sessions when convenient with the help of the semi-structured questionnaire and open-ended interviews where the Kaviraj spoke at length on various medicinal plants and diseases treated.

Results and Discussion

The Kaviraj was observed to use a total of 59 plants distributed into 42 families in his various formulations. The various diseases treated included sexual disorders, bed wetting, gastrointestinal disorders, malaria, helminthiasis, respiratory tract infections, anemia, pain, menstrual disorders, tooth and gum disorders, heart disorders, skin diseases, diabetes, malnutrition, burning sensations during urination, eye diseases, tuberculosis, swelling of hands or legs, jaundice, bone fracture, and cuts and wounds. The results are shown in Table 1.

Table 1: Medicinal plants and formulations of the Kaviraj of Dalu chara village, Sreemangal Upazila, Maulvibazar district, Bangladesh.

Serial Number	Scientific Name	Family Name	Local Name	Parts used	Disease, Symptoms, Formulations, and Administration
1	*Dracaena sanderiana* Sander ex Mast	Agavaceae	Pahari keya (mohila)	Leaf	Spermatorrhea. Juice obtained from crushed leaves is taken orally with milk.
2	*Amaranthus retroflexus* L.	Amaranthaceae	Upot lengra	Root	Bed wetting. Roots are tied to the body.
3	*Amaranthus spinosus* L.	Amaranthaceae	Kantadugi	Stem	Low semen density. Stems are eaten as vegetable.
4	*Mangifera indica* L.	Anacardiaceae	Aam	Leaf, seed	Bloating. Seeds are dried and powdered. Pills made from equal amounts of powder and talmishri (sugar obtained from sap of *Borassus flabellifer*) are orally taken. See *Oxalis oregana*.
5	*Semecarpus anacardium* L.	Anacardiaceae	Bhella	Oil	See *Cissus quadrangularis*.
6	*Annona squamosa* L.	Annonaceae	Ata	Leaf	Head lice. Juice obtained from crushed young leaves is mixed with coconut oil and applied topically to hair and scalp.
7	*Alstonia scholaris* (L.) R. Br.	Apocynaceae	Chatim	Stem	Malaria, helminthiasis or pneumonia in children. The gum that comes out after breaking a stem is taken orally with mother's milk and water.
8	*Homalomena aromatica* Schott.	Araceae	Pahari gondogi	Stem	Loss of appetite, burning sensations in breast of lactating mother. Stems are cooked and eaten as vegetable.
9	*Xanthosoma sagittifolium* (L.)Schott.	Araceae	Dudh kochu	Leaf, stem	Anemia. Stems and leaves are cooked and eaten.
10	*Borassus flabellifer* L.	Arecaceae	Taal	Sap	See *Mangifera indica*.
11	*Calotropis procera* (Aiton) WT Aiton	Asclepiadaceae	Akondo	Leaf	Pain. Leaves are rubbed with old ghee (clarified butter), warmed and applied topically to painful areas.

