

Poster Presentation

Plant Science 2018 *Natural Medicine 2018*



Joint Event
International Conference on
Plant Science
&
Natural Products, Medicinal Plants and Traditional Medicines
November 15-16, 2018 | Paris, France

Strengths and weaknesses of the herbal medicine registration system in Bahrain

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The primary goal of a country's Drug Regulatory Authority (DRA) is to ensure that all products on the market are safe, effective and meet the approved quality standards. Kuwait however, lacks appropriate herbal medicines (HMs) regulations causing consumer safety issues. An important part of informing effective policy formation is to understand strengths and weaknesses in more advanced systems. As part of a wider research programme to inform a registration system for HMs in Kuwait, this study aimed to highlight the main strengths and weaknesses of the HMs registration system in Bahrain, a country similar to Kuwait, which does not manufacture but import all HMs and has a HM registration system. With ethics and Bahrain DRA approval, eight face-to-face semi-structured interviews were conducted with key officials involved in the registration of HMs in Bahrain. Interview data were analysed using thematic framework analysis. Participants perceived the major strengths of the current registration system as: having appropriate registration guidelines in place which are continuously updated, having an increased level of transparency by publishing registration activities and sharing these publicly, being a trusted reference source for other

countries in the region and being an independent entity not influenced by governmental higher powers providing full autonomy of introducing new policies. Some of the major perceived weaknesses of the current system were the lack in the organisational structure and hierarchy which is causing communication difficulties between departments, the restraint in financial resources to invest in continuous staff training, the significant lack of human resources causing workload and delay in submission to deadlines, and absence of important regulatory activities such as a pharmacovigilance system. It is anticipated that this study will provide evidencebased lessons for Kuwait and other countries with unsophisticated drug regulatory systems to design effective HMs regulation.

Speaker Biography

Azhar Alostad is a pharmacist with qualifications in MPharm and MSc. She has expertise in pharmaceutical and herbal regulations. Since her graduation, she worked as a scientific reviewer in the Kuwaiti Drug Regulatory Authority. In 2016, she started her PhD in Pharmacy and Pharmaceutical Sciences at the University of Manchester, United Kingdom supervised by the coauthors Ellen Schafheutle and Douglas Steinke. Her PhD research aims to introduce suitable guidelines for the registration of herbal medicines in Kuwait.

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Study of telomerase activity in sunflower infected by sclerotinia fungus

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Root and crown rot caused by necrotrophic fungal pathogen *Sclerotinia sclerotiorum* (Lib.) de Bary is one of the most important diseases, infects over 400 plant species, include sunflower. Telomerase activity is highly regulated, abundant in animal rapidly dividing cells and reproductive organs. It has been demonstrated that this enzyme may be related to in aging process and cancer. However, evidence for a correlation between telomerase activity and diseases across plant groups is weak. In this study for the first time the relationship between sclerotinia rot and telomerase activity was investigated. We hypothesized that the rate of TERT expression could confer tolerance against this fungal pathogen. To test this hypothesis, susceptible (SDR19) and resistant (LC1064-C) genotypes of sunflower infected with the A37 fungal isolate. Experimental samples were taken from the leaves of *Helianthus annuus* and evaluated by real time PCR. The results indicated the reduction of TERT expression in both susceptible and resistant strains

under fungal disease stress. These results also showed the higher expression in resistant line than the sensitive one. This difference may be correlated with the expression of resistance genes in the resistant line, which need more investigation.

Speaker Biography

Maryam Parvini has completed her PhD at the age of 31 years from Islamic azad University, science and research branch, Tehran, Iran. After 3 years research in Royan institute (for my Ph.D thesis), whose ranking is the first for stem cells and Developmental biology researches in Iran, She achieved a thorough understanding of every aspect of these areas, especially neural patterning and achieving the different neural progenies from human embryonic stem cells. Her most recent position as scientific staff in Islamic Azad University, Urmia, Iran, has provided me with 1 year supervisory experience as leader of M.Sc students. She is also keen to express my deep interest to Plant science, especially for molecular aspects. It was extreme enough cause to bigen my cooperation with Prof. Dr Reza Darvishzadeh, who is plant biotechnologist. Since this field obviously take a great leap forward, she need to go on with learning and experiencing as to assist me in this feild more and more. She is a reviewer of some Iranian journals.

