World Journal of Natural Products Research 1 (1): 01-04, 2010
ISSN 2079-2220

Phytochemicals Investigation on a Tropical Plant, *Zea mays* from Kursha, Kushtia District, Bangladesh

[1]*M. Amzad Hossain and* [2]*Atiqur Rahman*

[1]Department of Biotechnology Research Institute, Universiti Malaysia Sabah,
Locked Bag No. 2073, 88999 Kotakinabalu, Sabah, Malaysia
[2]Department of Biotechnology, Daegu University, Kyoungsan, Kyoungpook 712-714, Republic of Korea

Abstract: The developing countries mostly rely on traditional medicines. This traditional medicine involves the use of different plant extracts or the bioactive constituents. This type of study provides the health application at affordable cost. This study such as ethnomedicine keenly represents one of the best avenues in searching new economic plants for medicine. In keeping this view in mind the present investigation is carried out in *Zea mays* seed of Kursha, Kushtia District, Bangladesh. The results suggest that the phytochemical properties of the seed for curing various ailments.

Key words: *Zea mays* % Ehtyl acetate % Methanol % Phytochemical % Traditional medicine

INTRODUCTION

"Phyto" is the Greekword for plant. There are many "families" of phytochemicals and they help the human body in a variety of ways. Phytochemicals may protect human from a host of diseases. Phytochemicals are non-nutritive plant chemicals that have protective or disease preventive properties. Plant produces these chemicals to protect itself but recent research demonstrates that many phytochemicals can protect humans against diseases. There are many phytochemicals in fruits and herbs and each works differently.

Zea Mays is a small tree, which grows in tropical and sub tropical Asian countries, America and currently cultivated in sub-tropical countries of the world and in warm climates. It is locally known as 'Bhutta'. Maize is a potential allergen source from early infancy as it is an ingredient in infant's diets in many parts of the world. A relatively low degree of relation is through to exit between maize and the other cereals [1] although maize and rice antigens show similarities [2]. Recently it is used as a diuretic in acute and chronic cystitis in the bladder irritation of uric acid and phosphatic gravel, gonorrhoea and hepato biliary disease [3]. The recent surge of interest in chemistry of this plant has led to the isolation of more than 20 components including flavonoids, terpenoids and caffeic acid derivatives with different biological acitivies [4, 5]. During the course of our investigation on the biologically active constituents of Labiatae plants, we examined the constituents of the seeds of *Zea Mays* widely cultivated in Bangladesh and isolated some flavonoid compounds. Hence, the present study has been made to investigate the phytochemical screening of the *Zea mays* seed.

MATERIALS AND METHODS

Plant Material: The ripe seeds of Zea Mays were collected from the Kursha, Kushtia district of Bangladesh in June 2009. The plant was identified and voucher specimen number was deposited at the Department of Pharmacy, Dhaka University, Dhaka, Bangladesh with No. 10132.

Preparation of Extracts: The *Zea mays* fruits were first washed well and pulp was removed from the seeds. Seeds were washed several times with distilled water to remove the traces of pulp from the seeds. The seeds were dried at room temperature and coarsely powdered. The powder was extracted with hexane to remove lipids. It was then filtered and the filtrate was discarded. The residue was successively extracted with ethyl acetate and methanol using cold percolation method. The percentage yields were 2.43% in ethyl acetate and 14.89 % in methanol.

Corresponding Author: M. Amzad Hossain, Department of Biotechnology Research Institute, Universiti Malaysia Sabah, Locked Bag No. 2073, 88999 Kotakinabalu, Sabah, Malaysia.

Preliminary Phytochemicals Screening: One gram of the ethyl acetate and methanol extracts of *Zea Mays* seed were dissolved in 50 ml of its own mother solvents to obtain a stock of concentration 1% (v/v). The extracts thus obtained were subjected to preliminary phytochemical screening following the methodology of Harborne [6] and Kokate [7].

Screening Procedure

Test for Alkaloids: Five ml of the extract was added to 2 ml of HCl. To this acidic medium, 1 ml of Dragendroff's reagent was added. An orange or red precipitate produced immediately indicates the presence of alkaloids.

Test for Amino Acids: One ml of the extract was treated with few drops of Ninhydrin reagent. Appearance of purple colour shows the presence of amino acids.

