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Phytochemical constituents and antioxidant activity of the tuber Amorphophallus paeoniifolius (Dennst.) Nicolson (Araceae) in ethanolic extract from Kottoor, Thiruvananthapuram, Kerala.

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ABSTRACT

The present study shows the phytochemicals and antioxidant eventuality of Amorphophallus paeoniifolius tuber. Both primary and secondary metabolites were detected in ethanol extract. Proximate analysis estimated the humidity content (81.29%), carbohydrate (1.201 µg/ g), crude fat (0.72%), free amino acid (0.028 µg/ g), protein (0.123 µg/ g), ash (9.7%),), fibre (0.87%) and lipid (0.87%) content of tuber of Amorphophallus paeoniifolius. Total alkaloids, phenolics, flavonoids, tannins, terpenoids, carbohydrate, saponins and steroid content of ethanol were also determined. The secondary metabolites were rich in ethanol extract with high terpenoids (2.190 µg/ g) followed by carbohydrate (1.201 µg/ g), tannins (0.499 µg/ g), flavonoids (0.426 µg/ g), phenolics (0.411 µg/ g), alkaloid (0.343 µg/ g), saponins (0.021 µg/ g), and steroids (0.013 µg/ g). The IC_{50} value for ethanolic extract by DPPH assay was (30.556 µg/ ml) which suggest Amorphophallus paeoniifolius as an implicit natural free revolutionary scavenger which would find use as an antioxidant.

Keywords Amorphophallus paeoniifolius, Phytochemical analysis, Proximate analysis, Antioxidant activity, IC_{50} value

1. INTRODUCTION

Tuber crops are important energy sources, second only to cereals, substantially in the tropical regions of the world. Tuber crops constitute the second largest group of cultivated species, after cereals in tropical countries and enthrall high position in the food security, due to their high carbohydrate content and spicy value (Lebot, 2009). In India there's an being rich inheritable diversity of tropical root and tuber crops particularly aroids, yams and several minor tuber crops (Chuakul et al., 2000; Keardrit et al., 2010). Amorphophallus paeoniifolius (Dennst.) Nicolson of family Areaceae is a tuberous factory generally used in Ayurvedic drugs as well as ethnical drugs in India. Fresh Amorphophallus paeoniifolius corm contains riboflavin, ß- carotene, thiamine, choline, niacin and as well as serotonin and its derivations videlicet cis- N-(p- coumaroyl) serotonin and trans- N-(p- coumaroyl) serotonin (Niwa et al., 2000).

Corms have unique point of containing high situations of glucomannan (over 45), which is the best- known natural comestible and water-answerable fiber (Nishinari and Yoshimura, 1999). Regular consumption of glucomannan is reported to reduce total cholesterol, help constipation, reduce serum insulin, and regulate the situations of blood sugar and lipid metabolism, promote body weight loss and vulnerable functions of mortal body and also

serve as a mycotoxin adsorbent. Corms also retain implicit pharmacological parcels similar as antidiabetic and antioxidant exertion (Chen et al., 2003), anti-obesity exertion (Keithley et al., 2005), laxative exertion (Chen et al., 2006), anti-inflammatory exertion (Onishi et al., 2004) and prebiotic exertion (Li et al., 2005; Niwa et al., 2000). The main ideal of the present study was to carry out the qualitative and quantitative evaluation of phytochemicals, estimation of total phenolics, flavonoids alkaloids, saponin, tannin and steroids and evaluation of in vitro antioxidant exertion of Amorphophallus paeoniifolius. The energy of traditional factory species in drug tuber from their phytochemical factors, which work specific pharmacological goods on the mortal body and high number of phytochemicals may profit a species to survive in their natural terrain.

2. METHODOLOGY

Plant material was collecting from Kottoor, Thiruvananthapuram, Kerala and practical works were done in Accuratus Scientia Natural Product Research and Development Pvt Ltd Attingal.

