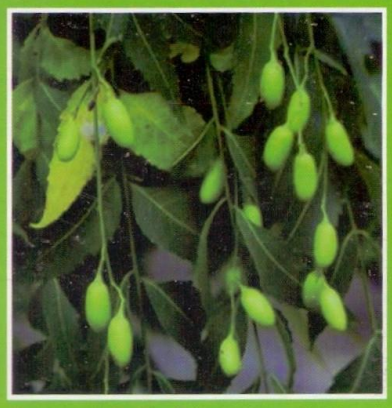
# BOOK OF ABSTRACTS





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# Plenary Lecture

## PL-01

## Drought, Water Scarcity and Way Forward: Barind Tract, NW Bangladesh

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**Abstract**

In Bangladesh, agriculture plays a major role in the national economy. The drought prone Barind Tract receives (1300 mm) almost 48% less rainfall than the national average (2500 mm) where the annual, seasonal and monthly rainfalls for the period of 1971-2011 show declining trends. Here the higher values of rainfall seasonality index and the precipitation concentration indicate alarming situation for the rain-fed agriculture. On the other hand, cropping intensity has increased almost double since mid eighties of last century because of the introduction of groundwater irrigation. The water balance scenario shows the rainfall deficit condition in long dry period (October-May) and accordingly irrigation is required for agriculture. Drought modeling using Standardized Precipitation Index (SPI) indicates twelve moderate to extreme agricultural and hydrological drought (Class-B), and 75% of them coincide with El Niño events making the region as water scarce one in the country. The depth to groundwater table (GWT) reveals that the maximum and minimum depths during 1991-2010 show an average increasing depth (9-14m) in dry and monsoon seasons very indicating unsustainability for groundwater withdrawal. On the other hand, the aquifer for large scale groundwater development exists at greater depth, not fully recharged even during rainy season putting stress on groundwater resource. This will hamper the country's food security and ultimately threaten its socio-economic sustainability. So the management approaches of groundwater resource for maintaining agricultural productivity in sustainable way and ensuring drinking water availability, adaption measures like the artificial recharge of groundwater or rainwater harvesting through the Managed Aquifer Recharge (MAR) technique has been started in Nachole Upazilla in the Tract (Mallickpur and Ganoir Villages) since November, 2013 as a first approach of this type in drought prone rural Bangladesh. Here the declining trend of GWT over decades regained during rainy seasons before 2004, but afterwards it did not return back towards its original position due to meteorological as well as groundwater drought condition. The performance analysis of the practiced MAR technique shows regaining of GWT with response to artificially augmented recharge over last two years. In 2016, maximum GWT depth (bgl) was 2.57- 4.52 m higher than 2014 and is running nearly suction mode of pump even during the dry season, reversing the situation without creating any sorts of quality (both chemical and bacteriological) hazard. People of the area, therefore, are getting water using HTWs, which was scarce in recent decades before implementing MAR.

# PL-02

# Role of Botanical Pesticides in Organic Agriculture in North-Western Himalayas

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**Abstract**

Pest management is facing economic and ecological challenge worldwide due to human and environmental hazards caused by majority of synthetic pesticides. As a response to such concerns, the use of botanical pesticides is now fast gaining wider acceptance among farmers. In modern times botanical pesticides have long been touted as attractive alternatives to synthetic chemical pesticides for the management of insects-pests and diseases particularly under organic farming conditions because botanicals pose no or little threat to the environment and human health as compared to the chemical pesticides. Botanical pesticides is one answer to the pest problem under organic farming conditions. There are many plants in North-Western Himalayas which have pesticidal properties. Extracts of these plants can be sprayed on the crop to either kill or repel insects. In the context of agricultural pest management, botanical pesticides are best suited for use in organic food production in industrialized countries but can play a much greater role in the production and post- harvest protection of food in developing countries. The North-Western Himalayan region consists of some parts of three states *viz.* Himachal Pradesh, Jammu & Kashmir and Uttarakhand each having four distinct zones *i.e.* zone-1 (200-800 m amsl), zone-2 (801-1800 m amsl), zone- 3 (1801-2200 m amsl) and zone-4 (> 2200 m amsl). Each zone has some specific plants having pesticidal properties. So for, more than 40 plants have been identified in the N-W region for having pesticidal properties, out of which neem (*Azadirachtaindica*), Panchphuli (*Lantana camara*), snake root (*Eupatorium sp*.), water pepper (*Polygonumhydropiper*), pink morning glory (*Ipomea carnea*), heeng (*Ferula asafoetida*), aak (*Calotropisprocera*), garlic (*Allium sativum*), chilli (*Capsicum* sp.) marigold (*Tagetes sp*.) brahami (*Bacopa monnieri*), curry paatta (*Murraya koenigii*) etc. have been evaluated extensively for their pesticidal effectiveness in different crops.

The long term experimental evidences at Palampur (Himachal Pradesh) have shown that the aqueous extracts of all these plants have the strong pesticidal properties. For example, 10% leaf extract of water pepper (*Polygonum hydropiper*) was found most effective against mustard, cowpea & okra aphids, bean bug (*Riptortus sp*.), soybean bug (*Chaulipis sp.*) etc. Similarly, botanical pesticides derived from Lantana (*Lantana camara*) were also observed to be most effective for the management of soybean & bean bugs, soybean & pea leaf miner, *cercospora* leaf spot of mash, blister beetle (*Malabris sp.*), flea beetle etc. Lantana products were also observed to have strongaphidicidal properties. Eupatorium extract (10%) effectively managed flea beetle and blister beetle in okra, soybean leaf miner maggot (*Aproaerma sp*.), bean bug (*Riptortus sp*.) and soybean bug (*Chauliops sp*.). Eupatorium extract also controlled *cercospora* leaf spot of mash and soybean effectively. Neem products (aqueous neem leaf extract, neem oil, neem seed kernel extract) effectively managed bean and soybean bugs, pea leaf miner, beetles, aphids and diseases like cercospora in mash, root rot wilt complex and powdery mildew in pea. Similarly, darekastra (*Melia azadirach*), effectively managed most of the insect-pests and diseases mentioned above. Heeng (*Ferula* sp.) and darekastra (*Melia azadirach*) controlled powdery mildew in pea effectively. In vitro evaluation of ten botanicals against disease pathogens (*Scelerotium rolfsii, Drechsleraturcicum and D. maydis*) showed that maximum inhibition (52.2%) of *D. maydis* was caused by *Eupatorium* extract followed by *Murrayakoengii*and35 per cent to 35.2 per cent inhibition was noticed with *Bacopamonnieri* and *Artemisiarecondita* extracts, respectively. Growth of *D. turcicum* was inhibited maximum (55.1%) with *Eupatorium adenophorum* followed by (36.8%), *Lantana camara* and (35.2%) *Bacopa monnieri* respectively. *Bacopa monnieri* gave maximum inhibition (57.0%) of *Sclerotium rolfsii* followed by (43.1%) *Eupatorium adenophorum* extract.