Test for Anthraquinones: Five ml of the extract solution was hydrolysed with diluted Conc. H_2SO_4 extracted with benzene. 1 ml of dilute ammonia was added to it. Rose pink coloration suggested the positive response for anthraquinones.

Test for Flavonoids: One ml of the extract, a few drops of dilute sodium hydroxide was added. An intense yellow colour was produced in the plant extract, which become colourless on addition of a few drops of dilute acid indicates the presence of flavonoids.

Test for Glycosides: The extract was hydrolysed with HCl for few hours on a water bath. To the hydrolysate, 1ml of pyridine was added and a few drops of sodium nitroprusside solutions were added and then it was made alkaline with sodium hydroxide solution. Appearance of pink to red colour shows the presence of glycosides.

Test for Phytosterol: The extract was refluxed with solution of alcoholic potassium hydroxide till complete saponification takes place. The mixture was diluted and extracted with ether. The ether layer was evaporated and the residue was tested for the presence of phytosterol. The residue was dissolved in few drops of diluted acetic acid; 3 ml of acetic anhydride was added followed by few drops of Conc. H_2SO_4 . Appearance of bluish green colour showed the presence of phytosterol.

Test for Saponins: The extract was diluted with 20 ml of distilled water and it was agitated in a graduated cylinder for 15 minutes. The formation of 1cm layer of foam showed the presence of saponins.

Test for Steroids: One ml of the extracts was dissolved in 10 ml of chloroform and equal volume of concentrated sulphuric acid was added by sides of the test tube. The upper layer turns red and sulphuric acid layer showed yellow with green fluorescence. This indicated the presence of steroids.

Test for Tannins: Three ml of the extract and a few drops of 1% lead acetate were added. A yellow precipitate was formed, indicates the presence of tannins.

Test for Triterpenoids: Five mg of the extract was dissolved in 1 ml of chloroform; 1 ml of acetic anhydride was added following the addition of 1 ml of Conc. H_2SO_4. Formation of reddish violet colour indicates the presence of triterpenoids.

RESULTS

The result obtained in the present investigation (Table 1), the ethyl acetate and methanol extracts of the seeds of *Zea mays* showed the presence of alkaloids, amino acids, flavonoids, glycosides, phytosterols, saponins, steroids, tannins and triterpenoids. Further, the ethyl acetate and methanol extracts of the seeds showed the absence of anthraquinones.

Table 1: The analysis of phytochemicals in the ethyl acetate and methanol extract of *Zea Mays*

	Inference	
Phytochemicals	Ethyl acetate	Methanol
Alkaloids	+	+
Amino acids	+	+
Anthraquinones	-	-
Flavonoids	-	-
Glycosides	+	+
Phytosterol	+	+
Saponins	+	+
Tannins	+	+
Triterpenoids	+	+
Steroids	+	+

+ = presence; - = absence

DISCUSSION

A variety of herbs and herbal extracts contain different phytochemicals with biological activity that can be of valuable therapeutic index. Much of the protective effect of fruits and vegetables has been attributed by phytochemicals, which are the non-nutrient plant compounds. Different phytochemicals have been found to possess a wide range of activities, which may help in protection against chronic diseases. For example, Phytochemicals such as saponins, terpenoids, flavonoids, tannins, steroids and alkaloids have antiinflammatory effects [8-12]. Glycosides, flavonoids, tannins and alkaloids have hypoglycemic activities [13, 14]. Rupasinghe *et al.* [15] have reported that saponins possess hypocholesterolemic and antidiabetic properties. The terpenoids have also been shown to decrease blood sugar level in animal studies [16]. Steroids and triterpenoids showed the analgesic properties [17, 18]. The steroids and saponins are responsible for central nervous system activities [19].

Phytochemicals screening of the ethyl acetate and methanol extracts of *Zea Mays* seed used in this study revealed that the crude extracts contained alkaloids, amino acids, flavonoids, glycosides, phytosterols, saponins, steroids, tannins and triterpenoids (Table 1).

Even though, this is only a preliminary study of the occurrence of certain properties of *Zea mays* seed an in-depth study will provide a good concrete base of all the phytochemicals functions mention above.