12	*Eupatorium odoratum* L.	Asteraceae	Refugee pata	Leaf	Irregular menstruation. Juice obtained from crushed leaves of *Eupatorium odoratum* is mixed with juice obtained from crushed leaves of *Cynodon dactylon* and taken orally. See *Momordica charantia*.
13	*Spilanthes acmella* (L.) Murray	Asteraceae	Bingraj	Leaf, stem, flower, fruit	Tooth and gum infections. Leaves, stems, flowers and fruits are chewed and taken orally.
14	*Oroxylum indicum* Vent.	Bignoniaceae	Mon	Leaf	See *Ficus cunia*.
15	*Terminalia arjuna* (Roxb.) Wight & Arn.	Combretaceae	Arjun	Leaf, bark	Heart disorders. Juice obtained from crushed leaves or bark is taken orally. See *Pyrrosia nuda*.
16	*Terminalia bellirica* (Gaertn.) Roxb.	Combretaceae	Bohera	Fruit, seed	Skin diseases. Fruits of Terminalia bellirica are mixed with rhizomes of *Curcuma aromatica* and skin of fruits of *Citrus aurantifolia*. Paste prepared from the mixture is applied topically to affected areas of skin. Physical weakness. Seeds are boiled and then squeezed to obtain juice, which is taken orally.
17	*Kalanchoe pinnata* (Lam.) Pers.	Crassulaceae	Pahari keya (purush)	Leaf	Spermatorrhea. Juice obtained from crushed leaves is taken orally with milk.
18	*Coccinia grandis* (L.) Voigt	Cucurbitaceae	Telakucha	Leaf	Diabetes. Leaves are taken orally in the cooked or fried form.
19	*Momordica charantia* L.	Cucurbitaceae	Tit corolla	Fruit	Stomach pain. Juice obtained from crushed fruits of *Momordica charantia* is mixed with juice obtained from crushed leaves of *Eupatorium odoratum* and taken orally.
20	*Cuscuta reflexa* Roxb.	Cuscutaceae	Shorno lota	Stem	Low sperm count, jaundice. Juice obtained from crushed stems of *Cuscuta reflexa* is taken orally with juice obtained from crushed rhizomes of *Curcuma aromatica*.
21	*Dioscorea alata* L.	Dioscoreaceae	Shimul alu	Tuber	Malnutrition. Pills made from tubers are orally taken.
22	*Cassia alata* L.	Fabaceae	Daud pata	Leaf	Eczema. Juice obtained from squeezed leaves of *Cassia alata* is applied to affected areas with a little salt and paste of clove of *Allium sativum*.
23	*Cassia fistula* L.	Fabaceae	Bador lathi	Fruit	Stomach pain. Fruits are orally taken.
24	*Cassia tora* L.	Fabaceae	Khaichar	Leaf	Diarrhea in children. Leaves are taken orally with milk.
25	*Mimosa pudica* L.	Fabaceae	Lojjaboti	Root	To expedite delivery. Roots are tied to the body of the expecting mother.
26	*Vicia faba* L.	Fabaceae	Uri	Leaf	Itches, eczema. Crushed leaves of *Vicia faba* are mixed with juice obtained from crushed bulbs of *Allium cepa* and topically applied to affected areas.
27	*Hyptis suaveolens* Poit.	Lamiaceae	Tukma	Stem, seed	Constipation, burning sensations during urination. Stems are soaked in water overnight followed by taking the water the following morning on an empty stomach. See *Sterculia platanifolia.*
28	*Leucas aspera* (Willd.) L.	Lamiaceae	Dom kolosh	Leaf	Coughs and mucus in children. Juice obtained from crushed leaves of *Leucas aspera* is mixed with juice obtained from crushed leaves of *Ocimum tenuiflorum* and taken orally.
29	*Ocimum americanum* L.	Lamiaceae	Kalo tulshi	Leaf	See *Leucas aspera*.
30	*Ocimum sanctum* L.	Lamiaceae	Pahari tulshi	Leaf	Cold. Half spoonful of juice obtained from crushed leaves is taken orally thrice daily for adults, and 1/5 spoonful of juice taken thrice daily with milk for children.
31	*Allium cepa* L.	Liliaceae	Peyaz	Bulb	See *Vicia faba*. See *Ficus cunia*.
32	*Allium sativum* L.	Liliaceae	Roshun	Clove	See *Cassia alata*. See *Cissus quadrangularis*.
33	*Hibiscus rosa-sinensis* L.	Malvaceae	Joba	Flower	Blood dysentery. Flowers are taken orally with sugarcane molasses and water.
34	*Melastoma malabathricum* L.	Melastomataceae	Lutki	Leaf	To stop bleeding from external cuts and wounds. Paste of leaves is topically applied to cuts and wounds.