3. RESULT AND DISCUSSION

3.1. Percentage yield and preliminary phytochemical analysis

The crude extract was partitioned using detergent with ethanol, their separate extract yields are presented in Table1.The results of the phytochemical composition of Amorphophallus paeoniifolius in solvent extract ethanol. Phytochemical webbing of crude extract revealed the presence of both primary and secondary metabolites. The remedial eventuality of plants can be attributed to the presence of these secondary metabolites. Comparing to other secondary metabolites, terpenoids (2.190 µg/ g) and carbohydrates (1.201 µg/ g) are more in Amorphophallus paeoniifolius. Grounded on proximate analysis of Amorphophallus paeoniifolius carbohydrates and proteins are responsible for the protective parcels observed in tuber. The tuber of this plant has high medicinal value and consumed by numerous people as a food. Pharmacologically, it displayed-inflammatory (De et al., 2010), analgesic (Shilpi et al., 2005), CNS depressant (Das et al., 2009), cytotoxic (Angayarkanni et al., 2007), antibacterial and antifungal (Khan et al., 2008) conditioning in experimental studies. The tuber contains phytochemicals like β- sitosterol (Srivastava et al., 2014), lupeol (Khare 2007), quercetin, gallic acid (Nataraj et al., 2009; Nataraj et al., 2012), and betulinic acid (Tandan & Sharma 2013).

2.2. Proximate analysis

The dimension of humidity content is veritably important in the processing, preservation and storehouse of food. The minimum and maximum range of tuber water content ranges from 78.09 to 81.09 from the standard guidelines by Zehra Ekin (2011). In this study tuber shows 81.29% of humidity. Tuber expansion is explosively affected by water force so that both deficiency and inordinate water force can beget tuber contortion and other tuber quality issues similar as pointed ends, clods, brown centre and concave heart. Protein content analysis is introductory for the characterization of food type. Amorphophallus paeoniifolius showed a high content of carbohydrate, ash and protein which indicates the high nutritive value of the tuber and by homogenizing the proximate composition it's relatively safe to be

used as salutary supplement. Amorphophallus paeoniifolius have perceptible quantum of total ash (9.7%), carbohydrate (1.201 mg/ g),protein, 0.123 µg/ g, free amino acids, 0.028 µg/ g, fat (0.72%), fibre (0.87%) and lipid (0.87%).

2.3. Total phenolics, flavonoids, steroids and alkaloid content

Quantitative analysis of phytochemical constituents whose presence were detected by qualitative analysis were carried out and results are given Table 4. resemblant results were attained with qualitative analysis and results revealed that ethanol has the loftiest content of terpenoids and carbohydrates and this is followed by Amorphophallus paeoniifolius tubers are phenolics, flavonoids, steroids and alkaloid rich species, which accounts for its high pharmacological exertion. The flavonoids are 0.426 µg/ gin Amorphophallus paeoniifolius, the phenolic composites are 0. 411 µg/ gin Amorphophallus paeoniifolius, the alkaloids are 0.343 µg/ gin Amorphophallus paeoniifolius and the steroids are 0.013 µg/ gin Amorphophallus paeoniifolius.

2.4. Antioxidant activity

Antioxidant eventuality of the excerpt of A. paeoniifolius tuber was anatomized grounded on its capacity to scavenge DPPH, FRAP and ABTS. $^{+}$ Ethanol extract showed advanced antioxidant effectiveness along with the high content of phenolic composites. The immersion was taken place at 517 nm. DPPH shows 30.556 µg/ ml IC_{50} value. FRAP shows 21.254±0.147 Trolox concentrationabsorbance and ABTS. $^{+}$ shows 6.815±0.117 µg/mlIC_{50} value.

DPPH radical scavenging activity

Calculation:

Radical scavenging activity of each sample is calculated by,

$$\% \text{ Radical scavenging activity} = \frac{A_{control} - A_{sample}}{A_{control}} \times 100$$

Were, $A_{Control}$-Absorbance of control, A_{sample}- Absorbance of sample.

