Research Article *ISSN: 2277-8713*
Srilakshmi P, IJPRBS, 2012; Volume 1(5): 331-337 *IJPRBS*

ISSN: 2277-8713
IJPRBS
A Path for horizing your innovative work
INTERNATIONAL JOURNAL OF PHARMACEUTICAL RESEARCH AND BIO-SCIENCE

COMPARATIVE STUDIES OF SOME METABOLITES IN CARNY LEAF GALLS WITH PONGAMIA PINNATA LEAF GALLS

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Accepted Date:

10/10/2012

Publish Date:

27/10/2012

Keywords

Galls

Carya

Total sugars

Proteins

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Abstract

There are hundreds of unique galls caused by insects and mites. They are formed on a variety of plants and in a broad range of sizes, shapes, colors and textures. Galls may be found on leaves, stems, twigs, branches, trunks and roots. Some galls are common and abundant and easily noticed. Others are rare or less conspicuous.This paper reports the quantitative estimation of some metabolites in leaf galls of Carya. The parameters assayed were Total sugars and Proteins. Total sugar content is less and protein content is more in Carny leaf galls when compared to the Pongamiapinnata leaf galls.

INTRODUCTION

Carya belongs to a family Juglandaceae, in Greek Carya means nut. Carya is commonly known as Hickory. The genus includes 17-19 species of deciduous trees with pinnately compound leaves and big nuts. Five or six species are native to China, Indochina and India, 11 or 12 are from the United States, two to four are from Canada and four are found in Mexico. It grows well in both wet and dry areas, but prefers well-drained soils. The Hickory tree is also used for fire wood and the Hickory flavor it adds to smoke meats. It is a great tree in areas with high winds because of the tap roots that go down deep in the earth making the trees very wind resistant. Man and animals enjoy the nut from the Hickory tree. Carya sect.Sinocarya is called Asian hickories. Galls are seen on leaves and fruits. Galls may also provide the insect with physical protection from predators[1, 2]. In Carya galls are seen on leaf and leaf stem. The Carya leaf stem gall phylloxera (phylloxeracaryaecaulis) also uses as a food source. Egg hatch in early spring and the galls quickly from around the developing insects. Phylloxera galls may damage weakened or stressed hickories, but is generally harmless. Deformed leaves and twigs can rain down from the tree in the spring as squirres break off infected tissue and eat the galls, possibly for the protein content or because the galls are fleshy and tasty to the squirrels. Pongamia pinnata, locally known as Karanja, is a mangrove plant belonging to the family Fabaceae. It is a medium size glabrous tree attaining a height of around 18 meter and its habitat is in the littoral regions of South-east Asia, Australia and Fiji.[3, 4] In Ayurveda and Unani medicine, used as anti-inflammatory, anti-plasmodia, anti-noneceptive, anti- hyperglycemic, anti-lipodo oxidative, antidiarrheal, antiulcer, anti-hyper ammonic and anti-oxidant[5]. Traditionally its bark is used in pile; leaves are effective as medicated both and Rheumatic pains, and the seeds are used in hypertension, bronchitis, whooping cough, skin diseases and Rheumatic arthritis.[6-8]. Roots are used for cleaning gums, teeth and ulcers, also effective in gonorrhea[9, 10]. Insect gall formation is uncommon and specific to only certain plants[11]. Pongamiapinnataand Carya are such plants.

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MATERIALS & METHODS

Young galled leaves of equal size were collected from the local areas of Hyderabad, Andhra Pradesh, India during August 2012. Biochemical studies from gall affected leaves were conducted. These studies included estimation of total soluble sugar and Protein by Phenol Sulphuric acid reagent method[12] and by Lowry method[13] respectively.

Estimation of total soluble sugar

The amount of total soluble sugars was estimated by Phenol sulphuric acid reagent method (Dubois et al., 1951).

5oomg each of fresh normal and fungal infected gall was homogenized with 10ml of 80% ethanol. Then each sample was centrifuged at 2000rpm for 15-20min. The supernatant were collected separately, to 1ml of alcoholic extract, 1ml of 5% phenol solution was added and mixed. Then 5ml of 96% sulphuric acid was added. Each tube was gently agitated during the addition of the acid and then allowed to stand in a water bath at 25-30C for 20minutes. The OD of the characteristic yellow orange color thus developed was measured at 490nm in a spectrophotometer. Simultaneously a standard curve was prepared by using known concentration of glucose. The amount of sugar was expressed as mg/g fresh weight of tissue.