# Botanical Pesticides

## BP-01-Key Note Paper

## Higher Plants as Novel Source of Green Pesticides for Agricultural Pests Management

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### Abstract

Different synthetic pesticides are used for control of agricultural pests have their own limitations due to their post application side effects such as pest resistance and residual toxicity threatening food security. The non biodegradable nature of synthetic chemicals induces resistance in pests rendering them in effective. Currently exploration of phytochemicals or plant products is gaining momentum by the agricultural industries so as to formulate some novel plant based biopesticides for the management of agricultural pests. Plant possesses a number of defensive secondary metabolites viz. terpenoids, phenolics, alkaloids which provide them protection against herbivores and pathogens. This valuable defensive chemistry could be exploited for the discovery of new plant based pesticides. Plant based formulations are chiefly biodegradable and are recognized as better sustainable and eco-friendly alternatives of synthetic pesticides. The biological activity in some plants may be due to synergistic effects of different active principles leading to different mode of action during their pesticidal action. Currently, four major types of botanicals such as pyrethrum, rotenone, neem and essential oils (EOs) are in use for pest management. Plant-based EOs are gaining interest as they are volatile, can be used as fumigant, safe to the environment as well as to human health and have been used in traditional medicine and pharmaceutical preparations . Some essential-oil-based pesticides have been formulated by different agricultural industries and are already commercially available. Currently 'DMC Base Natural' comprising 50% EO from rosemary, sage and citrus and 50% glycerol being used as a safe food additive. Carvone has been introduced under the trade name TALENT in The Netherlands. EcoSMART technologies has introduces EcoPCOR, containing eugenol, for control of crawling and flying insects. EcoTrol, containing Rosemary EO, has been introduced for horticultural crops. A fungicide Sporan™ contains rosemary EO. Likewise, a weedicide Matran™ contains clove EO. Formulations of some EOs viz., thyme oil (*Thymus capitatus*), jojoba oil (*Simmondsia californica*) and rosemary oil (*Rosemarinus officianalis*) are also frequently used as plant-based safe preservatives. The market demand of biopesticide also increased significantly in past few decades with 12 % annual growth rate, where plant products are an integral partner with biological resources and have potential to increase their share in biopesticide formulations. Hence, there is a lot of scope green pesticides to be sustainably and ecofriendly used in agriculture sector.

## BP-02

# Efficacy of Botanicals, Bio-agents and Fungicides on Growth Parameters and Disease Control of Eggplant

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**Abstract**

This study tested the efficacy of ten aqueous extracts of botanicals, one antagonist and two fungicides on the vegetative growth and disease control of a common vegetable plant like eggplant (*Solanum melongena* L.) during January to June, 2014. Increased shoot height, root height, shoot weight, root weight and number of leaves of eggplant over control were found in most of the treatments. Numbers of germination of eggplant seeds and mortality of young plants were calculated. The percentage of reduction of diseases was calculated after the spray of extracts. Botanical extracts of *Acacia nilotica, Allium sativum, Datura stramonium* and formulation of *Trichoderma* were found most effective in controlling foot and root rot and wilt diseases of eggplant compare to control under field conditions. The result showed that botanical extracts and *Trichoderma* formulation acted as potential eco-friendly remedy for management of diseases of eggplant.

**Key words:** Botanicals, *Trichoderma*, eggplant, foot and root rot and growth parameters

## BP-03

# Management of Foot and Root Rot Disease of Fenugreek

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**Abstract**

The experiment was conducted at Spices Research Centre, BARI, Shibganj, Bogra, Bangladesh during Rabi season of 2015-16 to find out the suitable control measures in controlling foot and root rot disease of Fenugreek. BARI Fenugreek 2 was used in the experiment. Four botanicals (Garlic extract, Neem leaf extract,Henna leaf extract&Turmeric powder), three chemicals (Bavistin, Cabriotop&Provax 200 WP) and one control were used as treatment. The lowest radial mycelial growth (5.17 mm) was found in Provax 200 WP (0.25%) treated plate followed by Bavistin (0.25%) and Cabriotop (0.3%), and the highest radial mycelial growth (52.83 mm) was obtained from untreated control followed by Garlic extract (54.17 mm) and Neem extract (49.17 mm) at 7 days after inoculation (DAI). Similar trends were observed for Radial mycelial growth at 14 DAI. Foot and root rot incidence of fenugreek under different treatments ranged from 9.66 - 35.88%, while the lowest incidence was observed in Seed treatment and soil drenching with Provax 200 WP (0.25%) and the highest incidence was observed in untreated control which was followed by seed treatment and soil drenching with Garlic extract (1:5). Seed treatment and soil drenching with Provax 200 WP (0.25%) gave the highest seed yield (1.82t/ha) which was followed by seed treatment and soil drenching with Cabriotop (0.3%) and seed treatment and soil drenching with Bavistin (0.25%),

and the lowest seed yield (1.48t/ha) was recorded in control plot. It may be concluded that seed treatment and five times soil drenching at an interval of 7 days from seedling stage with Provax 200 WP (0.25%) or Bavistin (0.25%) or Turmeric powder (0.5%) significantly inhibited the growth of *Fusariumsolani* in the laboratory and reduced foot and root rot disease and increased seed yield of Fenugreek in the field.

## BP-04

# Effect of Botanical Extract on Pest Control in Yard long Bean Field

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**Abstract**

An experiment was conducted to study the impact of nine different plant products on controlling viral infestation in Yard long bean field. Fresh plant materials of Khoksha (*Ficus hispida*), Chotra (*Lantana sp.*), Chirata (*Swietia chrata*), Neem (*Azadiracta indica*), Bel (*Schinus limonica*), Halude-hurhuri (*Cleomp viscosa*) and Marigold (*Targetes erecta*), seeds of Mahogany (*Swietenia mahagoni*) and Bishkatali were collected from different regions of Rajshahi. Randomized complete block design (RCBD) was followed for the experiment. Ten treatments were applied and each treatment consists of three replications. This study revealed that extract prepared from Bel leaf was superior in terms of producing more yard long bean leaves (78.57±0.600). Whereas a less number of leaves attack (20.82±0.96) and highest yard long bean production (77.51±31.85 gm) were found in the treatment of Bel leaf. Out of these botanicals, Bel leaf extract showed best performance against the pest attack compare to other extracts. Neem leaf extract also showed good performance in the protection of yard long bean plant from pest. Halude hurhuri leaf extracts showed moderate performance against pest. Mahogany seed extract showed lowest efficacy and hampered the normal plant growth and low length (55.04±7.18 cm) plant as well as reduced the yield (4.72±4.7 gm) of yard long bean. Although , Halude hurhuri, Chirata and Marigold leaf extracts were found effective against yard long bean pests but a higher production was observed in the treatments of Bel and Neem leaf extracts in experimental yard long bean field.