35	*Azadirachta indica* A. Juss.	Meliaceae	Roshoni neem	Leaf	Body pain, itches. Leaves are fried and orally taken; alternately, juice obtained from squeezed leaves is orally taken.
36	*Stephania japonica* (Thunb.) Miers	Menispermaceae	Gulli lota	Stem	Waist pain or sprain. Stem is tied around the waist.
37	*Ficus cunia* Buch.-Ham. ex. Roxb.	Moraceae	Jogya dumur	Leaf, seed	Stomach disorders. Leaves and seeds of *Ficus cunia* are taken orally with bulb of *Allium cepa* and leaves of *Oroxylum indicum*.
38	*Musa ornate* W. Roxburgh	Musaceae	Ram kola (pahari)	Trunk	Constipation, anemia. Juice obtained from crushed trunk is orally taken.
39	*Averrhoa carambola* L.	Oxalidaceae	Kamranga	Leaf, fruit, stem	Liver diseases, fever. Leaves, stems and fruits are orally taken by chewing. See *Clerodendrum viscosum*.
40	*Oxalis oregana* Nutt.	Oxalidaceae	Chutki	Leaf	Bloating, sex stimulant. Juice obtained from crushed leaves of *Oxalis oregana* is mixed with juice obtained from crushed leaves of *Mangifera indica* and taken orally.
41	*Piper betle* L.	Piperaceae	Paan pata	Leaf	To stop bleeding from external cuts and wounds. Paste of leaves is applied to wounds.
42	*Plumbago zeylanica* L.	Plumbaginaceae	Agun pata	Leaf	Pain reliever. Crushed leaves are mixed with oil and ghee (clarified butter) and applied topically to painful areas.
43	*Cynodon dactylon* (L.) Pers.	Poaceae	Durba	Leaf	See *Eupatorium odoratum*.
44	*Saccharum officinarum* L.	Poaceae	Aakh	Stem	See *Clerodendrum viscosum*.
45	*Persicaria glabra* (Willd.) M. Gómez	Polygonaceae	Kathali kot	Leaf	Eye diseases. Paste of leaves is applied to eyes.
46	*Pyrrosia nuda* (Giesenh.) Ching	Polypodiaceae	Ponkhiraj	Leaf	Watery eyes. Paste of leaves of *Pyrrosia nuda* and leaves of *Terminalia arjuna* is applied to the scalp.
47	*Eichhornia crassipes* (Mart.) Solms	Pontederiaceae	Pana kochuri	Stem	To keep head cool. Stems are mixed with water and kept on top of head.
48	*Pityrogramma austroamericana* Domin.	Pteridaceae	Dheki shak	Leaf, stem	Tuberculosis. Leaves and stems are cooked and eaten as vegetable.
49	*Paederia foetida* L.	Rubiaceae	Padri gota	Leaf	Diarrhea. Leaves are boiled in water and orally taken.
50	*Aegle marmelos* (L.) Corr.	Rutaceae	Bael	Leaf, fruit	Diarrhea. Leaves are chewed and orally taken; alternately, fruit pulp is mixed with water and taken in the form of sherbet.
51	*Citrus aurantifolia* (Christm.) Swingle	Rutaceae	Lebu	Skin of fruit	See *Terminalia bellirica*.
52	*Santalum album* L.	Santalaceae	Shada chondon	Stem	Headache. Paste of stem is applied topically to the forehead.
53	*Scoparia dulcis* L.	Scrophulariaceae	Chini pata	Leaf	Dysentery in children. Crushed leaves are taken orally with mother's milk.
54	*Smilax macrophylla* Willd.	Smilacaceae	Kumira lota	Leaf	Physical weakness, swellings of hands or legs. Paste of leaves is mixed with water and taken orally.
55	*Solanum elaeagnifolium* Cav.	Solanaceae	Gut baegun	Fruit	Anemia, sex stimulant. Fruits are cooked as vegetable or fried and eaten.
56	*Sterculia platanifolia L. f.*	Sterculiaceae	Udal, Ulot komol	Stem	Anemia, low sperm count. Stems of *Sterculia platanifolia* are soaked in water. The water is orally taken with seeds of *Hyptis suaveolens*.
57	*Clerodendrum viscosum Vent.*	Verbenaceae	Bati pata	Leaf	Jaundice. Juice obtained from crushed leaves of *Clerodendrum viscosum* is mixed with juice obtained from crushed leaves of *Averrhoa carambola* and juice obtained from crushed stems of *Saccharum officinarum*. Half cup of the mixture is taken orally for 3 days.
58	*Cissus quadrangularis L.*	Vitaceae	Har bhanga	Leaf	Bone fracture. Leaves of *Cissus quadrangularis* are fried with cloves of *Allium sativum* in oil obtained from *Semecarpus anacardium*. The fried mixture is applied as poultice on bone fractures.

59	*Curcuma aromatica Salisb.*	Zingiberaceae	Pahari holud	Rhizome	See *Cuscuta reflexa*. See *Terminalia bellirica*.

The Kaviraj essentially followed the simple principle of one plant per disease. Only in several cases were more than one plant used for treatment of a single disease. Even then, the formulations were simple. Formulations mainly consisted of juice obtained from crushing, macerating or squeezing plant or plant parts followed by oral or topical administration of the juice. For instance, juice obtained from crushed leaves of *Eupatorium odoratum* was mixed with juice obtained from crushed leaves of *Cynodon dactylon* and administered orally as treatment of irregular menstruation. For topical applications, usually an oil or 'ghee' (clarified butter) was mixed with the plant part before application. For instance, pain was treated with warm leaves of *Calotropis procera*, which has been rubbed with ghee. This is an aspect of the considerable knowledge of the Kaviraj and has been observed by us also in our previous surveys. Oil or ghee would not only serve as an emollient, but would also allow even distribution on the skin of phytochemicals present in leaves, and at the same time allow for better absorption of lipid-solvent phytochemicals.

Scientific validations as well as similar ethnomedicinal uses can be seen with a number of treatments of the Kaviraj. For instance, *Alstonia scholaris*, a plant used by the Kaviraj for treatment of malaria is reportedly used by many tribes of India for treatment of malaria and malarial fever [21]. The tribals of Bankura districts, West Bengal, India also use the plant as a febrifuge [65]. The antinociceptive and anti-inflammatory properties of *Calotropis procera* leaves have been described [27] in Wistar rats; notably, the leaves of the plant were used by the Kaviraj to treat pain. *Spilanthes acmella* is used in traditional medicines of India for treatment of toothache [15]; the plant was used by the Kaviraj to treat tooth and gum infections. The potential benefits of *Terminalia arjuna* in cardiovascular disorders have been reviewed [61]; the Kaviraj also used the plant against heart diseases.