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Video Presentation

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The early expression of *WUSCHEL*, an organ identity gene, is a marker in Tobacco and *Beta palonga* during the onset of *in vitro* shoot morphogenesis

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The two *in vitro* morphogenesis pathways leading to whole plant regeneration involve either shoot organogenesis followed by root organogenesis or somatic embryogenesis. Both developmental pathways can occur either directly without an intermediate callus stage, or indirectly following an unorganized callus stage. Reports of involvement of *WUS* gene concerning *in vitro* shoot organogenesis are very scanty, particularly in the non-model plant systems, i.e., plants other than *Arabidopsis*. We have studied the role of growth regulators behind *in vitro* shoot organogenesis and somatic embryogenesis in two plant systems, viz. tobacco (*Nicotiana tabacum* L. var. Jayasri) and *Beta palonga* R.K.Basu & K.K.Mukh, a model and a non-model plant system respectively. We have also correlated the phenomena of de differentiation with the relative expression of *WUS* (*WUSCHEL*) gene in a time-dependent manner. The results indicated that early *WUS* gene expression is a definite marker for *in vitro* shoot organogenesis in tobacco and *Beta*

both in direct and indirect modes of regeneration. Additionally, we have performed a comparative homology modelling and *in silico* structural analysis of *WUSCHEL* proteins of *B. palonga*, *B. vulgaris*, and *Arabidopsis* to find out the commonality of the ligand binding site. The amino acids of the binding sites were identical (Arginine, Tryptophan, Proline, Asparagine, and Tyrosine) in the three materials under study; except two additional amino acids (Isoleucine and Alanine) in *B. vulgaris*.

Speaker Biography

Gaurab Gangopadhyay, Associate Professor, Division of Plant Biology, Bose Institute, Kolkata, India is in the field of plant science research for last 28 years. After graduating from Presidency College, Kolkata and post graduation in Botany (University of Calcutta) he did his doctoral work at Bose Institute. He has a Post Doctoral Research experience for over twelve years. Dr Gangopadhyay has 68 research publications and 58 NCBI GenBank submissions. His H-index is 14, and he acts as editorial board member and reviewer for peer-reviewed scientific journals. His present area of research interest is Marker Assisted Plant Breeding, Plant Biotechnology and Molecular Biology.

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Accepted Abstracts

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Evaluation of the antioxidant activity of 31 Amazonian species

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The Amazon has an interesting reserve of phytotherapeutic resources and ancestral form have been used by the natives of this region in the cure of various diseases, and reported in several ethnobotanical studies. The objective of this work is to evaluate the antioxidant capacity and the content of phenols and total alkaloids in the methanolic extracts of the leaves of 31 plant species collected in 2015 in the town of Tamshiyacu, - Loreto Region – Peru. The percentage of free radical inhibition of DPPH were calculated, in order to select all three with high activity. From these, the total concentration of phenolic compounds and alkaloids were analyzed by UV / Vis spectrophotometry. The extracts were subjected to fractionation in a chromatographic column and the fractions with similar molecules, grouped using thin layer chromatography. The final fractions were analyzed by GC-MS to identify the molecules present in them. About the results, the species that showed

the best activity at concentrations lower than 5.0 mg / ml, were *Virola sebifera*, *Caryocar glabrum* and *Tapirira guianensis*. The concentration of total phenolic compounds was 18580.9, 15180.7 and 11568.7 mg / 100g for *V. sebifera*, *C. glabrum* and *T. guianensis*, and total alkaloids were 36.6, 0.0 and 74.0 mg / 100g for these same species. The main secondary metabolites present are 3,5-di-tert-butyl-4-hydroxyanisole and normetadhol and caryophyllene in *V. sebifera*, diisooctyl dicarboxylate, 1,2-benzene and 3,5-bis (1,1-dimethyl ethyl-phenol in *C. glabrum* and diisooctylphthalate, α -panasinseno, and vitamin E in *T. guianensis*. Of the 31 species under study, three were found with high antioxidant activity and in which they emphasized their high concentration of phenolic compounds, inferring in a certain sense, that these substances are the cause of this activity.