**Key words:** Extract, pests, aphids, yard long bean

## BP-05

# Effects of Some Botanicals on Management of Chickpea Pod Borer (*Helicoverpa armigera* Hubner)

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**Abstract**

The experiment was conducted to evaluate some botanicals against chickpea pod borer, *Helicoverpa armigera* Hubner. The treatments were $T_1$ (Neem Seed Kernel Extract @ 100 g/L of water); $T_2$ (Garlic extract @ 100gm/L of water); $T_3$ (Neem oil @ 3ml/L of water); $T_4$ (Chilli extract @ 10 g/L of water); $T_5$ (untreated control). The result revealed that amongst botanicals $T_3$ (Neem oil @ 3ml/L of water at 7 days interval) treatment was the most effective in reducing pod infestation and larvae number (42.52% and 69.85% respectively) followed by $T_1$ (39.30% and 64.17% respectively) treated plot whereas $T_2$ treated plot showed least (12.23% and 32.09% respectively) performance over control. $T_3$ (Neem oil @ 3ml/L of water at 7 days interval) treatment also the most effective in increasing pod number, seed number and yield (54.233/plant, 59.695/plant and 1.1275 t/ha respectively) whereas $T_2$ (41.480/plant, 46.735/plant and 0.8510 t/ha respectively) treated plot showed least performance over control. In terms of grain weight (g/plant) and 1000 seed weight (g), Neem Seed Kernel Extract @ 100 g/L of water was the most effective increasing grain weight (g/plant) and 1000 seed weight (10.718g and 0.1385g respectively) followed by Neem oil @ 3ml/L of water (10.485g and 0.1375g respectively) treatment over control whereas $T_4$ treated plot showed least (6.918g and 0.1265g respectively) performance. Though, neem seed kernel extract increased the highest level of grain weight and 1000 seed weight followed by neem oil, conversely the yield was increased by neem oil followed by neem seed kernel extract, those are comparatively safe for managing chickpea pod borer.

## BP-06

# Allelopathic Effects of *Lantana camara* L. on Germination and Growth Behavior of Some Important Pulses and Vegetable Crops of Bangladesh

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**Abstract**

An investigation was conducted to understand the present status of *Lantana camara* (a globally recognized invasive alien weed) around the Rajshahi University campus and their effect on some popular crops cultivated in Bangladesh. The collected *Lantana* plant and their leaf extracts was subjected to study on germination and growth response of some important pulse seeds (Chick pea, Lentil, Grass pea) and vegetable seeds (Tomato and Bean ) in Bangladesh. The effect of *L. camara* leaf extracts at different strengths (T1-T4) were employed on germination and growth

behavior of pulse and vegetable seeds. Data were recorded at three intervals (3, 5 and 7 days) after posing the seeds on different treatments (T0-T4). The results demonstrated that with the increased concentrations of *Lantana* leaf extracts caused inhibitory effect on germination percentages, shoot and root elongation from both the pulse and vegetable seeds. The inhibitory effect was much prominent at T4 treatment among the other treatments in morphogenic response.

## BP-07

# Effects of Botanical Products against Stem Borer of Sugarcane

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**Abstract**

The experiment was conducted to study the effect of different botanical products at two locations viz., Mohan farm, Thakurgaon and BSRI farm, Ishurdi, Pabna during 2003-04 cropping season. Plantation was done with the variety Isd 34 at Mohan farm and Isd 16 at BSRI farm. Botanical products such as neem leaves, tobacoo leaves, bishkatali plants powder and nimbicidine were used and the treatments were $T_1$ = Neem leaves powder @ 50 kg $ha^{-1}$ (Planting + April + June + August), $T_2$ = Neem leaves at 2% solution (April + June + August), $T_3$ = Nimbicidine @ 1.5 litre $ha^{-1}$ (April + June + August), $T_4$ = Nimbicidine @ 2.0 litre $ha^{-1}$ (April + June + August), $T_5$ = Nimbicidine @ 2.5 litre $ha^{-1}$ (April + June + August), $T_6$ = Bishkatali plants powder @ 80 kg ha $^{-1}$ (Planting + April + June + August), $T_7$ = Bishkatali plants powder @ 100 kg $ha^{-1}$ (Planting + April + June + August), $T_8$= Tobacco leaves extract at 12.5 gm/L water (April + June + August), $T_9$ = Tobacco plants powder @ 100 kg $ha^{-1}$ (Planting + April + June + August). Data were taken 3 times on Stem borers infestation percentage. At Mohan farm, Stem Borer (SB) infestation (June and September) showed that there was no significant difference among the treatments. Pooled data showed 24.63-44.23% efficacy among the treatments, which is far below the desired level (80%) of efficacy. But BSRI farm, June-September showed that there was no significant difference among the treatments in reducing the SB infestation but the treatment Tobacco leaves extract at 12.5 g/L water solution showed 67.63% effectiveness among the treatments in August data. It can be concluded that tobacco leaves extract at 12.5 g/L water showed positive effect against SB infestation.

## BP-08

# Varietal Screening of Tomato to Tomato Fruit Borer *Helicoverpa armigera* Hubner (Lepidoptera: Noctuidae) and Associated Tomato Plant Characters

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**Abstract**

Ten tomato varieties were screened to assess their level of resistance against fruit borer *Helicoverpa armigera* Hubner (Lepidoptera: Noctuidae) under field conditions. The abundance of fruit borer larvae on the tomato varieties, percent fruit infestation by fruit borer, and the morphological characters, nitrogen content, yield and seed germination of the varieties were studied. The studied varieties differed in their morphological characters viz., leaf thickness, trichome density and rind thickness, and also in nitrogen content. The fruit borer larval population and fruit infestation varied significantly among the varieties. Five varieties namely BARI Tomato-1, BARI Tomato-4, BARI Tomato-10, BARI Tomato-11 and BARI Tomato-15 were least infested by fruit borer (3.6±0.5 to 10.0±1.7%) and had significantly lower abundance of larvae (0.3±0.3 to 0.7±0.3 plant$^{-1}$), and the varieties were classified as resistant. The yield reduction and seed germination of these varieties ranged from (3.9 to 7.9% and 76.7±2.4 to 90.7±2.7%, respectively). Four varieties namely BARI Tomato-2, BARI Tomato-5, BARI Tomato-12 and BARI Tomato-14 were graded as moderately resistant as the varieties showed 12.4±0.5 to 16.2±0.6% fruit infestation by fruit borer and revealed 1.0±0.0 to 1.3±0.3 larvae plant$^{-1}$. The yield reduction and seed germination of these varieties ranged from (9.6 to13.2% and 66.7±1.8 to 73.3±1.3%, respectively). Only the variety BARI Tomato-7 was categorized as moderately susceptible which had significantly the highest abundance of fruit borer larva (1.7±0.3 plant$^{-1}$), fruit infestation (22.2±2.9%) and yield loss (15.9%), and lowest germination performance (62.7%). The study indicated that the varieties differed in their levels of resistance and this promising source of resistance may be incorporated in the integrated management of tomato fruit borer.