Fruits of *Terminalia bellirica* were used by the Kaviraj against skin diseases; the tribals of Bankura districts, West Bengal, India use the oil obtained from seeds against skin diseases [65]. The blood sugar lowering effect of *Coccinia grandis*, which was used by the Kaviraj against diabetes has been shown [34]. *Momordica charantia* fruit extract reportedly possess analgesic activity [67]; leaves of *Eupatorium odoratum* reportedly also possess analgesic activity [24]; the two plant parts used in combination were used by the Kaviraj against stomach pain. *Cassia alata*, a plant used by the Kaviraj for treatment of eczema, is used for treatment of skin diseases in Nigeria [5]. Use of the flowers of the plant for treatment of eczema has also been reported [1]. *Cassia fistula*, used by the Kaviraj for treatment of stomach pain, reportedly possesses analgesic activity [32].

The use of *Ocimum sanctum* against bronchial asthma, common cold and coughs has been reviewed [64]; the plant was used by the Kaviraj against cold. Extracts of aerial parts of *Hibiscus rosa-sinensis* have been reported to be used in diarrhea [26]; the plant was also used by the Kaviraj against diarrhea. Leaves of *Azadirachta indica* were used by the Kaviraj against body pain; analgesic effect of the leaves has been reported [13]. *Stephania japonica*, used by the Kaviraj to treat waist pain, also has reported analgesic potential [9]. The hepatoprotective activity of *Averrhoa carambola* has been shown [14], a plant used by the Kaviraj against liver diseases. *Plumbago zeylanica* also has reported analgesic activity [31]; the plant was used by the Kaviraj as a pain reliever. Amelioration of acetic acid induced colitis by leaves of *Paederia foetida* has been reported [11]; ethanolic extract of leaves has been found to be inhibitory towards a number of enteric pathogens [66]. The plant was used by the Kaviraj against diarrhea. Another plant used by the Kaviraj against diarrhea, namely *Aegle marmelos*, also has reported anti-diarrheal activity [63].

Santalum album, used by the Kaviraj against headache, has reported analgesic activity [57]. *Scoparia dulcis*, used by the Kaviraj for treatment of dysentery, is used in traditional medicines of India for treatment of dysentery and stomach problems [35]. The hepatoprotective potential of *Clerodendrum viscosum* has been shown in carbon tetrachloride-induced hepatotoxicity in rats [58]; the plant was used by the Kaviraj to treat jaundice. *Cissus quadrangularis* was used by the Kaviraj to treat bone fracture. The bone fracture healing activity of the plant in experimental scientific studies has been reviewed [30]. Prevention of bone loss by oil extract of *Allium sativum* cloves has also been demonstrated. It may be noted that *Allium sativum* cloves and *Cissus quadrangularis* leaves were fried in oil obtained from *Semecarpus anacardium* by the Kaviraj before applying to fractured area.

It can be seen that a number of the medicinal plants used by the Kaviraj can be validated on the basis of pharmacological activity studies conducted with these plants. At the same time, other plants had similar ethnomedicinal uses in other regions. These two things in combination suggest a high probability of discovering newer and more efficacious drugs from these plants.

References

1. Abubacker, M.N., R. Ramanathan and T. Senthil Kumar, 2008. *In vitro* antifungal activity of

Cassia alata Linn. flower extract. Natural Product Radiance, 7: 6-9.