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Antidiabetic and toxic evaluation of polar extracts of *Myrciaria dubia*, *Coussapoa asperifolia* and *Remigia pedunculata***Victor Sotero**

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The aim of this work is to evaluate three plant species in order to observe their behavior as antidiabetic with the polar extracts of *Myrciaria dubia* (fruit), *Coussapoa asperifolia* (bark) and *Remigia pedunculata* (leaf), native to the Peruvian Amazon, were evaluated in terms of their antidiabetic activity (AAD), and toxic (ACT) in vitro and in vivo, according to the following methodology: a) AAD to inhibit the α -glucosidase, and b) ACT, evaluate the dose lethal in front of *Artemia franciscana*. For the in vivo assays, the AAD and ACT assays were performed, for the first, the extracts were administered to 10 Albino mice and diabetics (induced with streptozotocin), in concentrations of 100, 500 and 1000 mg/kg, for one hour, evaluating the glycemia index, and acute toxicity test was performed, administering to the mice a concentration of 2000 mg/kg of the extracts under 14 days. In addition, analyzes of the main chemical families were carried out using UV/Vis spectroscopy for phenolic

compounds, alkaloids and saponins of the methanolic extracts of the three species. According to the results, these species have an important antidiabetic activity, obtaining a percentage of inhibition against α -glucosidase in extracts of 500 μ g/ml of 51.5%, 40.7% and 97.4%, for *M. dubia*, *R. pedunculata* and *C. asperifolia* respectively. Thus, according to the results of acute toxicity, they did not present some toxicological problems in certain organs and the lowest glycemic indexes in diabetic mice was in the concentration of 1000 mg/kg where there were obtained: 92.6, 96.8 and 96.8 mg/dl, for *M. dubia*, *C. asperifolia* and *R. pedunculata* respectively. The highest concentration in secondary metabolites were the phenolic compounds being 794.1 mg/g in *M. dubia*; 324.7 mg/g in *R. pedunculata* and 214.5 mg/g in *C. asperifolia*.

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The impact of modern genomics on potato disease resistance breeding


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Methods to track and verify the integrity of multiple disease resistance genes are needed for crop improvement in light of pathogen population changes. Diagnostic resistance gene enrichment sequencing (dRenSeq) enables the high-confidence identification and complete sequence validation of functional resistance genes in crops. We have shown that the technology can direct parental selection in breeding programs and confirms transgene integrity in GM crops. Our study reveals a very limited base of utilised resistances in major potato cultivars but

has identified additional and currently very effective resistances in potato varieties that could be combined with the help of the technology. To combine the most complementary resistances, we can assess the diversity of pathogen populations through a similar enrichment-sequencing based approach referred to as PenSeq. The combination of dRenSeq and PenSeq enables, for the first time, a comprehensive Pathogen/Crop coevolution study on a global scale.

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 Notes:

Hybrids of grapevine mildew and oak disease are not able to infect banana trees in South American rainforests

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Today, plants are important. But diseases of plants are also important. Two of these diseases are important. The first one is grapevine mildew. It is important because of the grapevine's economic importance all over the globe but particularly in grapevine producing countries. The second one is the oak disease, which affects oaks. In this study we looked at what happens when we cross the grapevine mildew with the oak disease. We took 50 grapevine mildews isolates and crossed them with 30 oak disease isolates. Surprisingly, none of the isolates was able to fertilize other isolates. When BET was added into the fertilizing mix, all isolates appeared to die. We then took 15 grapevine mildew isolates and 15 oak disease isolates and put them into some banana trees

in South American rainforests. Surprisingly, the banana trees did not appear to be affected by the isolates ; however, when grew in darkness, the grapevine mildew appears to be able to evolve into a fungi which can grow into the soil. Our results show that, overall, no phylogenetic connection or « evolutionary bridge » exist between the grapevine, the oaks, and the banana trees, and between their associated pathogenic fungi. However, a host jump from banana tree to other monocotyledon crops, such as tobacco, is still possible as not much is still known about the evolutionary biology of fungi, and should be investigated further.

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Bioenergy agriculture and importance: A review**Gul Ebru Orhun**

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Bioenergy plants are a popular feedstock for ethanol production in the world due to its abundance and relative ease of conversion to ethyl alcohol (ethanol) such as corn. Corn and other high-starch grains have been converted into ethanol for thousands of years, yet only in the past century has its use as fuel greatly expanded. Conversion includes grinding, cooking with enzymes, fermentation with yeast, and distillation to remove water. The production and consumption of increasingly large amounts of energy are sustaining the U.S. modern standard of living and across the world. This plants are important for bioenergy and economy. Bioenergy is a broad classification of energy production methods which utilize the physical and chemical properties of biomass - renewable plant-derived organic matter. For example, while maize cobs have been used on a small scale as a fuel for direct combustion in cooking and heating, their use as feedstock for large-scale energy

production is a more modern concept. The large-scale use of maize cobs presents new challenges and issues to consider: production rates must be estimated: harvesting, handling and storing methods should to be developed: effects of maize cob removal on soil composition and productivity should be assessed: and energy conversion methods should be optimized. At the same time this industry is important for economic growth. The use of bioenergy can lead to higher economic growth across the world. This paper summarizes research done about bioenergy plants and economy as literature review and addresses the above issues in order to discuss the suitability and diversity of energy plants in the bioenergy industry. So, we have examined importance of bioenergy plants and statement and advance of bioenergy industry in the world in this study