Control used: Ethanol DPPH solution

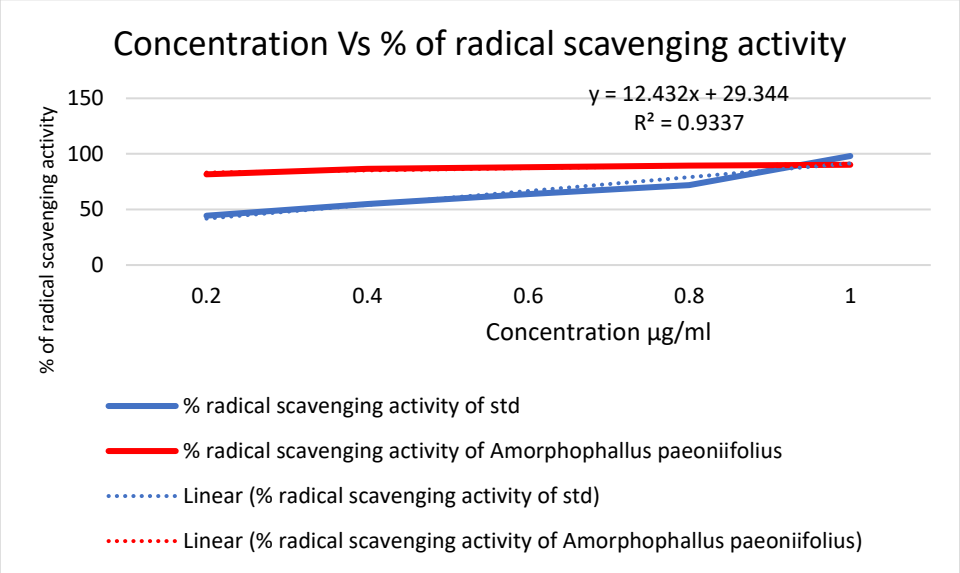
Blank used: Ethanol

Absorbance of control= 0.991nm

% radical scavenging activity of Amorphophallus paeoniifolius

Concentration(µg/ml)	Absorbance of std	% radical scavenging activity of std	Absorbance of Amorphophallus paeoniifolius	% radical scavenging activity of Amorphophallus paeoniifolius
0.2	0.551	44.4	0.124	87.49
0.4	0.447	54.89	0.119	87.99

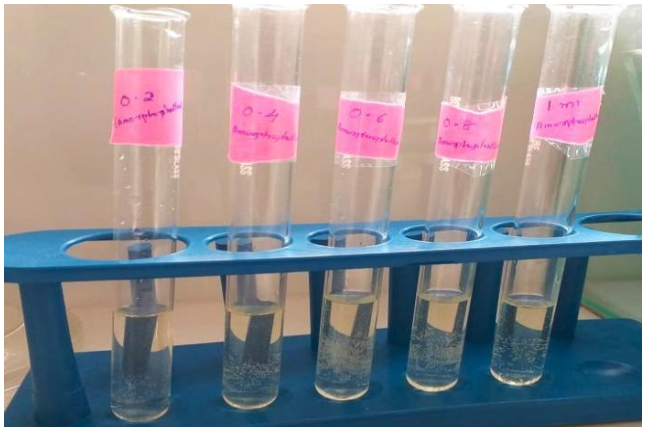
0.6	0.357	63.98	0.106	89.3
0.8	0.279	71.85	0.102	89.71
1	0.019	98.08	0.099	90.01



IC_{50} of standard = 1.6615 µg/ml

IC_{50} of Amorphophallus paeoniifolius = 30.556±0.113 µg/ml

DPPH radical scavenging activity of Amorphophallus paeoniifolius



Ferrous reducing antioxidant power (FRAP)

Concentration of $FeSO_4$	Absorbance at 593 nm
0.2	0.032
0.4	0.051
0.6	0.072
0.8	0.093
1.0	0.112