**Key words:** Fruit borer, infestation, *Lycopersicon esculentum*, resistance, trichome, variety

## BP-09-Key Note Paper

# Non-Chemicals Crop Pest Management *via* Bio-botanical Pesticides for the Safety of Environment and Human Health

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**Abstract**

The rise and non-judicious consumption of synthetic chemical pesticides in modern agriculture is alarming. The problems of pest resistance, residues, food and environment contamination, human exposure during manufacturing, packing and application, etc. associated with the use of synthetic pesticides have necessitated the development of other safer pest management strategies including the bio-pesticides. In this context, the use of plant extracts/derivatives with greater selectivity and biodegradability has received a special attention the world over. The newer products focus on pest specificity, phyto-compatibility, safety to mammals and the environment, less susceptibility to resistance, ready availability (preferably locally) and cost effectiveness. This has led to boosting the century-old practices of protecting agricultural crops/stored products using plant-derivatives which have been known to resist insect attack. Plant derived materials are more biodegradable and less likely to contaminate the environment. At IPFT, India some of the formulations based on bio-botanical pesticides have been developed for the control of insect pests. The active ingredients used for developing the formulations are derived from natural occurring plants and their by-products are also used suitably. As far as botanical pesticides are concerned, Neem alone occupy more than 60% share in crop pest management. Inspite of all efforts and focus, botanical pesticides are not the first choice of farmers because of its slow action, poor knockdown effect, unstable product/formulation etc. At our institute, we have made sincere efforts to enhance the pesticidal activity of Neem along with reduction in application cost by using a plant based synergist. We have also identified plant based adjuvants which can decrease the recommended dose of chemical, botanical and biological pesticides for different crop pest management for the safety of environment and human kind.

## BP-10

# Eco-friendly Pest Management in Kidney Bean (*Phaseolus vulgaris L.)* Experimental Field with Some Botanical Pesticides

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**Abstract**

A field experiment on eco-friendly pest management in kidney bean (*Phaseolus vulgaris*) field was conducted at Rajshahi University during August, 2010 to November, 2010 with seventeen botanical pesticides prepared from the leaves and seeds of Bangladeshi plants. These botanicals are Batabi Lebu fruit (*Citrus decumana*), Holdehurhure (*Cleom viscosa*), Meswak (*Glycosmis arborea*), Bel Leaves (*Schinus limonia*), Holude Leaves (*Curcuma aromatica*), Batabi Lebu Outer shell *(Citrus decumana*),Tejpata (*Cinnamomum tamala*), Kamranga(*Averrhoa carambola*), Chirata (*Swietia chirata*), Lebu Leaves (*Citrus limon*), Biskatali (*Polygonum hydropiper)* , Onion (*Allium cepa*), Chakor (*Hibiscus sabdariffa*), Ganda (*Tagetes erecta)*, Jute Leaves (*Corchorus capsularis)* and Garlic (*Allium sativum*). One control treatment without botanicals was maintained during this experiment where only water was sprayed. Out of these botanicals, a less number of insect attacks on bean leaves were found in treatment of Holde-hurhure(12.953±3.858), whereas a high number of insect attacks were observed in treatment of Biskatali (57.140±9.601) and control (70.983±2.018). Besides the pest control, botanical pesticides have also enormous effect on plant growth. The tallest bean plant was observed in the treatment of Holde –hurhure (10.833±0.49 ft) and shortest in treatment of Ganda leaves (4.166±2.776 ft).We found a less number of aphid attacks on bean stems/leaves in treatment of Holde-hurhure (5±2.64), where as a high number of aphid attacks were found in the Tejpata treatment (47.666±6.064).The Bean production was high in treatment of Holde hurhure **(**751.66±68.45 g) compare to control (113.33±32.82g). From this study, it is found that Holde hurhure extract not only showed good protection of bean plant from insect attack but also increase the bean production. Therefore, we conclude that farmers should use botanical pesticides from Holde hurhure instead of toxic chemical insecticides for controlling pest in bean field.

## BP-11

# Biocontrol of Fusarium Wilt of Tomato under Field Condition and their Effect on Yield of Tomato

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**Abstract**

Application of bioagent is a harmless method ofcontrolling soil borne plant diseases thus reducing hazardous pesticide use andenvironmental pollution. Efficacy of saprophytically competitive bioagents and some plants leaf extract against *Fusariumoxysporum* f.sp. *lycopersici*causal agent of Fusarium wilt disease were studied. Two biocontrol agentsviz.,broth and compost of *Triochoderma viride* and *T.harzianum* and five botanical plants extracts viz., *Lawsonia inermis (*henna), *Allamanda schottii* (allamanda), *Polygonum hydropiper* (biskatali),*Azadirachta indica* (neem) and *Asclepias calotropis* (akanda) were assessed for their efficacy against wilt disease and yield of tomato under field condition in Regional Agricultural Research Station, BARI, Ishurdi, Pabna during 2011-13. A chemical fungicide Provax (2g/liter water) was used as negative control and untreated soil with *Fusarium* inoculum as positive control. Highest wilt incidence was found at Naogaon (30%) followed by Rajshahi (28%) and Pabna (27%).Wilt incidence varied from 7.65-37.50%, while the lowest incidence was observed in soil amendment with Provax (7.65%) which was statistically similar to soil drenching allamanda leaf extract (1:5) (8.5%), and the highest incidence was observed in untreated soil (37.5%). Biskatali leaf extract showed intermediate disease incidence (12.50%). Other biocontrol and botanical agents did not showed satisfactory results. Provax treated plot showed the highest (92.35%) healthy plants and highest (19.26) number of fruits per plant followed by soil drenching allamanda and biskatali leaf extract 87.5% and 17.15 and 17.11 number of fruits per plant, respectively. Provax treated plot gave the highest (30.55 t/ha) yield which was statistically significant to the soil treated with allamanda and biskatali leaf extract and that were 28.33 and 27.11 t/ha, respectively. Untreated plot gave the lowest (20.19 t/ha) yield which was followed by soil drenching with neem leaf extract (1:5). It may be concluded that compare with Provax (0.2%), allamonda and biskatali (1:5) leaf extracts significantly decreased the disease and increased the yield of tomato.

## BP-12

# Effect of Fruit Ripening Chemicals and Mutagen on Morphology of Tomato (*Lycopersicon esculentum* Mill.)

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**Abstract**

Aim of this investigation was to determine the effect of two fruit ripening chemicals on morphological characters of tomato. One mutagenic agent ethylene glycol was used to justify the mutagenic effects of fruit ripening chemicals. Control was maintained by treating the seeds with water for same treatment durations following same methods as that of different chemicals. Plant height, leaf length, mid rib length, petiole length terminal leaflet length breadth were determined. The highest mutagenic effect on plant height was observed in $D_3$ (1.5 ml/100 ml) of ethylene glycol for 12hrs followed by Eden and Ripen-15. Leaf length was found to increase in $D_1$ (0.5 ml/100 ml) of Ripen-15 for 6hrs as compared to control. The highest mid rib length was observed in $D_2$ (1.0 ml/100 ml) of Ripen-15 for 6hrs followed by ethylene glycol and Eden. The petiole length was found to highest in $D_1$ (0.5 ml/100 ml) of Ripen-15 for 6hrs and lowest in $D_5$ (2.5 ml/100 ml) of Eden for 12hrs. Eden has significant effect on terminal leaflet length and breadth. Correlation studies showed significant and positive relation among all morphological characters with different chemicals.