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Pre-treatment salicylic acid: Effects on growth and Cd uptake by *Musa spp.* under *in vitro* conditions**Doaa Elazab**

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Cadmium (Cd) is an omnipresent non-nutrient heavy metal, with a particular concern because of its high solubility, mobility, and high phytotoxicity even at low concentrations as well as its toxicity for human upon its entry into the food chain. In this study, salicylic acid (SA) has been investigated as a pre-treatment on Grand naine cultivar grown *in vitro*. Grand naine explants were cultivated on MS medium supplemented with different concentrations of SA (0, 0.5 and 1 mM), then these explants transferred twice to MS medium supplemented with varying concentrations of Cd (0, 50, 100, 200, 500, 1000 and 1500 μM CdCl_2) to examine the accumulation effect of Cd on

banana explants. After two subcultures on Cd medium, we found out that adding SA at 0.5 mM had a significant positive effect on vegetative growth such as; mortality, shoot multiplication, plantlet height (cm), fresh and dry weight (g), total chlorophyll, carotenoids and proline content. Moreover, the application of 0.5 mM of SA to the plants treated with 500 μM Cd reduced the uptake of Cd by 15%. The results in this paper is expected since SA is known as a hormone-like substance which has been reported as an alleviator for abiotic and biotic stresses either *in vitro* or *in vivo* cultures in many different plant species.

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Medicinal plants –Quality control from field to pharmacy –An evidence based study**Mohammad Kamil**

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In the recent years with ever-growing commercialization in the field of medicinal plants and herbal medicines, there has been an instant demand for quality control studies of the plants used in this system. The challenges are innumerable and enormous, making the global plant market unsafe. This talk seeks to enlighten physicians, pharmacists, consumers and stakeholders in plant medicine on the need to establish quality parameters for collection, handling, processing and production of plant medicine as well; as employ such parameters in ensuring the safety of the global herbal market. The processes of good quality assurance and standardization of plant medicines and products will also be discussed. In the present study an attempt has been made to study the medicinal plants in general from Selection of Medicinal Plants ; Good Agricultural Practices (GAP); Good Cultivation Practices (GCP);

Good Field Collection Practices(GFCP); Technical Planning; population density; Geographical distribution; Topographical maps; collecting techniques & procedures; Source and Period of Collection; Identification; Storage; Chemical Standardisation ;Assay; Current Good Manufacturing Practices (C GMP); Pre clinical studies to Clinical Approach; Good Marketing Practice (GMP), with special reference to maintain Standardisation at each and every stage and subsequent production of quality raw botanical materials/products. Different stages, i.e. Quality control studies of raw plant materials, Controlled studies for Method of Processing, Quality Control Studies of the finished product, Standardization procedures at each stage from birth of the plants up to its clinical application & marketing have been described.

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*Notes:*

Study of antihyperglycemic, antihyperlipidemic and antioxidant activities of tannins extracted from *Warionia saharae* Benth. & Coss**Mohamed Eddouks**

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W*arionia saharae* Benth & Coss, a plant belonging to Asteraceae family, is used for its anti-diabetic properties in Morocco. The objective of this study was to evaluate the effect of tannins extracted from *Warionia saharae* (*W. saharae*) on blood glucose levels and lipid profile in normal and streptozotocin (STZ)-induced diabetic rats. Tannins (TE) were extracted from *W. saharae* using Soxhlet apparatus and different organic solvents. Single and once daily repeated oral administration of TE (10 mg/kg) for 15 days were used to evaluate the glucose and lipid lowering activity in normal and diabetic rats. Furthermore, glucose test tolerance, liver histopathological

examination and *in vitro* antioxidant activity of TE were carried out in this study. The results showed that TE was able to exert antihyperglycemic and lowering total cholesterol effects as well as improvement of the high density lipoprotein (HDL)-cholesterol serum level after 15 days of treatment. Furthermore, TE improved glucose tolerance, histopathological status of liver in diabetic rats and demonstrated interesting antioxidant activity. In conclusion, the present investigation revealed that TE possesses potent antidiabetic and antihyperlipidemic activities as claimed in different ethnopharmacological practices.