Estimation of Protein

Quantitative estimation of protein was carried out by the method of Lowry *et al* (1951). 1 gm plant material was

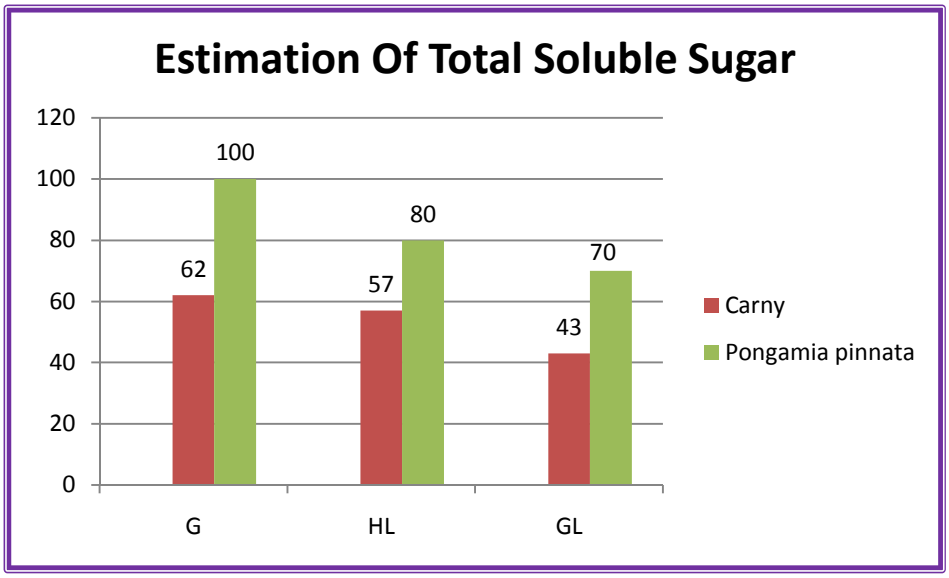
homogenized with 10ml of 80% ethanol. The extract was centrifuged at 5000rpm for 5 min and the supernatant was discarded. 5% 10ml TCA (Trichloroacetic acid) or per chloric acid (PCA) was added to the residue and incubated at 80°C for 20 minutes. The pellet was centrifuged and the supernatant was discarded. Residue was washed with 10ml distilled water and again centrifuged. The supernatant was discarded. 2% 10ml sodium carbonate in 0.1N NaOH was added to the residue and incubated for an hour at 30°C.Again centrifuged and residue was discarded. To 1ml of sample extract 5ml of alkaline copper reagent was added and then allowed to stand for 10minutes. Each tube was gently agitated during the addition of 0.5ml of Phenol reagent and incubated at room temperature in the dark for 30minutes till blue color was developed. The OD of the characteristic blue was measured at 660nm in a spectrophotometer after setting for 100% transmission against the blank, standard curve was prepared by using known concentrated of protein.

RESULTS AND DISCUSSION

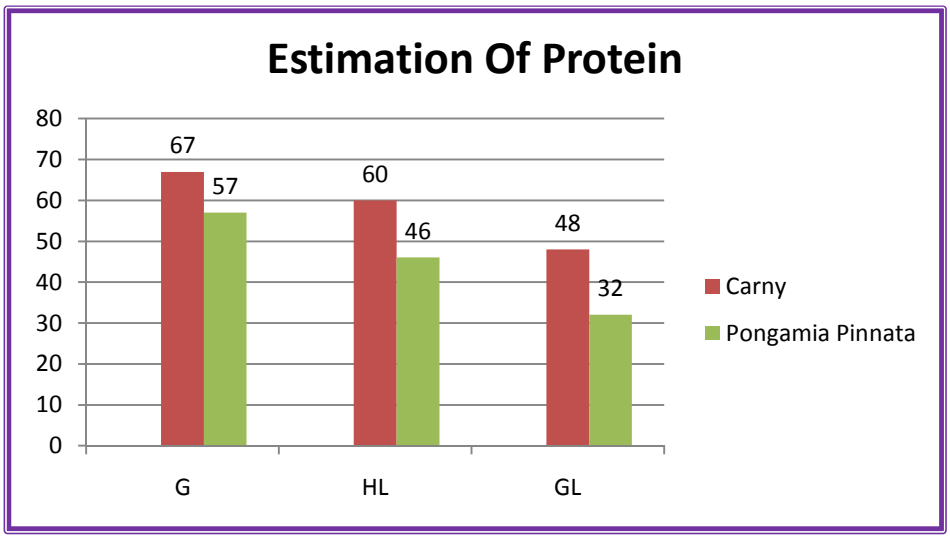
There was a substantial reduction in total soluble sugars in Carny leaf galls. The levels of Protein in gall tissue showed increase compared to Pongamiapinnata. These results are shown in graphs (A and B).Sugars and Proteins are very important biochemical nutrients for the plants. If abundantly existing, these are detected naturally by various other micro-organisms like bacteria, fungi, insects etc. So once infected, inside the host tissue these organisms utilize the excess nutrients present in the plant for their growth and sustenance[14].

CONCLUSION

Therefore, from the present investigation we can conclude galls cause a change in Quantities of metabolites. So these studies may be useful for the future investigations.



* G –Gall * HL – Healthy Leaf * GL – Gall Removed Leaf - TABLE - A



* G –Gall * HL – Healthy Leaf * GL – Gall Removed Leaf - TABLE - B

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