2. Akber, M., S. Seraj, F. Islam, D. Ferdausi, R. Ahmed, D. Nasrin, N. Nahar, S. Ahsan, F. Jamal and M. Rahmatullah, 2011. A survey of medicinal plants used by the traditional medicinal practitioners of Khulna City, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 5: 177-195.
3. Ali, M.A., H.A. Sagar, M.C.S. Khatun, A.K. Azad, K. Begum and M.I.I. Wahed, 2012. Antihyperglycemic and analgesic activities of ethanolic extract of *Cassia fistula* (L.) stem bark. International Journal of Pharmaceutical Sciences and Research, 3: 416-423.
4. Azam, M.N.K., M.N. Ahmed, M.M. Rahman and M. Rahmatullah, 2013. Ethnomedicines used by the Oraon and Gor tribes of Sylhet district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 7: 391-402.
5. Benjamin, T.V. and A. Lamikanra, 1981. Investigation of *Cassia alata*, a plant used in Nigeria in the treatment of skin diseases. Pharmaceutical Biology, 19: 93-96.
6. Biswas, K.R., T. Ishika, M. Rahman, A. Swarna, T. Khan, M.N. Monalisa and M. Rahmatullah, 2011a. Antidiabetic plants and formulations used by folk medicinal practitioners of two villages in Narail and Chuadanga districts, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 5: 158-167.
7. Biswas, A., W.M. Haq, M. Akber, D. Ferdausi, S. Seraj, F.I. Jahan, A.R. Chowdhury and M. Rahmatullah, 2011b. A survey of medicinal plants used by folk medicinal practitioners of Paschim Shawra and Palordi villages of Gaurnadi Upazila in Barisal district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 5: 15-22.
8. Biswas, K.R., T. Khan, M.N. Monalisa, A. Swarna, T. Ishika, M. Rahman and M. Rahmatullah, 2011c. Medicinal plants used by folk medicinal practitioners of four adjoining villages of Narail and Jessore districts, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 5: 23-33.
9. Bokshi, B., S.M.A. Rahman, S.K. Sadhu, A. Muhammad and M.A. Islam, 2013. Assessment of analgesic and antidiarrhoeal activities of different fractions of crude extract of *Stephania japonica* stem. International Journal of Pharmaceutical Sciences and Research, 4: 1233-1238.
10. Chowdhury, A.R., F.I. Jahan, S. Seraj, Z. Khatun, F. Jamal, S. Ahsan, R. Jahan, I. Ahmad, M.H. Chowdhury and M. Rahmatullah, 2010. A survey of medicinal plants used by Kavirajes of Barisal town in Barisal district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 4: 237-246.
11. Das, P.R., M.T. Islam, A.S.M.S.B. Mahmud, M.H. Kabir, M.E. Hasan, Z. Khatun, M.M. Rahman, M. Nurunnabi, Z. Khatun, Y.-K. Lee, R. Jahan and M. Rahmatullah, 2012. An ethnomedicinal survey conducted among the folk medicinal practitioners of three villages in Kurigram district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 6: 85-96.
12. Das, S., L. Kanodia, A. Mukherjee and A. Hakim, 2013. Effect of ethanolic extract of leaves of *Paederia foetida* Linn. on acetic acid induced colitis in albino rats. Indian Journal of Pharmacology, 45: 453-457.
13. Dinda, A., D. Das, G. Ghosh and S. Kumar, 2013. Analgesic and anti-inflammatory activity of various fractions of *Azadirachta indica* leaf in experimental animals. International Journal of PharmTech Research, 5: 838-843.
14. Eswaraiah, M.C., N. Sindhu, B. Dipankar and N. Manasa, 2013. Hepatoprotective activity of *Averrhoa carambola* stem ethanolic extract on CCl_4 induced liver damage in rats. International Journal of Pharmacy and Pharmaceutical Sciences, 5: 406-410.
15. Gupta, N., A.R. Patel and R.P. Ravindra, 2012. Design of Akkalkara (*Spilanthes acmella*) formulations for anti-microbial and topical anti-inflammatory activities. International Journal of Pharma and Bio Sciences, 3: 161-170.
16. Haque, M.A., M.K. Shaha, S.U. Ahmed, R. Akter, H. Rahman, S. Chakravotry, A.H.M.N. Imran, M.T. islam, R.C. Das and M. Rahmatullah, 2011. Use of inorganic substances in folk medicinal formulations: a case study of a folk medicinal practitioner in Tangail district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 5: 415-423.
17. Hasan, M.M., M.E.A. Annay, M. Sintaha, H.N. Khaleque, F.A. Noor, A. Nahar, S. Seraj, R. Jahan, M.H. Chowdhury and M. Rahmatullah, 2010. A survey of medicinal plant usage by folk medicinal practitioners in seven villages of Ishwardi Upazilla, Pabna district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 4: 326-333.
18. Hasan, M.E., S. Akter, N.S. Piya, P.K. Nath, U.S.R. Nova, H.R. Chowdhury, N.F. Anjoom, Z. Khatun and M. Rahmatullah, 2012. Variations in selection of medicinal plants by tribal healers of the Soren clan of the Santal tribe: a study of the Santals in Rajshahi district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 6: 315-324.
19. Hossan, M.S., A. Hanif, B. Agarwala, M.S. Sarwar, M. Karim, M.T. Rahman, R. Jahan and M. Rahmatullah, 2010. Traditional use of medicinal plants in Bangladesh to treat urinary tract infections and sexually transmitted