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Phenolic compounds of krasnodar tea


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The total content of tannins in three-leaf flushes in humid subtropics of Russia (unlike other tea-producing countries) increases from May to June, then there is a decline in their content, is associated with temperature and arid stress, slowing the synthesis of tannins in the tea leaf. At the end of stress, the tannin content is actively increasing, reaching a maximum in August. In the black tea content of theaflavins increases from the beginning of the collection of the sheet to its completion; the least number of thearubigins noted in June, the most-in August. A sharp drop in the synthesis of thearubigins and a slowdown in the accumulation of theaflavins in June are associated with the summer dormancy of growth and synthetic processes. The comparative analysis of samples of tea raw materials collected from the plant breeding Institute is done. Tea produced from

forms №582 and №2264, contains a large number of theaflavins, the highest content of thearubigins noted in tea plants cv. `Colchida`. Theaflavins are unstable compounds and easily pass into thearubigins during oxidation, currently there is no single standard for their content in the finished product. At the same time, hydrothermal conditions significantly affect the quality of tea, which requires blending its semi-finished product to obtain a quality brand. According to international rules, any blend of tea should have a ratio "theaflavins/thearubigins" not lower than 1:16, and in tea of the highest quality 1:10. According to this indicator, all tea produced from raw materials collected from the plant breeding Institute, meet international requirements.

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Collection and ethno botanical investigation of lentil (*Lens culinaris* Medik) cultivated in Algeria**Djouher Gaad**

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Lentil (*Lens culinaris* M.) is one among the historic crop cultivated since time immemorial time. In Algeria, the cultivated lentil was introduced in 1920, during the colonial period. Significant variability has been built up since their introduction and acclimatization. However, genetic erosion linked to the loss of local crop varieties being replaced by high yielding improved cultivars is becoming a notable concern. Therefore, accessions collected and information gathered regarding the farmers traditional knowledge are the first steps to undertake before starting plant breeding work. Surveys and collection of lentil accessions were conducted in different agro-ecological zones of Algeria in 2011. From ten regions (Departments), fifteen villages were surveyed and 30 lentil accessions were collected. The information on ethno botanical uses was collected through semi-structured questionnaires with local villagers, elders and those people having knowledge

associated with the production and utilization of lentil. The study revealed that among the interviewed farmers, 64% were males while 36% were females. The commonest cropping system found was the cultivation of lentil alone (95.5% of producers) and associated with grass pea (2.5%). Low yield (40% of responses), disease and insect attack (36%), and low rainfall (24%) were the main production constraints reported by the interviewees. The objectives of this study were (1) Draw the geographical distribution map of lentil accessions in Algeria using DIVA-GIS software, to (2) gather information regarding knowledge related to the use, traditional cultural practices of lentil, (3) collect samples to establish a national germoplasm collection of lentil for *ex situ* conservation and further research and development studies.

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Does low arbuscular mycorrhizal fungal colonization potential in plant roots result forest dieback at Horton plains national park?

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Horton Plains National Park (HPNP) is a plateau at the southern edge of the main Sri Lanka's central mountain massif. One of the most striking observations that anybody could make during a visit to Horton Plains is the dying trees at an alarming rate, forest dieback. Although there are many researches done on forest dieback in the montane forest, of Horton Plains, none have been able to identify the major cause for the problem and very little work has been done on the role of arbuscular mycorrhizae on forest dieback. Twenty four permanent plots of 20 m x 20 m were established randomly to cover 41-60% tree dieback area at Horton Plains National Park. Five randomly selected *Syzygium rotundifolium* saplings were taken as test plants. Four treatments were set up as control, addition of compost, compost with native mycorrhizae isolated from Horton Plains and native mycorrhizae only. In general, arbuscular mycorrhizal colonization is rather low in the present study sites of Horton Plains, when compared with that of similar regional ecosystems studied so far. Although tropical

forests support a high diversity of plants, at Horton Plains their associated arbuscular mycorrhizal fungi (AMF) are not diversified, possibly because AMF network might be disturbed or poorly established. Soil analysis showed a relatively low fungal spore count compared to other studies done in similar ecosystems. Soil pH, soil organic matter content and total nitrogen showed non significant differences between treatments. However, total phosphorus content significantly increased in plots with mycorrhizal addition than in the control plots. Soil pollution with Pb and Cd is evident at Horton Plains. In the present study, it is not surprising that lower AMF colonization correlated with poor AMF soil inoculum potential at Horton Plains. However, present study suggested that we could improve AMF colonization in soil through external addition of native AMF to the soil, thereby restoring the vigor of this vulnerable forest back to its initial glory.

