INTERNATIONAL JOURNAL OF APPLIED BIOLOGY AND PHARMACEUTICAL TECHNOLOGY

www.ijabpt.com Volume-3, Issue-2, April-June-2012 Coden : IJABPT Copyrights@2012 ISSN : 0976-4550

Received: 05th April-2012 *Revised: 08th April-2012* *Accepted: 12th April-2012*

Research article

PHYSICOCHEMICAL STUDIES IN PONGAMIA PINNATA GALLS INFECTED WITH FUNGUS

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ABSTRACT: This paper reports physicochemical studies in fungal infected galls of Pongamia pinnata. The parameters assayed were Total ash, acid insolubility and water solubility values and extractive values (Alcohol, water and petroleum ether). Fungal infected galls showed significantly higher value of ash, acid insolubility and low water solubility and high extractive values (petroleum ether and water) when compared to normal galls.

Key words: Galls, Physicochemical studies, Pongamia pinnata

INTRODUCTION

Pongamia pinnata is widely distributed throughout the greater part of India, especially at low levels in wet places. Pongamia pinnata, locally known as karanja in Hindi, Indian Beech in English and Pongam in Tamil (Krishnamurthy A., 1969). Pongamia is a mangrove plant belonging to the family Fabaceae. It is a medicinal plant native to Western Ghats and chiefly found in tidal forests of India (Krishnamurthy A., 1969). The tree is known for its multipurpose benefits and as a potential source of biodiesel (Naik M., Meher et al.,2008). The seeds are reported to contain on an average of about 28-34% oil with high percentage of polyunsaturated fatty acid (Sarma A.K.,et al., 2005) Historically, Pongamia has been used as folk medicinal plant, particularly in Ayurveda and Sidda systems of Indian Medicine(Meera B.,et al.,2003). Galls are often seen in Pongamia pinnata leaves and fruits. Leaf galls appear like tiny clubs. Galls may also provide physical protection to the insect from predators (Weis, A. E.,et al., 1994)(Graham N. Stone., et al., 2003). In traditional system of medicines the Pongamia pinnata plant is used for anti-inflammatory, anti-lipidoxative and anti-hyperglycemic (Punitha R, et al., 2006). Leaves are also used in rheumatic pains (Kirtikar K.R.et al., 2004). More recently, the effectiveness of pongamia pinnata as a source of biomedicines has been reported (Brijesh S.,et al., 2006) especially as antimicrobial and therapeutic agents.

MATERIALS AND METHODS

Collection of Plant Material:

Fungal infected young galled leaves of equal size were collected from the local areas of Hyderabad, Andhra Pradesh, India during January 2012. Fresh leaves were collected in bulk, washed, shade dried and pulverized in a mechanical grinder to obtain coarse powder and their physicochemical study was done.

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Determination of Physicochemical Parameters

Moisture content

The percentage of active chemical constituents in crude drug is given in terms of air dried drugs. So the moisture content of a drug should be determined.2g of powdered drug was transferred into a china dish and the contents were distributed evenly to a depth not exceeding 10mm. The loaded plate was heated at 105°C in hot air oven and weighed at different time intervals until a constant weight was obtained. The experiment was repeated six times for precision and percentage of moisture of the sample was calculated by taking the difference in weight after drying and initial weight of the drug (World health organization (WHO) Geneva, 1996).

Total ash value

About 2g of powdered drug was weighed accurately into a crucible and incinerated at a temperature of 450°C in muffle furnace until free from carbon. Then the crucible was cooled and weighed. Percentage of ash was calculated with reference to air dried plant material (World health organization (WHO) Geneva, 1996) (Practical pharmacognosy by Kandelwal .K.R.).

Acid insoluble ash

Ash obtained from total ash was boiled with 25ml of 2N HCl for few minutes and filtered through an ash less filter paper. The filter paper was transferred into a silica crucible and incinerated at 650°C in muffle furnace until free from carbon. Then the crucible was cooled and weighed. Percentage of acid insoluble ash was calculated with reference to air dried substance (Practical pharmacognosy by Kandelwal .K.R)

Water soluble ash

Ash obtained from total ash was boiled with 25ml of distilled water for few minutes and filtered through an ash less filter paper. The filter paper was transferred into a silica crucible and incinerated at 450°C in muffle furnace until free from carbon. Then the crucible was cooled and weighed. Percentage of water soluble ash was calculated with reference to air dried substance (World health organization (WHO) Geneva, 1996) (Practical pharmacognosy by Kandelwal .K.R.)

Determination of ethanol soluble extractive value

Accurately weighed 5g of air dried powdered plant material was macerated with 100ml of ethanol in a closed flask for 24hrs, shaking frequently during first 6hrs and allowed to stand for 18hrs. It was then filtered rapidly, taking precautions against loss of the solvent and 25ml of the filtrate were evaporate to dryness in a flat-bottomed shallow dish and dried at 100°C. The % w/w of ethanol soluble extractive value was calculate with reference to the air dried plant material (World health organization (WHO) Geneva, 1996) (Practical pharmacognosy by Kandelwal .K.R) (Pharmacopeia of India, Ministry of Health and Family Welfare,Government of India New Delhi 1996).

Determination of water-soluble extractive value

Procedure was the same as alcohol soluble extractive using chloroform and water (chloroform: water-1:399) instead of alcohol.

Petroleum ether extractive values

5g drug was refluxed with 100ml of petroleum ether for 24hrs and filtered through Whatman filter paper. 10ml of the filtrate was evaporated in a tarred dish at 105°C and weighed. Then ether soluble extractive values were calculated (World health organization (WHO) Geneva, 1996).

RESULT AND DISCUSSION

There was a decrease in Total ash value, acidinsolubility, moisture content but a slight increase in water solubility in fungal infected leaves when compared to control (Anupriyapandey., et al 2011). But there was an increase in extractive values (water and alcohol extractive values) in fungal infected leaves when compared to normal leaves. Further, the experiments were also conducted on galls and Pongamia leaves infected with fungus.There was a substantial increase in total ash, acid insolubility but slight decrease in water solubility and high extractive values (petroleum ether and water). The results are shown in Table 1.

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Table 1: Physicochemical parameters of Pongamia pinnata

Parameter	FG	NG	GL	FL
LOD	1.9%	1.85%	1.81%	1.86%
Ash values:				
Total ash value	9%	5%	6%	4%
Acid insoluble	5.6%	2.2%	2.8%	2.4%
Water soluble	2.2%	2.4%	2.2%	2.6%
Extractive values:				
Petroleum ether	44%	40%	28%	20%
Alcoholic	57.6%	73.6%	64%	49.6%
Water/Aqueous	64%	52%	57%	40%

* NG – Normal Gall * FG – Fungal Infected Gall * GL – Gall Removed Leaf * FL – Gall Removed Fungal Leaf

CONCLUSION

Therefore, from the present investigation we can conclude fungal infected galls cause a change in physicochemical parameters (Loss on drying, total ash, acid insolubility, water solubility and extractive values). Physicochemical studies are carried out to confirm the identity of plant and ascertain the quality and purity of the drug. So these parameters may be useful for the future investigations.

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