diseases. Ethnobotany Research and Applications, 8: 61-74.
20. Hossan, M.S., P. Roy, S. Seraj, S.M. Mou, M.N. Monalisa, S. Jahan, T. Khan, A. Swarna, R. Jahan and M. Rahmatullah, 2012. Ethnomedicinal knowledge among the Tongchongya tribal community of Roangchaari Upazila of Bandarban district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 6: 349-359.
21. Hussain, A., M.K. Zaman and A. Ramteke, 2013. Preliminary phytochemical screening and proximate analysis of trunk bark of *Alstonia scholaris* (L.) R. Br. Journal of Pharmacognosy and Phytochemistry, 1: 13-17.
22. Islam, F., F.I. Jahan, S. Seraj, I. Malek, A.F.M.N. Sadat, M.S.A. Bhuiyan, A. Swarna, S. Sanam and M. Rahmatullah, 2011. Variations in diseases and medicinal plant selection among folk medicinal practitioners: a case study in Jessore district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 5: 282-291.
23. Jahan, F.I., M.R.U. Hasan, R. Jahan, S. Seraj, A.R. Chowdhury, M.T. Islam, Z. Khatun and M. Rahmatullah, 2011. A comparison of medicinal plant usage by folk medicinal practitioners of two adjoining villages in Lalmonirhat district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 5: 46-66.
24. Jena, P.K. and A.K. Chakraborty, 2010. Evaluation of analgesic activity studies of various extracts of leaves of *Eupatorium odoratum* Linn. International Journal of Pharmacy & Technology, 2: 612-616.
25. Khan, M.A., M.N. Hasan, N. Jahan, P.R. Das, M.T. Islam, M.S.A. Bhuiyan, S. Jahan, S. Hossain and M. Rahmatullah, 2012. Ethnomedicinal wisdom and famine food plants of the Hajong community of Baromari village in Netrakona district of Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 6: 387-397.
26. Kumar, A. and A. Singh, 2012. Review on *Hibiscus rosa sinensis*. International Journal of Research in Pharmaceutical and Biomedical Sciences, 3: 534-538.
27. Lokhande, V. and N.S. Naikwade, 2011. The antinociceptive and anti-inflammatory activity of leaves of *Calotropis procera* Linn. Journal of Pharmacy Research, 4: 4639-4640.
28. Martin, G.J., 1995. Ethnobotany: a 'People and Plants' Conservation Manual, Chapman and Hall, London, pp: 268.
29. Maundu, P., 1995. Methodology for collecting and sharing indigenous knowledge: a case study. Indigenous Knowledge and Development Monitor, 3: 3-5.
30. Mishra, G., S. Srivastava and B.P. Nagori, 2010. Pharmacological and therapeutic activity of *Cissus quadrangularis*: An overview. International Journal of PharmTech Research, 2: 1298-1310.
31. Mittal, V., S.K. Sharma, D. Kaushik, M. Khatri and K. Tomar, 2010. A comparative study of analgesic activity of *Plumbago zeylanica* Linn. callus and root extracts in experimental mice. Research Journal of Pharmaceutical, Biological and Chemical Sciences, 1: 830-836.
32. Mollik, M.A.H., M.S. Hossan, A.K. Paul, M.T. Rahman, R. Jahan and M. Rahmatullah, 2010a. A comparative analysis of medicinal plants used by folk medicinal healers in three districts of Bangladesh and inquiry as to mode of selection of medicinal plants. Ethnobotany Research and Applications, 8: 195-218.
33. Mollik, M.A.H., A.I. Hassan, T.K. Paul, M. Sintaha, H.N. Khaleque, F.A. Noor, A. Nahar, S. Seraj, R. Jahan, M.H. Chowdhury and M. Rahmatullah, 2010b. A survey of medicinal plant usage by folk medicinal practitioners in two villages by the Rupsha River in Bagerhat district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 4: 349-356.
34. Munasinghe, M.A.A.K., C. Abeysena, I.S. Yaddehige, T. Vidanapathirana and K.P.B. Piyumal, 2011. Blood sugar lowering effect of *Coccinia grandis* (L.) J. Voigt: path for a new drug for diabetes mellitus. Experimental Diabetes Research, 2011: Article ID 978762, 4 pages, http://dx.doi.org/10.1155/2011/978762.
35. Murti, K., M. Panchal, P. Taya and R. Singh, 2012. Pharmacological properties of *Scoparia dulcis*: A review. Pharmacologia, 3: 344-347.
36. Nahar, M.N., J. Ferdous, F.Z. Samanta, K.A. Shuly, S. Nahar, R. Saha, S. Islam, M.J. Mahal, S. Seraj and M. Rahmatullah, 2013. Ethnomedicinal plants of the Rai Clan of the Tipra tribe of Sylhet district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 7: 403-414.
37. Naher, S., B. Ferdous, T. Datta, U.F. Rashid, T.N. Tasnim, S. Akter, S.M. Mou and M. Rahmatullah, 2013. Ayurvedic influences in folk medicine: a case study of a folk medicinal practitioner of Jhalokathi in Barisal district, Bangladesh. American Eurasian Journal of Sustainable Agriculture, 7:295-305.
38. Nawaz, A.H.M.M., M. Hossain, M. Karim, M. Khan, R. Jahan and M. Rahmatullah, 2009. An ethnobotanical survey of Rajshahi district in Rajshahi division, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 3: 143-150.
39. Rahmatullah, M., D. Ferdausi, M.A.H. Mollik, M.N.K. Azam, M.T. Rahman and R. Jahan, 2009a. Ethnomedicinal Survey of Bheramara Area in Kushtia District, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 3: 534-541.