CONCLUSION

In the present study, we have found that most of the biologically active phytochemicals were present in the ethyl acetate and methanol extracts of *Zea mays* seed. The medicinal properties of *Zea mays* seed extract extracts may be due to the presence of above mentioned phytochemicals. Further studies are in progress in our laboratory to isolate the active components.

ACKNOWLEDGEMENT

The authors are grateful to Ministry of Science and Information and Communication Technology for providing special research grant (Project No. Proc/R. Project/MHM/Chem-1/2003-2004) of this work.

REFERENCES

1. Kalveram, K. and G. Forck, 1978. Int Archs Allergy Appl Immunol, 57: 549-555.
2. Hoffman, D.R., 1975. Antibacerial activity of *Zea Mays*, Immunochem, 12: 53-58.
3. World Health Organisation, 2001. Geneva Legal Status of Traditional Medicine and Complementary/ Alternative Medicine, A worldwide Rev., 129: 23-7-2010
4. Don, D., N.N. Ham, D.H. Khac, N.T. Lam, P.T. Son, N.V. Dau, N. Grab and N.E. Stjernstrom, 1992. Phytochemical Investigation of the leaves of *Zea mays*, J. Ethnopharmacol., 36: 225-231.
5. Gruber, J., W. Slebert, D.J. Marderoslam, A.H.D. and R.S. Hock, 1999. Flavonoids contents of *Zea mays*. Phytochemical Analysis, 10: 22-28.
6. Harborne, J.B. 1998. Phytochemical methods. A guide to modern techniques of plant analysis. 3rd Edn. Chapman and Hall Int. Ed. New York.
7. Kokate, C.K., 2001. Pharmacohnosy. 16th Edn. Nirali Prakasham, Mumbai, India.
8. Liu, R.H., 2003. Health benefits of fruit and vegetables are from additive and synergistic combinations of phytochemicals. Am. J. Clin. Nutr., 78: 517S-520S.
9. Manach, C., F. Regerat and O. Texier, 1996. Bioavailability, metabolism and physiological impact of 4-oxo-flavonoids. Nutr. Res., 16: 517-544.
10. Latha, R.M., T. Geetha and P. Varalakshmi, 1998. Effect of *Vernonia cinerea* less flower extract in adjuvantinduced arthritis. General Pharmacol., 31: 601-606.
11. Akindele, A.J. and O.O. Adeyemi, 2007. Antiinflammatory activity of the aqueous leaf extract of *Byrsocarpus coccineus*, Fitoterapia, 78: 25-28.
12. Ilkay Orhan, Esra Kupeli, Bilge Sener and Erdem Yesilada, 2007. Appraisal of anti–inflammatory potential of the clubmoss, *Lycopodium clavatum* L. J. Ethnopharmacol., 109: 146-150.
13. Oliver, B., 1980. Oral hypoglycaemic plants in West Africa. J. Ethnopharmacol., 2: 119-127.
14. Cherian, S. and K.T. Augusti, 1995. Insulin sparing action of leucopelargonidin derivative isolated from *Ficus bengalesis* Linn. Indian J. Exp. Biol., 33: 608-611.

15. Rupasinghe, H.P., C.J. Jackson, V. Poysa, C. Di Berado, J.D. Bewley and J. Jenkinson, 2003. Soyasapogenol A and B distribution in Soybean (*Glycine max* L.Merr) in relation to seed physiology, genetic variability and growing location. J. Agric. Food Chem., 51: 5888-5894.
16. Luo, J., J. Cheung and E. Yevich, 1999. Novel terpenoidtype quinones isolated from *Pycnanthu angolensis* of potential utility in the treatment of type-2 diabetes. J. Pharmacol. Exptl. Therapy, 288: 529-534.
17. Sayyah, M., N. Hadidi and M. Kamalinejad, 2004. Analgesic and anti-inflammatory activity of *Lactuca sativa* seed extract in rats. J. Ethnopharmacol., 92: 325-9.
18. Malairajan, P., Geetha Gopalakrishnan, S. Narasimhan and K. Jessi Kala Veni, 2006. Analgesic activity of some Indian medicinal plants. J. Ethnopharmacol., 19: 425-428.
19. Argal, A. and A.K. Pathak, 2006. CNS activity of *Calotropis gigantea* roots. J. Ethnopharmacoo., 106: 142-145.