J Plant Physiol Pathol 2015, 2:5
http://dx.doi.org/10.4172/2329-955X.C1.003

OMICS International
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Global Summit on
Plant Science

September 21-23, 2015 San Antonio, USA

Studies on changes in isoflavone content during germination of commonly consumed indian legumes

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Legumes have been always consumed as staple source of proteins from plant origin worldwide irrespective of socio-economic distinction therefore, they are the only source of isoflavones and other secondary metabolites of plants for world population. Allelochemical properties of secondary metabolites in plants have developed during evolution by molecular modeling to mimic the role and structure of neurotransmitter, enzymes, and hormones of vertebrate as defense mechanism. Isoflavones are one of such biomolecules developed by plants to mimic physiological role of estrogen hence, when consumed by humans known to be beneficial in estrogen deficiency phase like menopause in women.

Variation in environment from north India to south India and religious practices have been playing significant role in maintaining important place for legumes in Indian diet. 25 to 30 different varieties of legumes consumed by Indian population. As Soybean parades itself as richest source of isoflavones from *Fabaceae* family on global front; other large number Indian legumes that might contain significant amount of phytoestrogens have not been analyzed.

In India, Legumes are germinated before consumption which might affect the isoflavone composition in them. Germination is process of development of new plant in which plant is prepared for resistance against biotic and abiotic stress as well as for establishment of symbiosis with soil micro-organisms.

Hence, we aimed at studying isoflavone content of commonly consumed Indian legumes and changes in isoflavone content during the process of germination which might affect their bioavailability for humans.

Method:

Legumes were soaked at room temperature till constant weight is obtained. Soaked legumes are then germinated for 12h, 24h, 36h, 48h at 24°C and relative humidity 90% Germinated legumes are dried in vacuum dryer at 45°C to obtain dry mass and grinded to fine powder. Isoflavones are extracted from powdered legumes in methanol. Isoflavone glycosides are hydrolyzed with HCl to get free aglycons. Genistein and Daidzein were quantified using HPTLC. It was found that Daidzein content of red cowpea increases significantly on at after 36h germination. Daidzein content of raw red cowpea is 50mg/g increases to 160mg/g on 36 h germination. Genistein content does not changes significantly.

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An evolutionary arms race between plants and viruses

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Common pokeweed plant (*Phytolacca americana*) produces pokeweed antiviral protein (PAP) as a defense mechanism against foreign pathogenic invaders. PAP is a ribosome inactivating protein (RIP) and an RNA N-glycosidase that removes specific purine residues from the sarcin/ricin (S/R) loop of large rRNA arresting protein synthesis at the translocation step. PAP is also a cap-binding protein and is a potent antiviral agent against many plants, animals and human viruses.Our research aims to elucidate the antiviral mechanism of RNA depurination and to understand how PAP recognizes and targets various RNA substrates. We have investigated interactions between PAP and Turnip mosaic virus genome linked protein (VPg). VPg functions as a cap analog in cap-independent translation and potentially target PAP to uncapped IRES-containing RNA. Fluorescence spectroscopy and HPLC techniques were used to quantitatively describe PAP depurination activity and PAP-VPg interactions. PAP binds to VPg with high affinity (29.5 nM); the reaction is enthalpically driven and entropically favored. Further, VPg is a potent inhibitor of PAP depurination of RNA in wheat germ lysate and competes with structured RNA derived from Tobacco Etch Virus (TEV) for PAP binding. VPg may confer an evolutionary advantage by suppressing one of the plant defense mechanisms and also suggests the possible use of this protein against the cytotoxic activity of RIPs.

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