40. Rahmatullah, M., A. Noman, M.S. Hossan, M.H. Rashid, T. Rahman, M.H. Chowdhury and R. Jahan, 2009b. A survey of medicinal plants in two areas of Dinajpur district, Bangladesh including plants which can be used as functional foods. American-Eurasian Journal of Sustainable Agriculture, 3: 862-876.
41. Rahmatullah, M., A.K. Das, M.A.H. Mollik, R. Jahan, M. Khan, T. Rahman and M.H. Chowdhury, 2009c. An Ethnomedicinal Survey of Dhamrai Sub-district in Dhaka District, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 3: 881-888.
42. Rahmatullah, M., M.A.H. Mollik, A.K. Paul, R. Jahan, M.A. Khatun, S. Seraj, A.R. Chowdhury, A.B.M.A. Bashar, S.M.R. Wahab and M.T. Rahman, 2010a. A comparative analysis of medicinal plants used to treat gastrointestinal disorders in two sub-districts of Greater Khulna Division, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 4:22-28.
43. Rahmatullah, M., M.A.H. Mollik, M. Harun-or-Rashid, R. Tanzin, K.C. Ghosh, H. Rahman, J. Alam, M.O. Faruque, M.M. Hasan, R. Jahan and M.A. Khatun, 2010b. A comparative analysis of medicinal plants used by folk medicinal healers in villages adjoining the Ghaghot, Bangali and Padma Rivers of Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 4:70-85.
44. Rahmatullah, M., D. Ferdausi, M.A.H. Mollik, R. Jahan, M.H. Chowdhury and W.M. Haque, 2010c. A Survey of Medicinal Plants used by Kavirajes of Chalna area, Khulna District, Bangladesh. African Journal of Traditional, Complementary and Alternative Medicines, 7: 91-97.
45. Rahmatullah, M., M.A. Khatun, N. Morshed, P.K. Neogi, S.U.A. Khan, M.S. Hossan, M.J. Mahal and R. Jahan, 2010d. A randomized survey of medicinal plants used by folk medicinal healers of Sylhet Division, Bangladesh. Advances in Natural and Applied Sciences, 4: 52-62.
46. Rahmatullah, M., A.A.B.T. Kabir, M.M. Rahman, M.S. Hossan, Z. Khatun, M.A. Khatun, and R. Jahan, 2010e. Ethnomedicinal practices among a minority group of Christians residing in Mirzapur village of Dinajpur District, Bangladesh. Advances in Natural and Applied Sciences, 4: 45-51.
47. Rahmatullah, M., M.A. Momen, M.M. Rahman, D. Nasrin, M.S. Hossain, Z. Khatun, F.I. Jahan, M.A. Khatun and R. Jahan, 2010f. A randomized survey of medicinal plants used by folk medicinal practitioners in Daudkandi sub-district of Comilla district, Bangladesh. Advances in Natural and Applied Sciences, 4: 99-104.
48. Rahmatullah, M., M.A.H. Mollik, M.N. Ahmed, M.Z.A. Bhuiyan, M.M. Hossain, M.N.K. Azam, S. Seraj, M.H. Chowdhury, F. Jamal, S. Ahsan and R. Jahan, 2010g. A survey of medicinal plants used by folk medicinal practitioners in two villages of Tangail district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 4: 357-362.
49. Rahmatullah, M., M.A.H. Mollik, M.K. Islam, M.R. Islam, F.I. Jahan, Z. Khatun, S. Seraj, M.H. Chowdhury, F. Islam, Z.U.M. Miajee and R. Jahan, 2010h. A survey of medicinal and functional food plants used by the folk medicinal practitioners of three villages in Sreepur Upazilla, Magura district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 4: 363-373.
50. Rahmatullah, M., R. Jahan, M.A. Khatun, F.I. Jahan, A.K. Azad, A.B.M.A. Bashar, Z.U.M. Miajee, S. Ahsan, N. Nahar, I. Ahmad and M.H. Chowdhury, 2010i. A pharmacological evaluation of medicinal plants used by folk medicinal practitioners of Station Purbo Para Village of Jamalpur Sadar Upazila in Jamalpur district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 4: 170-195.
51. Rahmatullah, M., T. Ishika, M. Rahman, A. Swarna, T. Khan, M.N. Monalisa, S. Seraj, S.M. Mou, M.J. Mahal and K.R. Biswas, 2011a. Plants prescribed for both preventive and therapeutic purposes by the traditional healers of the Bede community residing by the Turag River, Dhaka district. American-Eurasian Journal of Sustainable Agriculture, 5: 325-331.
52. Rahmatullah, M., M.N.K. Azam, M.M. Rahman, S. Seraj, M.J. Mahal, S.M. Mou, D. Nasrin, Z. Khatun, F. Islam and M.H. Chowdhury, 2011b. A survey of medicinal plants used by Garo and non-Garo traditional medicinal practitioners in two villages of Tangail district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 5: 350-357.
53. Rahmatullah, M. and K.R. Biswas, 2012a. Traditional medicinal practices of a Sardar healer of the Sardar (Dhangor) community of Bangladesh. Journal of Alternative and Complementary Medicine, 18: 10-19.
54. Rahmatullah, M., A. Hasan, W. Parvin, M. Moniruzzaman, A. Khatun, Z. Khatun, F.I. Jahan and R. Jahan, 2012b. Medicinal plants and formulations used by the Soren clan of the Santal tribe in Rajshahi district, Bangladesh for treatment of various ailments. African Journal of Traditional, Complementary and Alternative Medicines, 9: 342-349.
55. Rahmatullah, M., Z. Khatun, A. Hasan, W. Parvin, M. Moniruzzaman, A. Khatun, M.J. Mahal, M.S.A. Bhuiyan, S.M. Mou and R. Jahan, 2012c. Survey and scientific evaluation of medicinal plants used by the Pahan and Teli