## BP-13

# *Trichoderma:* A Promising Tool Box for Climate Smart Agriculture

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**Abstract**

The green revolution practiced at a great cost of environment to meet the increasing demand for food, fodder, fuel and fibre. The indiscriminate use of agrochemicals resulted damage ecosystem, food and water contamination, losing of local cultivar, pesticide tolerance, disease resistance, destruction of beneficial organisms along with different climate change vulnerability. Increased energy consumption caused by higher standard of living pose is a challenge on current effort to sustain a healthy environment and counteract climate change. Moreover soil erosion, emerging pest and pathogen, housing, biofuel production (Harvey and Pilgrim, 2011) will adding pressure on agricultural system to increase its productivity. Quick and impressive chemical based agricultural practices are potentially hazardous and turn into today's hot topics of both environment and public health concern. In the contrary biological control is eco-friendly technology with no risk, similar with organic and integrated pest/pathogen management (IPM) programmes. There is an urgent need to develop sustainable approach for maximum crop production with minimum damage. *Trichoderma harzianum* rifai are widely recognized bioagent act against a broad array of commercially important plant pathogen. Antagonistic *Trichoderma* now are of central importance in many

industries for enzymes and metabolites. Their plant growth promoting capabilities made them unique fertilizer for organic farming. They can also exploit as abiotic stress reliever and can alleviate phytotoxicity. This study reveals the other beneficial arsenal of *Trichoderma* spp. focusing on biocontrol activity and further review is needed to discover the agriculture friendly tools which may be open a miracle door.

## BP-14

## Evaluation of Pressmud against White Grubs and Rootstock Borer of Sugarcane

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**Abstract**

An attempt was made to compare the effects of pressmud treated plot and control plot on the incidence of rootstock borer and white grubs in sugarcane. Before planting, furrow soil was treated with Pressmud @ 15 t/ha as an organic amendment. Pressmud @ 15 $tha^{-1}$ treated plot showed the lowest (3%) and the highest (47%) incidence of white grubs population in month of August and December compare to control plot. Rootstock borer was also the lowest (55.56%) and the highest (87.23%) in month of July and December compared to control. The pressmud caused significant increase in white grubs populations but no effects on rootstock borer infestation as compared to control.

## BP-15

## Identification of Tropical Sugarbeet Diseases in Bangladesh

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**Abstract**

Sugarbeet (*Beta vulgaris* L) grown throughout the world is affected by a good number of diseases. The crop is subject to attack by the diseases from the time of seed sowing until the harvest of the crop. In Bangladesh, nine (9) tropical sugarbeet diseases have been identified through diagnostic process. The diseases are Sclerotium root rot (*Sclerotium rolfsii*), Rhizoctonia root and crown rot (*Rhizoctonia solani*), Fusarium root rot (*Fusarium oxysporum* f. sp. *betae*), Cercospora leaf spot (*Cercospora beticola*), Alternaria leaf spot (*Alternaria alternate*; *Alternaria brassicae*), Anthracnose (*Colletotrichum dematium*), Crown gall (*Agrobacterium tumefaciens*), Root knot (*Meloidogyne* spp.) and Heart rot (boron deficiency). All parts of the plant (seeds, seedlings, foliage and roots) are susceptible to attack by these diseases which reduced the yield and sugar content of tropical sugarbeet genotype to a great extent. Some of them like sclerotium root rot, rhizoctonia root and crown rot and heart rot are very destructive diseases which sometimes destroy the whole tropical sugarbeet field. However, the occurrence of these diseases varied from genotype to genotype and place to place. Early information on crop health and disease identification can

facilitate the control of tropical sugarbeet diseases through proper management strategies. This is the first report of tropical sugarbeet diseases in Bangladesh.

**Key words**: Sugarbeet, yield, sugar, genotype, *Beta vulgaris*

## BP-16-Poster

# Efficacy of different Chemical and Botanical Insecticides in Controlling Mango Hopper *(Amritodus atkinsoni* L.*)*

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**Abstract**

Laboratory experiments were conducted in the IPM Lab, Department of Entomology at Bangladesh Agricultural University, Mymensingh, during February, 2014 to May, 2015 to manage the mango hopper (*Amritodus atkinsoni* L.) using five insecticides: three chemicals (Acetamiprid 20 SP, Q-fos 25 EC and Confidor 70 WG) with 3 concentrations (0.001%, 0.00125% and 0.0025%) and two botanicals (Neem extract and Mahogoni extract) with 3 concentrations (0.5%, 1.0% and 1.5%) maintaining six replications of each to know their efficacy in controlling mango hopper. Comparative efficacy of insecticides in the laboratory showed that all the three concentrations of Confidor 70 WG (0.001%, 0.00125% and 0.0025%) effectively controlled mango hopper (48.15%) where Acetamiprid 20 SP can kill 46.67% at the same concentrations on an average but it was found that Confidor 70 WG can control 98.33% mango hopper while Acetamiprid 20 SP can control 93.33% when these were applied at 0.0025% concentration and observed at 24 hours after treatment. Therefore within two neonicotinoid insecticides Confidor 70 WG was superior in considering mortality percentage of mango hopper. Among the botanical insecticides, Azadirachtin based Neem extract 1.5% was the best insecticide on an average than the Mahogoni extract for controlling the mango hopper but both of them showed moderate efficacy at 1.0% concentration for the 3 hours after treatment. Mortality percentage varied with the time intervals and concentrations which was displayed in a linear regression equation curve. Observation on the efficacy of insecticides in managing mango hopper which will contribute in increasing mango yield showed that Confidor 70 WG 0.0025% effectively controlled mango hopper (98.33%) among the chemical insecticides and Neem extract (1.5%) showed higher efficacy than Mahogoni extract (1.5%) among the botanicals.

## BP-17-Poster

# Efficacy of *Desmodium gangeticum* (L.) DC against Stored Product Pests

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**Abstract**

Screening of *Desmodium gangeticum* (whole plant) has been done for the detection of the presence of bioactive compounds which revealed that two of the test plant extracts petroleum ether (Pet.E.) and methanol ($CH_3OH$) extracts were found active against the adult beetles of *Sitophilus oryzae and Callosobruchusmaculatus*in the dose mortality experiments. However, all the three extracts of the test plant showed efficacy in repellent activity tests. Pet.E. extract was tested against adult beetles of *S. oryzae* through dose mortality assay and the $LD_{50}$ values were established as 0.966, 0.622, 0.642, 0.680, 0.957, 0.957, 0.688, 0.708, 0.708, 0.708, 0.594, 0.600 and 0.600 $mgcm^{-2}$ for 0.5h, 6h, 12h, 18h, 24h, 30h, 36h, 42h, 48h, 54h, 60h, 66h and 72h of exposure respectively. The $CH_3OH$ extract was tested against *C. maculatus* adults through dose mortality assay and the $LD_{50}$ values were established as 1.191, 1.104, 1.096, 1.052, 1.021, 1.008, 0.962, 0.883, 0.829, 0.818, 0.818, 0.772 and 0.726 $mgcm^{-2}$ for 0.5h, 6h, 12h, 18h, 24h, 30h, 36h, 42h, 48h, 54h, 60h, 66h and 72h of exposure respectively. The extracts showed repellent activity against the adults of *Tribolium castaneum, S. oryzae, C. maculatus*and *C. chinensis* adults.The activity of Pet.E.extract found strong enough against *T. castaneum* ($p<0.001$) and moderate against *C. chinensis* ($P<0.01$) and the chloroform ($CHCl_3$) extract showed moderate activity against *T. castaneum* ($P<0.01$) in repellency while the $CH_3OH$ extract showed the lowest considerable repellency against *C. maculatus* ($P<0.05$). According to the intensity of activity the results could be arranged in a descending order: Pet.E. > $CHCl_3$> $CH_3OH$ against *T. castaneum, C. chinensis and C. maculatus*; However, all the extracts did not show significant repellent activity against *S. oryzae* adults.