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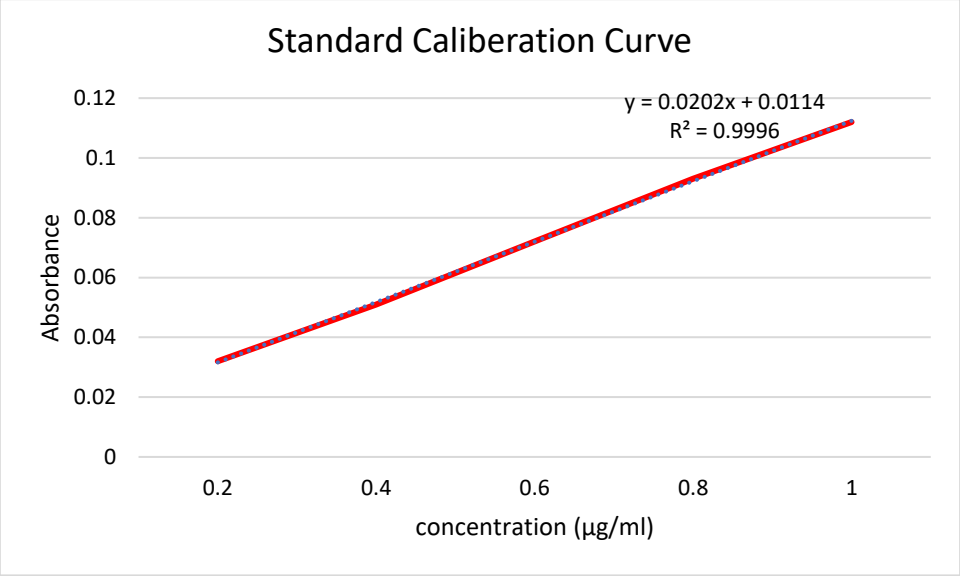
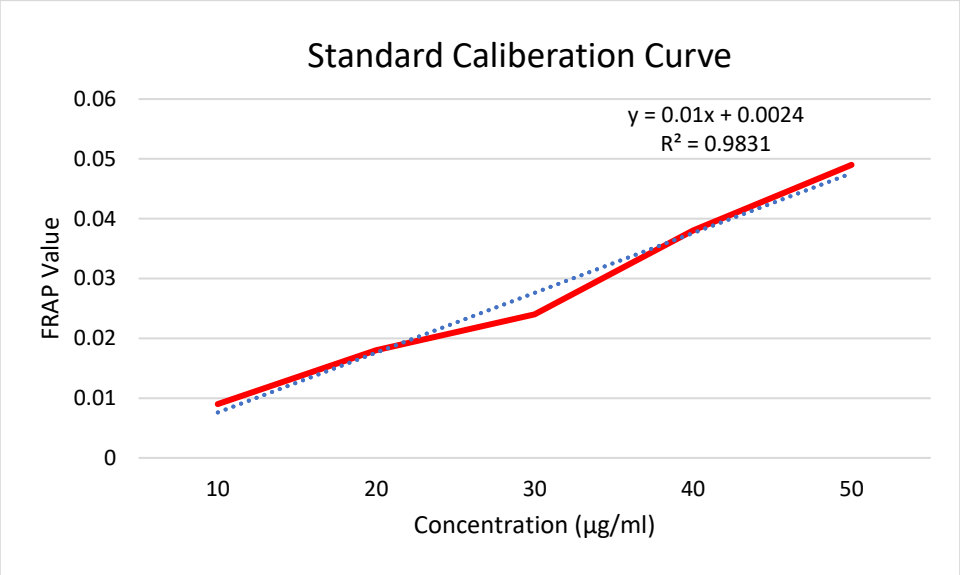


Concentration of Trolax(µg)	FRAP value
10	0.009
20	0.018
30	0.024
40	0.038
50	0.049



FRAP value of Amorphophallus extract= 0.019

Trolox concentration= 21.254±0.147 Trolox equivalent

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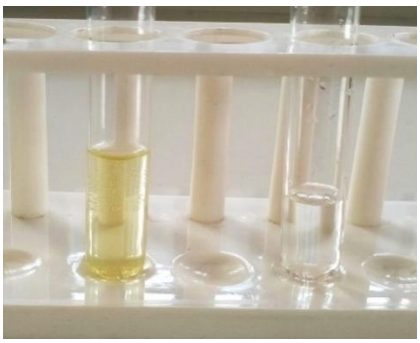