tribal communities of Natore district, Bangladesh. African Journal of Traditional, Complementary and Alternative Medicines, 9: 366-373.
56. Rahmatullah, M., M.N.K. Azam, Z. Khatun, S. Seraj, F. Islam, M.A. Rahman, S. Jahan, M.S. Aziz and R. Jahan, 2012d. Medicinal plants used for treatment of diabetes by the Marakh sect of the Garo tribe living in Mymensingh district, Bangladesh. African Journal of Traditional, Complementary and Alternative Medicines, 9: 380-385.
57. Saneja, A., P. Kaushik, D. Kaushik, S. Kumar and D. Kumar, 2009. Antioxidant, analgesic and anti-inflammatory activities of *Santalum album* Linn. Planta Medica, 75-P-102, DOI: 10.1055/s-2009-1216540.
58. Sannigrahi, S., U.K. Mazumder, D. Pal and S.L. Mishra, 2009. Hepatoprotective potential of methanol extract of *Clerodendrum infortunatum* Linn. against CCl_4 induced hepatotoxicity in rats. Pharmacognosy Magazine, 5: 394-399.
59. Sarker, S., S. Seraj, M.M. Sattar, W.M. Haq, M.H. Chowdhury, I. Ahmad, R. Jahan, F. Jamal and M. Rahmatullah, 2011. Medicinal plants used by folk medicinal practitioners of six villages in Thakurgaon district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 5: 332-343.
60. Sarker, B., F. Akther, U.A.R. Sifa, I. Jahan, M. Sarker, S.K. Chakma, P.K. Podder, Z. Khatun and M. Rahmatullah, 2012. Ethnomedicinal investigations among the Sigibe clan of the Khumi tribe of Thanchi sub-district in Bandarban district of Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 6: 378-386.
61. Seth, S., P. Dua and S.K. Maulik, 2013. Potential benefits of *Terminalia arjuna* in cardiovascular disease. Journal of Preventive Cardiology, 3: 428-432.
62. Shaheen, Md.E.K., M.A. Syef, S.S. Saha, M.S. Islam, M.D.A. Hossain, M.A.I. Sujan and M. Rahmatullah, 2011. Medicinal plants used by the folk and tribal medicinal practitioners in two villages of Khakiachora and Khasia Palli in Sylhet district, Bangladesh. Advances in Applied and Natural Sciences, 5: 9-19.
63. Shamkuwar, P.B., S.R. Shahi and D.P. Pawar, 2012. Efficacy of *Aegle marmelos* L. Corr. (Rutaceae) in Ayurvedic antidiarrhoeal formulation. European Journal of Experimental Biology, 2: 194-198.
64. Singh, E., S. Sharma, J. Dwivedi and S. Sharma, 2012. Diversified potentials of *Ocimum sanctum* Linn (Tulsi): An exhaustive survey. Journal of Natural Products and Plant Resources, 2: 39-48.
65. Sinhababu, A. and A. Banerjee, 2013. Ethno-botanical study of medicinal plants used by tribals of Bankura districts, West Bengal, India. Journal of Medicinal Plants Studies, 1: 98-104.
66. Uddin, B., T. Nahar, M.I. Khalil and S. Hossain, 2007. *In vitro* antibacterial activity of the ethanol extract of *Paederia foetida* L. (Rubiaceae) leaves. Bangladesh Journal of Life Sciences, 19: 141-143.
67. Ullah, M., M. Showkat, N.U. Ahmed, S. Islam and N. Absar, 2012. Evaluation of *Momordica charantia* L. fruit extract for analgesic and anti-inflammatory activities using *in vivo* assay. Research Journal of Medicinal Plant, DOI: 10.3923rjmp.2012.