## BP-18-Poster

# Vector Control Potentials of *Evolvulus Nummularius*

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**Abstract**

The whole plant (wp) of *Evolvulus nummularius* was extracted in petroleum ether (PetE), chloroform ($CHCl_3$) and methanol ($CH_3OH$), and were screened against two vectors *i.e.* eggplant aphid, *Aphis gossypii* and larvae of the mosquito, *Culex quinquefasciatus* under laboratory conditions to yield their efficacy through dose-mortality assay and repellent activity against *A. gossypii* and larvicidal activity against *C. quinquefasciatus* larvae with much success. The extracts were tested against *A. gossypii* with doses 0.196, 0.147, 0.098, 0.049 and 0.025mg/$cm^2$ which were applied on both the sides of treated leaves (taken as a part round in shape of 3.6cm diam.) and the test insects were released there to observe mortality or to find any sort of abnormality due to the extracts compared to the

controls (where no extracts were used). The PetE extract was the highest in activity for 3h, 6h, 9h, 12h, 15h, 18h, 21h and 24h of exposures with $LD_{50}$ values 0.673, 0.167, 0.120, 0.093, 0.069, 0.044, 0.035 and 0.034mg/cm$^2$ respectively. Against the eggplant aphids $CH_3OH$ extracts of *E. nummularius* (wp) offered repellent activity and PetE and $CHCl_3$ extracts of the same didn't show repellency. All the extracts were also tested against 1 day aged mosquito larvae, while for the doses of PetE extracts were 200,100, 50, 25, 12.5 and 6.25ppm; and for the $CHCl_3$ extracts were 400, 200, 100, 50, 25 and 12.5ppm and for the $CH_3OH$ extracts were 800, 600, 400, 200, 100, 50 and 25ppm. The PetE extract was the highest in activity; while the $LC_{50}$ values 229.552, 127.677, 74.044, 64.412 and 45.345ppm for 6h, 12h, 18h, 24h and 30h of exposures respectively. The analysis of data revealed that the test plant *E. nummularius* possesses vector control potential.

## BP-19-Poster

# Effect of Plant Extracts, Chemical Fungicides and Antagonistic Fungi against *S. rolfsii* Sacc. - A Foot Rot Pathogen of Betelvine (*Piper betle L.*)

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**Abstract**

In this study *in vitro* antifungal activity of some plant extracts, chemical fungicides and antagonistic effect of some bio-control agents were investigated against *Sclerotium rolfsii* Sacc. Plant extracts were prepared following standard method using three solvents i.e. water, ethanol and acetone. Radial mycelial growth and percent inhibition radial growth (PIRG) were measured after 2-7 days of incubation periods. Out of twelve medicinal plants maximum (100%) antifungal activity were exhibited in *Datura metel, Lowsonia inermis* and *Adhatoda vasica* leaf extracts in all used solvents and concentrations (5, 10, 15, 20 and 25% ) while no inhibition was exhibited in *Heliotropium indicum*. Eight fungicides namely secure, thiovite, ridomil, rovral, antracol, dithan M-45, cupravit, bavistin were used. Among them the most effective fungicides were secure and thiovite which showed 100% inhibition at the concentrations of 100, 200, 400 and 800 ppm while no inhibition was exhibited in ridomil. Total seven antagonists i.e. *Trichoderma harzianum, T.viride, Aspergillus sp., Fusarium oxisporium, Penicillium sp., Botrytis sp.* and *Colletotricum gloeosporioides* were tested for antagonistic effect against the pathogen. In dual culture the highest inhibition was recorded 66.10% in *T. harzianum* and the lowest was 23.52% in *F. oxisporium* after 7 days of incubation period. On the other hand the highest inhibition was recorded 66% in *T. harziunum* and the lowest was 35% in *Botrytis sp.* So, *D. metel, L. inermis* and *A. vasica* leaf extracts can be used as effective botanical fungicides in combination with chemical fungicide and a bio-control agent in integrated disease management practices that may be less harmful and eco-friendly.

***Key Words*:** Plant extract, chemical fungicide, antagonistic fungi, dual culture, poison agar and PIRG

## BP-20-Poster

# An Eco-friendly Approach to Reduce Reproductive Attributes in the Housefly, *Musca domestica* L. Using Crude Plant Extracts

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**Abstract**

As an alternative to chemical insecticides, plant extracts showing insecticidal properties are being increasingly used nowadays in insect pest management programs. With a view to an eco-friendly approach, here we report some bioactive properties of whole-plant boiled extracts of three indigenous plant species *viz*., *Calotropis procera* (Aiton), *Piper longum* L. and *Polygonum hydropiper* L., in a housefly model. Efficacies of the whole-plant aqueous extracts of three indigenous plant species *viz*., *Calotropis procera* (Aiton), *Piper longum* L. and *Polygonum hydropiper* L., have been assayed for control of the common housefly, *Musca domestica* L. Using bioassays against the 2nd instar larvae, the estimated $LC_{50}$ values for the three plant extracts were 557.89µL, 981.02µL and 773.27µL, respectively, suggesting *C. procera* as the most effective plant under study. Data on vital reproductive attributes of the experimental flies revealed that the egg-laying and egg-hatch ($P<0.001$), and the numbers of pupae and adults, and female ratios ($P<0.05$) were all reduced significantly by the application of the extracts in housefly culture media, whereas the apparent lengthened larval duration and reduced longevity of the adults were not statistically significant ($P>0.05$). Interestingly, *C. procera* extracts at higher concentrations yielded 21.54% deformed pupae and 11.76% deformed adults which failed to survive. Implications of these findings in terms of developing a plant-based bio-insecticide for *M. domestica* having eco-friendly, safer and economic benefits have been discussed.

## BP-21-Poster

# Larvicidal Efficacies of Some Plant Extracts and their Synergistic Effects with Cypermethrin on the Life-history Traits of *Musca domestica* L.

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**Abstract**

Crude aqueous extracts from leaf, stem and root of three indigenous plants *viz. Calotropis procera* (Aiton), *Piper longum* L. and *Polygonum hydropiper* L. were used in larvicidal bioassays against the 2nd-instar larvae of the housefly *Musca domestica* L. for 72h exposure. $LC_{50}$ concentrations of the extracts of the most effective plant parts were 5399.93ppm, 7276ppm and 8149.33ppm, respectively for the root of *C. procera*, leaf of *P. hydropiper* and the root of *P. longum*. Compared to the plant extracts (PE), the synthetic pyrethroid insecticide cypermethrin (CP) had

much stronger larvicidal effect with an $LC_{50}$ of 239.77ppm. The combined effects of CP and the most effective PE showed further lower $LC_{50}$ values of 396.95ppm, 571.57ppm and 923.48ppm for *C. procera* root, *P. hydropiper* leaf and *P. longum* root, respectively. The $LC_{50}$ concentrations of the CP+PE mixtures were then applied to the fly culture medium to evaluate seven vital life-history traits of the flies such as fecundity, percent egg-hatch, larval duration, numbers of pupae and adults, female ratio and adult longevity, where all the traits were shown to be negatively affected by the treatments. Finally, the co-toxicity coefficient (CC) values of the CP+PE mixtures were estimated to reveal that the mixtures had pronounced synergistic effects against *M. domestica* under study. The results are promising indicative of the suggestion that the mixtures of indigenous plant extracts with synthetic pyrethroid insecticide(s) are more effective than the insecticide or plant extracts alone, and such synergistic mixtures could be effective in reducing housefly population in both indoor and field conditions.