Ferrous reducing antioxidant power of Amorphophallus paeoniifolius

ABTS.$^{+}$ radical scavenging assay

Radical scavenging activity of each sample is calculated by

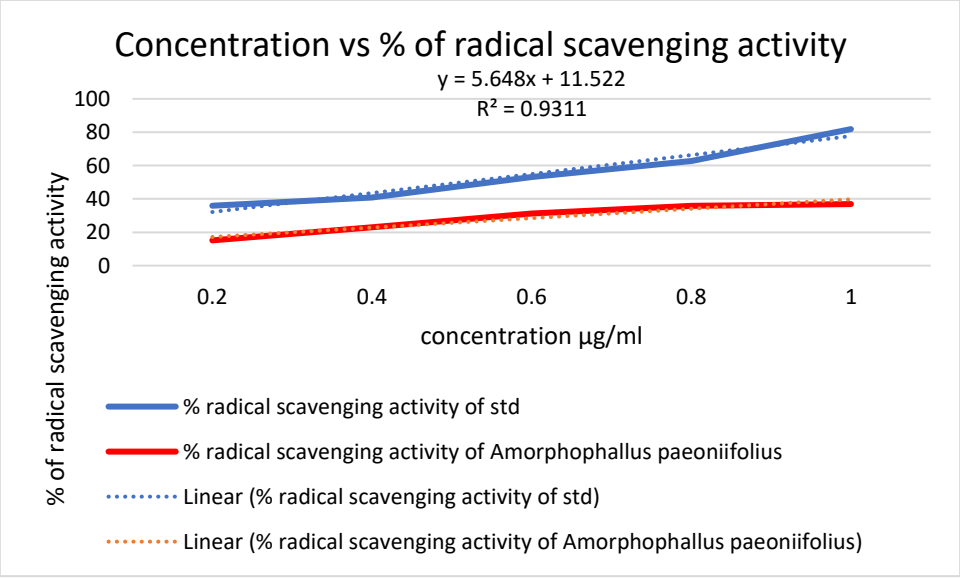
$$\% \text{ Radical scavenging activity} = \frac{\text{Acontrol} - \text{Asample}}{\text{Acontrol}} \times 100$$

Where, Acontrol – Absorbance of control, Asample – Absorbance of sample.

Absorbance of control= 0.799 nm

% of radical scavenging activity of Amorphophallus paeoniifolius

Concentration(µg/ml)	Absorbance of std	% radical scavenging activity of std	Absorbance of Amorphophallus paeoniifolius	% radical scavenging activity of Amorphophallus paeoniifolius
0.2	0.0512	35.92	0.678	15.14
0.4	0.0473	40.8	0.615	23.03
0.6	0.0374	53.19	0.549	31.29
0.8	0.0297	62.83	0.512	35.95
1	0.0145	81.85	0.504	36.92



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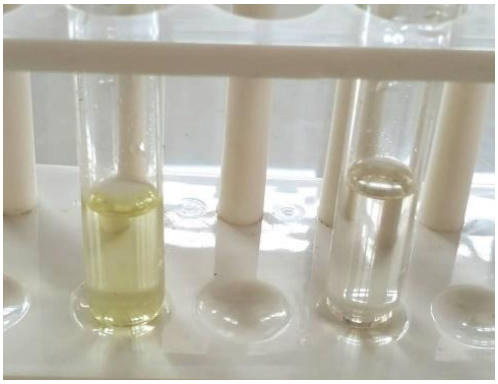

ABTS.$^{+}$ radical scavenging assay of Amorphophallus paeoniifolius

IC_{50} of standard = 2.568±0.122µg/ml

IC_{50} of Amorphophallus paeoniifolius = 6.815±0.117 µg/ml

1. CONCLUSION

Amorphophallus paeoniifolius is generally seen in South India. The phytoconstituents present in the plants are substantially carbohydrates and terpenoids are responsible for the conduct. farther exploration is demanded to insulate the plants responsible for the natural conditioning. It was also observed that no clinical trials have been conducted so far. Hence from the Ayurvedic literature it's concluded that the plants have high medicinal value. The proximate nutritive composition showed that elephant foot yam is a good source of salutary complex carbohydrate, protein, fibre etc. Traditional and ethnomedicinal literature has shown the factory to be largely effective and safe for medicinal use. From this study we find that, the Amorphophallus paeoniifoliushas antioxidant property.

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Declaration

Competing interests

The authors declare no existing competing interest.

References

1. Angayarkanni J, Ramkumar KM, Poornima T, Priyadarshini U.. 2007. Cytotoxic activity of Amorphophallus paeoniifolius tuber extracts in vitro. Am-Euras J Agric Environ Sci. 2:395–398.
2. Chen HL, Cheng HC, Liu YJ, Liu SY, Wu WT. Konjac acts as a natural laxative by increasing stool bulk and Pharmacognosy and Phytotherapy. 2013; 5(12):196-203.
3. Chen HL, Sheu WH, Tai TS, Liaw YP, Chen YC. Konjac supplement alleviated hypercholesterolemia and hyperglycemia in type-2 diabetic subjects- a randomizeddouble - blind trial. Journal of the American College of Nutrition. 2003; 22(1):36-42.