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Evaluation of Postharvest losses of mango (*Mangifera indica*) in Batticaloa district, Sri Lanka and reducing stem end rot disease by retention of latex at harvest

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This study was conducted to assess the postharvest losses of mango, due to the existing postharvest handling practices in Batticaloa district, Sri Lanka and to investigate on the sanitation practices in reducing the stem-end rot (SER), during ripening. A survey was conducted to assess the extent of loss due to post harvest handling practices of mango at field, transport, storage and market levels. The data was collected using oral questionnaires, personal interviews, group discussions and informal observation in the field and at the markets, selected randomly. The postharvest losses were found 10.0, 4.7, 2.63, 6.71, 6.89 and 3.73% at harvest, transport, picker, wholesaler, retailer and consumer levels, respectively. Considering the

channels involved in mango marketing, the growers, wholesaler and retailers had the highest percent of losses followed by the consumers (3.73%). Thus, the total postharvest loss was estimated as high as 34.67%. Further, the results revealed that soon after picking, drying the mango latex in the sunlight was practiced by 34% of the growers while 12% of the growers wash and dry in the direct sunlight. Yet, 54% of the growers, the majority, sell the mangoes without any sanitation practices. The harvested mangoes, washed and air dried before storing for ripening, showed a significant reduction in the SER development.

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Business potential of Agritourism for improving the farmers' income in India


Chidanand Patil

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India is an agrarian driven economy as more than half of its population is still dependent on agriculture as main source their livelihood but this sector is facing disguised unemployment due to lack of opportunities in rural areas, hence, it's important to generate business or employment opportunities in rural areas. Agritourism is the latest concept in the Indian tourism industry, which normally occurs on farms in the villages. It offers people the welcome escape from the daily hectic life in the peaceful rural environment. Agritourism contributes towards development of the agricultural sector by exposing the visitors towards diversified agricultural activities like how crop cultivation takes place, experience ploughing the land, milking the cow, poultry, fishery, beekeeping, organic farming, floriculture, terrace gardening, hydroponics, etc. even some tourists get motivated to take up entrepreneurial ventures in

agriculture and by providing employment opportunities and income to the farmers and tour operators, and an opportunity to rest, relax, enjoy and learn about agriculture for the visitors. There are 23 and 37 agritourism destinations are prevailing in Karnataka and Punjab respectively. Agricultural areas in India have many tourist attractions with varied agro-climatic conditions which can form the basis for tourist attraction. The paper suggested that the Ministry of Agriculture, Ministry of Tourism and Agricultural Universities should give orientation towards agritourism by providing some innovative ideas and by training the farmers in their areas. Reviewing literature on agritourism in Punjab and Karnataka indicated that, agritourism as an economic development instrument has great potential to contribute towards improving the farmers' income.

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 Notes:

Need of revitalizing unani system of medicine

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The increasing incidences of Western Medicine's failures and exhaustive costs and parallel realization of traditional medicines, unique strengths moderately powerful effects but safety, radical cure and low costs, have set the stage for incorporating the latter in healthcare in a big way. World Health Organization which earlier co-opted Traditional Medicines (TMs) just to allow some level of Universal Health Coverage (UHC), is now looking to them for filling up Western Medicine's serious lacunas. However, understanding the novel character and uniqueness of basics of TM's is very important to rule out the curbing disadvantages too of TMs; otherwise they will also be taken up as that type of medicine which is useful only for handful population without any logic behind their activity. Therefore it is very important to know about the reason behind the utility of TM. In Unani System of medicine, there is proper reasoning in the method of preparation of drugs, including underlying rationality in combination of various medicinal plants, minerals, animals products etc.; method of drug administration; various preservatives used; indications and contraindications of drugs in different situations; restriction, avoidance and abstinence of certain foods and diet (*Parhez*); known adverse drug effect; complete drug profile beforehand; knowledge about the adverse drug-drug or food-drug interaction; guidelines for prescribing in extremes of age or in presence of altered organ function or in presence of pregnancy or lactation, etc. The above information is usually given in various Unani Formularies and classical Unani Literatures. Moreover, correctives (*Muslehat*) to drugs are used since a long time to minimize some undesirable effects, which the basic and the adjuvant constituents may produce in a normally prescribed combination with both single and compound drugs. Drugs that