## BP-22-Poster

# Toxicity of *Careya arborea* Roxb. Leaf extracts on *Oreochromis aureus* and *Artemia salina* L.

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**Abstract**

The petroleum ether (PetE), chloroform ($CHCl_3$) and methanol ($CH_3OH$) extracts of *Careya arborea* Roxb. leaf have been screened through piscicidal test against *Oreochromis aureus* (=*Tilapia aurea*) and cytotoxicity (brine shrimp lethality) test against *Artemia salina* nauplii were carried out as a supporting experiment to find out toxic protentials of the test plant. *C. arborea* extracts were tested against ten individuals of *O. aureus* fries (2 months aged) in each 500ml biker with 400ml of water, while the doses of PetE extract were 110, 100, 90, 80 and 70ppm; and of $CHCl_3$ extract were 80, 70, 60, 50and 40ppm and also of $CH_3OH$ extract were 50, 40, 30, 20 and 10ppm. The $CH_3OH$ extract was the highest in activity; while the $LC_{50}$ values were 303.380, 466.529, 191.155, 67.529, 38.462 and 26.794ppm for 9h, 12h, 15h, 18h, 21h and 24h of exposures, respectively.

The brine shrimp lethality tests were carried out on ten individuals of *A. Salina* nauplii (24 hours aged) in each of the 20ml test tubes with 10ml of saline water.The $CH_3OH$ extract was the highest in activity; while the $LC_{50}$ values were 54765.3, 1024.984, 129.977 and 35.8474ppm for 6h, 12h, 18h and 24h of exposure respectively. The doses of $CH_3OH$ extract were 100, 50, 25, 12.5 and 6.25ppm; and of $CHCl_3$ extract were 150, 100, 50, 25 and 12.5ppm and of PetE extract were 250, 200, 150, 100 and 50 ppm.

The $CH_3OH$ extract of *C. arborea* leaves was found strong in activity on both *O. aureus* and *A. salina*, but the $CHCl_3$ and PetE extracts didn't show promising activity against the test agents.

# Bio-active Compounds and Anti-microbial Agents

## BCA-01-Key Note Paper

## Screening of Potential Biosurfactants from Pseudomonas sp for Bioremediation of Oil Contaminated Areas

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**Abstract**

For the last few years, biosurfactants have attracted attention throughout the world due to their minimum toxicity, biodegradable potential and ecological acceptability. Because of hydrophobic nature of the oil, remediation of oil-contaminated areas is a great challenge that can be overcome by the use of biosurfactants. In spite of this their use is very much limited due to high cost in comparison with their chemical counterparts. Because of their limitations, global focus is on the screening of microbial strains for ecofriendly surfactant production with better and excellent oil-emulsifying ability. In the present investigation ten bacterial isolates (PB1- PB10) were screened from different oil-contaminated areas for biosurfactant production, characterized for plant growth promoting characteristics, studied for different biosurfactant properties (such as foaming, surface tension reduction, drop collapse tect, haemolytic activity etc. ) and petrol emulsification index. All the ten isolates synthesized extracellular biosurfactant on minimal salt medium (MSM) supplemented with 2.5% dextrose as carbon source. All the strains showed foaming activities were found to reduce surface tension from 72 dynes /cm to 29 dynes/cm, passed drop collapse test and were positive for haemolytic activity. Biosurfactants from all the isolates were found to emulsify petrol with varying degrees. Isolates PB1 and PB8 were found to be the best with emulsification endex of 95.05 and 55.50 respectively. These strains had the potential to emulsify petrol and can be used for remediating petrol-spilled sites. In addition to this, these strains had been found to possess various plant growth promoting properties and can be exploited to promote plant growth well.

**Key words:** Biosurfactants, *Pseudomonas,* Bioremediation, oil-contaminated areas

## BCA-02-Key Note Paper

# Study of Antibacterial Activity of*Acacia nilotica* (L) leaf Extract against Diarrhoeal Bacteria in Bangladesh Perspective

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**Abstract**

*Acacia nilotica*(subfamily: Mimosaceae) commonly has been used in folk medicine to treat different diseases including diarrhoea. The crude ethanolic extract of *A .nilotica* leaves was evaluated for itsphytochemicalnature (group determination of plant constituent) and pharmacological activities (analgesic, antibacterial and cytotoxic activity). For separation of pure bioactive compounds open column chromatographic (OCC) and thin layer chromatographic methods (TLC) were used. Initial results obtained from TLC showed the presence of steroid in the ethanolic extracts. It has one double bond in the six member ring (CH=C, 140 ppm and 121 ppm); one carboxylic acid group (C, 181 ppm), one alcoholic group (-OH, the carbon attached to OH is 71 ppm). After NMR spectroscopy the purified bioactive compound was sitosterol. The antibacterial activities of the crude ethanolic extracts and active purified compound were tested using disc diffusion method. The extractshowed 10.67mm,8.33mm,9.33mm, 9.00mm, 8.67mm,9.67mm and 10.67mm zones of inhibition against *Escherichia coli, Shigellasonnei, S.dysenteriae, S.shiga, S.boydii, S.flexneri*and *Vibrio cholera* respectively. The purified compound (sitosterol) was separately used to investigate its antibacterial activities using same disc diffusion method. The result showed 8.00mm, 9.33mm, 9.67mm, 8.33mm, 9.00mm, 8.33mm and 7.67mm zones of inhibition against *Escherichia coli, Shigellasonnei, S.dysenteriae, S.shiga, S.boydii, S.flexneri*and*Vibrio cholera* respectively with respect to standard ciprofloxacin (10 µg/ml) disc. It was found that purified sitosterol (100µg/ml) has significant antibacterial activities against seven pathogenic diarrhoeal bacteria. It is expected that the findings of the experiment may be useful to rural poor people of Bangladesh to get new biomedicine for the treatment of diarrhoea.

**Key words:** Antibacteial activity, sitosterol, *Acacia nilotica* and pathogenic diarrhoeal bacteria

## BCA-03

# Effect of Methanolic Extract of Botanicals on Foot and Root Rot Disease of Lentil

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**Abstract**

Lentil (mushur dal) is one of the most common pulses in Bangladesh. Production of lentil is affected by different kinds of fungal diseases. Foot and root rot disease is considered as the important one. Efficacy of three methanolic extracts of three indigenous botanicals (*Lawsonia inermis*, *Nigella sativa*, and *Allium sativum*) were tested for controlling foot and root rot disease of Lentil at the experimental field of Regional Agricultural Research Station, Ishurdi, Pabna, Bangladesh during November-March, 2015. Accordingly, methanolic extracts of dried leaves of *Lawsonia inermis*, seeds of *Nigella sativa* and *Allium sativum* were prepared and treated the seeds before sowing. Out of these botanicals, 15% *Lawsonia inermis* leaf extract showed best performance against foot and root rot causal fungi which statistically identical with 10% *Lawsonia inermis*. *Nigella sativa* seed extract (15%) also showed good activity for controlling foot and root rot disease of lentil. However, the chemical detergent Trix solution showed lowest efficacy which was statistically similar to control.