4. Chuakul W. Encyclopedia: Medicinal plants, Vol. 2. Bangkok: Department of Pharmaceutical Botany, Faculty of Pharmacy, Mahidol University, 2000, 207.
5. Das SS, Sen M, Dey YN, De S, Ghosh AK.. 2009. Effects of petroleum ether extract of Amorphophallus paeoniifolius tuber on central nervous system in mice. Indian J Pharm Sci. 71:651–655.
6. De S, Dey YN, Ghosh AK.. 2010. Anti-inflammatory activity of methanolic extract of Amorphophallus paeoniifolius and its possible mechanism. Int J Pharma Bio Sci. 1:1–
7. Keardrit K, Rujjanawate C, Amornlerdpison D. Analgesic, antipyretic and anti-inflammatory effects of Tacca chantrieri. Journal of Medicinal Plants Research. 2010; 4(19):1991-1995.
8. Keithley J, Swanson B. Glucomannan and obesity: a critical review. Alternatives Therapies in Health and Medicine. 2005; 11:30-34. Kumalasari ID, Harmayani E, Lestari LA, Raharjo S, Asmara W, Nishi K, Sugahara T. Evaluation of immunostimulatory effect of the arrowroot (Maranta arundinacea. L) In vitro and In vivo. Cytotechnology. 2012; 64:131-137.
9. Khan A, Rahman M, Islam MS.. 2008. Antibacterial, antifungal and cytotoxic activities of amblyone isolated from Amorphophallus campanulatus. Indian J Pharmacol. 40:41–44.
10. Khare CP. 2007. Indian medicinal plants: an illustrated dictionary. New York: Springer.
11. Lebot V. Tropical root and tuber crops. Soil, plant growth and crop production,2009,2.
12. Li B, Xia J, Wang Y, Xie BJ. Grain-size effect on the structure and anti-obesity activity of konjac flour. Journal of Agricultural and Food Chemistry. 2005; 53:7404- 7407.
13. Nataraj HN, Murthy RLN, Setty R.. 2012. Evaluation of gastroprotective ability of Amorphophallus paeoniifolius corms against indomethacin induced gastric ulcers. RGUHS J Pharm Sci. 2:67–73.
14. Nataraj HN, Murthy RLN, Setty SR.. 2009. In vitro quantification of flavonoids and phenolic content of – Suran. Int J ChemTech Res. 1:1063–1067.
15. Nishinari K, Yoshimura M. Dynamic viscoelastic study on the gelation of Konjac glucomannan with different molecular weights. Food Hydrocolloids. 1999; 13:227-233.
16. Niwa T, Etoh H, Shimizu A, Shimizu Y. Cis-N-(p-Coumaroyl) serotonin from Konnyaku, Amorphophallus konjac K. Koch. Bioscience. Biotechnology and Biochemistry. 2000; 64:2269-2271.
17. Onishi N, Kawamoto S, Nishimura M, Nakano T, Shigeta S, Hashimoto K. The ability of konjac-glucomannan to suppress spontaneously occurring dermatitis in NC/Nga mice depends upon the particle size. Biofactors. 2004; 21:163-166.
18. Srivastava S, Verma D, Srivastava A, Tiwari SS, Dixit B, Singh RS, Rawat AKS.. 2014. Phytochemical and nutritional evaluation of Amorphophallus campanulatus (Roxb.) Blume Corm. J Nutr Food Sci. 4:1–6.
19. Tandan N, Sharma P.. 2013. Quality standards of Indian medicinal plants. New Delhi, India: Indian Council of Medical Research Publisher.
20. Zehra Ekin 2011.Some analytical quality characteristics for evaluating the utilization and consumption of potato (Solanum tuberosum L.) tubers African Journal of Biotechnology Vol. 10(32), pp. 6001-6010, DOI: 10.5897/AJB11.042. ISSN 1684–5315 © 2011 Academic Journals