are toxic in crude form are processed and purified in many ways before its clinical use (*Tadbir*). In spite of the fact that, every drug used in traditional systems of medicine may have some side effect (*Muzarrât*), the aim of the above precautions and reasoning, taken by well-informed and experienced physician, was obviously to avoid any ADRs. Concept of temperament (*Mizaj*) in Pharmacotherapy (*Ilajbildawa*) is an important part in Unani System of Medicine (USM). So, in USM the drugs are classified into Four 4 degrees (*Darjaat-e-advia*) viz 1st, 2nd, 3rd and 4th. Higher degrees according to their potency (4th) are more potent and likewise have more side effects/ toxic effects. Correctives (*tadbir-e-advia*) are used to minimize toxicity on the basis of temperament of drugs and its impact in minimizing side effects by prescribing or selecting the degree of drugs as per disease. Similarly, substitutes (*abdaal-e-advia*) of the drugs are used for better efficacy as less toxic drugs are prescribed as substitute to higher toxic drug in drug management based on the condition, *Mizaj* of patient. Cost effectiveness is also considered for better Health Economy and rational use of Unani Medicine.

Likewise Unani drugs of any origin (plant, animal or mineral) are categorized in four degrees on the basis of temperament, potentiality (potency) and power of effectiveness (efficacy) which in its entirety curb adverse drug reactions. Higher the degree, higher the adverse effects Degree α Efficacy and Adverse effect Dose α 1/Efficacy & Potency. Higher the degree higher is the effect but higher is the toxicity of the drug also. So, in Unani system if we use the drug of higher degree, we reduce the toxicity by various means as e.g: Reduce the quantity, Use it along with some corrective agent and detoxify the drug.

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Notes:

Soil fertility status and yield trends in the rice-Wheat system in Nepal

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Farming system of Nepal is the integration of forestry, livestock and crop production. Leaf litters are collected from the forestry and put as bedding materials in the cattle shed and mixed with cattle manure and urine. The decomposed Farm Yard Manure (FYM)/compost are applied in the crop field and incorporated in the soil by plowing. Then the crops are planted in the field.

In recent years, the livestock numbers are decreasing due to scarcity of labors working in the agricultural fields, because they are going out of the country for jobs and are migrating to cities and towns. Therefore, use of chemical fertilizers is increasing in major crop growing area as compared to organic fertilizers.

Comparing the soil fertility status of five development regions of Nepal, soil pH is dominated by acidic in nature except for Far-Western Development Region. The organic matter content

of the majority of samples from Eastern Development and Far-Western Development Region was very low while the organic matter of the other regions was low to medium. The nitrogen content also ranged from low to medium across all the Regions. The status of phosphorus and potassium are low in Eastern Region whereas low to high in other Regions. The average status of soil nutrient contents is declining throughout the nation, but the rate of decline is higher in the eastern part of the country.

Long-term soil fertility experiment on rice-rice-wheat system carried out in Bhairahawa, Nepal showed a sharp decline in rice yields in minus phosphorus (P) treatment in normal season rice, whereas in early rice, it was almost zero. Wheat yield declined in both P and potassium (K) missing plots. The application of P and K fertilizers partially recovered in P and K deficient plots.

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Innovation in Technology Transfer for mitigating crop losses and boosting Food Security**M P Srivastava**

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Climatic changes, population explosion, urbanization and pests and diseases pose serious threat to food and nutritional security. Worldwide pests cause 40% reduction in yield. To ensure sustained productivity from limited land we have to employ innovative technology for food production commensurate to meet food requirement of ever-growing population, which is likely to cross 9 billion by 2050. It is therefore obligatory for us as savior of plants to reduce losses. Though Sustainable Pest Management Technology is available but how far it reaches the growers is debatable. Transfer of technology implies application of latest know how/innovations

on farmers' field through traditional tools of extension powered by print and electronic media helps in preventing crop losses and augmenting production which otherwise is lost due to pest invasion. For efficient management releasing pest control warning, their wider publicity through satellite channel has helped in minimizing losses and boosting food security. Discussions at International fora help to think globally and act locally. Field application of technology suited locally and or modified extension program best suited to the region.

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 Notes:


Fluorescence based kompetitive (competitive) allele specific PCR (KASP) for high-throughput SNP marker detection and validation**Tabassum Rahman Sunfi**

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Considering the enormous potential of DNA markers in plant breeding and recent advances in single nucleotide polymorphism (SNP) genotyping for its promising role in crop improvement, it is crucial for plant breeders to adopt the capacity of SNP marker development and marker assisted selection. However, cost of utilizing high throughput SNP detection system is possibly the most important factor that limits the implementation of marker assisted selection (MAS). In the current work, we have attempted to establish fluorescence-based Kompetitive Allele Specific PCR (KASP) technology for easy and efficient detection of SNP alleles and validation of SNP based quantitative trait loci (QTL). A mapping population at F6 and F7 with the salt tolerant rice landrace *Horkuch* and sensitive but high yielding *IR29*, was used to establish KASP genotyping. Specific salt tolerance SNP-based QTLs had been

previously identified at the F2-3 stage from this mapping population, with *IR29* (♀) and *Horkuch* (♂). KASP markers were designed and genotyping assay was done with F6 sample DNA where polymorphism in seven out of eight SNP markers were detected. Based on physiological analysis for the presence of desired QTLs, a subset of plants were chosen and advanced to F7 generation and SNP based QTLs were validated applying KASP assay. Hence, in the overall study KASP genotyping method was found more suitable as a marker validation system than other methods due to its high accuracy, low cost, flexibility in assay design and fluorescence based detection method. Therefore, was used further for potential donor (tolerant) plants selection that can be used in marker assisted breeding program.

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 Notes:

Production of sweet pepper under different protective structures

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One sweet pepper variety was evaluated under different low height (1.0 m) protective structures including fine net (120 mesh)+polytunnel, fine net, coarse net (40 mesh)+polytunnel, coarse net, only polytunnel and open field condition. Protective structures had the significant influence on growth and yield of sweet pepper. The highest number of fruits per plant was recorded (11.35) from the plants grown under fine net+polytunnel protected system followed by coarse net+polytunnel protected system (9.77) while it was the lowest for open condition (4.63). The fruit yield per plant was also the highest (1.117 kg/plant) when the crops grown under fine net+polytunnel protection followed by the plants grown under coarse net+ polytunnel protection (0.902 kg/plant). Yield of sweet pepper under protected condition was much higher compared to that of plants grown under open

field condition (0.268 kg/plant). Protective structures provide congenial atmospheric condition and protected the plants from pest attack, cold injury during winter which enhance proper growth and development. For on farm adaptive trial the same variety was evaluated under net+ polythene, only net covering and open field condition at seventeen farmer's field during winter season of 2014. Results revealed that the average number of fruits/plant (9.3) and individual fruit weight (87.7 g) were the maximum when the crop grown under the protective structure of net+polytunnel while both of these were the minimum for open field condition. The fruit yield/plant was recorded the highest from net+polytunnel (826.4 g) while it was the lowest for open condition (333.3 g).

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Notes:

Roof garden- A small approach towards feed the city

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The study was conducted at roof top of Horticulture Research Centre (HRC), Bangladesh Agricultural Research Institute (BARI), Gazipur during July 2016 to June 2017 to evaluate the suitable model for year round vegetable supply to the city dwellers. Nine Treatments viz., T1= Plastic box 1, T2= Plastic box 2, T3= Plastic box 3, T4= Plastic box 4, T5= Plastic box 5, T6= Plastic box 6, T7= Plastic box 7, T8= Half drum, T9= Sac/Multilayer box and three roof top garden models viz., Model 1, Model 2, Model 3 were included in the study. Each model consists of 22 type vegetables. Considering the 3 models, there were a narrow difference in term of vegetable yield and prices.

The main cause behind it was the number of vegetables were same (22) in all models. Just rearrange the vegetables within the treatments and type of production system viz., single cropping, inter cropping and relay cropping. So, on a roof garden from a 10 m² / 100 ft² area, anybody can follow any model preferably Model 1 and Model 2, which vegetable price (2270 tk) and yield (73 kg) were higher, respectively. This study was just 1-year result, so after another year trial it may be concluded which model is best in terms of yield and price to feed the city dwellers.

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