**Key words:** Botanicals, extract, methanol, foot and root rot disease and lentil

## BCA-04

# Evaluation of Anti-microbial Sensitivity of the Remedial Compounds Extracted from Selected Medicinal Plants

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**Abstract**

There is a growing interest in the study of natural products, especially in the field of drug screening, development and biological research. Plants are the potential source of biological products and anti-microbial biological agents. The present study was undertaken to extract the bioactive compounds from *Kalanchoe pinnata*, *Justicia adhatoda* and *Phyllanthus emblica* and to clarify that these plant extracts has great potential value to combat against different

diseases caused by the microbes. In this investigation, the plant bioactive compounds were extracted using acetone, ethanol and methanol as organic solvents; and performed their antimicrobial potentiality against selected pathogens using disc diffusion method. The observed zone of inhibition showed that extracts of *Phyllanthus emblica* has significant anti-microbial activity against *Klebsiella spp.*. Extracts of *Phyllanthus emblica* formed larger zone of inhibition against *Klebsiella spp.* than the commonly used third generation antibiotics like azithromycin. Surprisingly, we found that some of the first and second generation antibiotics work better than the third generation antibiotics although the third generation antibiotics are used frequently. Further investigations are required to establish these plant extracts for their medicinal potentiality.

*Key words*– Plant extracts, medicinal compounds, anti-microbial sensitivity, antibiotic resistance.

## BCA-05

## Assessment of Antibacterial and Antioxidant Activities of Wheat (*Triticum aestivum* L.)

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**Abstract**

Wheat is one of the most important cereal crops in the world and also in Bangladesh. The wheat bran and wheat germ provides protection against diseases such as constipation, heart disease, diverticulum, appendicitis, obesity and diabetes.Under this study to estimate the antibacterial and antioxidant activities using leaf, seed, awn, root, stem and whole plants of two wheat varieties namely Kheri and Pavon76 were used. For that methanol and ethanol solvent was used to extract the antibacterial and antioxidant compounds fromthe mentioned organs of wheat plants. Antibacterial activities were evaluated in *in vitro* conditions against four bacteria *viz. Staphylococcus aureus, Streptococcus mutans, Bacillus subtilis* and *Escherichia coli* using disk diffusion method. Cefotaxime-10 µg was used as standard drugs (antibiotic) for investigating the bacterial species. For both wheat varieties *E. coli* showed as more sensitive strain against all the tested organs. However, leaf extract of those varieties did not show any significant result against any bacterial species. The antioxidant activities were also studied through *in vitro* conditions by measuring DPPH (2,2-diphenyl-1-picrylhydrazyl) and total antioxidant capacity (TAC) test. Leaf and seed extract of variety Kheri showed 50% scavenging of DPPH at the concentration of 180 and 100 µg/ml. It was observed that Pavon 76 showed 50% scavenging with 100 µg/ml and 190 µg/ml of DPPH. The TAC of extracts and standard (vitamin C) were also estimated and found that methanolic and ethanolic extract of both varieties showed lower (3.58%) absorbance (µg/ml) compared to standard vitamin C (7.83%). Based on these results, it can be concluded that extracts of two varieties and their different parts contain great amount of such compounds that have antibacterial and antioxidant activity. So, that they can be used for the treatment of several infectious diseases caused by pathogenic bacteria and prevent us from the highly damaging free radicals or reactive oxygen species formed through various metabolic pathways in our body.

## BCA-06

# Comprehensive Analysis of *in vitro* Antioxidant, Anti-inflammatory and Antidiabetic Activities of three different Plants parts from Bangladesh and Screening for their Phytochemical Composition

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**Summary**

**Background:** Different plants parts are used in various ailments in folk medicine. The present study was designed to investigate and compare the antioxidant, antidiabetic, anti-inflammatory, toxic properties and phenolic contents (total phenols, flavonoids, flavonols and proanthrocyanidins) of methanolic extracts from *Syzygium cumini* Bark (SCB), *Bombax ceiba* Fruits (BCF) and *Samanea saman* Flowers (SSF).

**Methods:** The antioxidant activities and phenolic contents of methanolic extractives were evaluated by *in vitro* standard method using spectrophotometer. *In vitro* α-amylase and protein denaturation methods were adapted to analyze the antidiabetic and anti-inflammatory effect of the all plants extract. Preliminary phytochemical compositions were assayed through analytical screening method.

**Results:** Among the extracts, SCB showed the highest antioxidant activity followed by BCF and SSF. In addition, the reducing capacity on ferrous ion was in the following order: SCB > BCF > SSF. The phenolic content of SCB was found to be higher than other extracts. TPC and TFC were found strongly correlated ($P<0.01$) with antioxidant activities of the all plants extracts. In α-amylase inhibition assay SCB extract causes 53.95% inhibition at concentration 1000 µg/mL, which was significantly ($P<0.05$) different from another extracts. In the *in vitro* assay for anti-inflammatory activity test BCF showed highest potency ($P<0.05$) in comparison to all other extracts. Alkaloids, flavonoids, phenols, carbohydrate, resins, saponins, steroids, tannins, anthracenosides and coumerins as phytochemicals were present in the extracts.

**Conclusion:** The present study suggested that all the plants parts effectively ameliorate oxidative stress and thus be useful as pharmaceutical agents in various ailments. The present study also concluded that SCB have α-amylase inhibition and BCF have anti-inflammatory potential to be used as antidiabetic and anti-inflammatory agents.

## BCA-07

# $CaCO_3$Nanoparticles dispersed Poly(lactic acid)/Chitosan Biomaterials for Biomedical Application

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**Abstract**

$CaCO_3$ nanoparticles filled PLA/CS nanocomposites were prepared through a solution casting method. The morphological properties of developed nanocomposites were investigated with scanning electron microscopy (SEM) and found to be extensively transformed with CS and $CaCO_3$ content. Furthermore, Fourier transform infrared spectroscopy (FTIR) revealed that $CaCO_3$ interacted between PLA and CS in the composites. The mechanical properties of nanocomposites in terms of tensile strength and tensile modulus were significantly improved by the addition of $CaCO_3$ into the matrix. The fracture surfaces of composites were also recorded using SEM and it indicated smooth and homogeneous texture throughout the surface for PLA/CS/ $CaCO_3$ nano biomaterials. The authors expected that the developed nanocomposites will enhance important properties and could be more potential for biomedical application.

## BCA-08

# Mechanism of Growth Inhibitory Effect of *Zingiber zerumbet* Extract in Ehrlich Ascites Carcinoma Cell

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**Abstract**

*Zingiber zerumbet*, a member of Zingiberaceae family, is commonly found in Bangladesh, Ceylon, Malay Peninsula, and South East Asia. For centuries, it has been used in traditional medicine systems for the treatment of various ailments. The present study is undertaken to evaluate *in vitro* & *in vivo* antitumor effect of methanolic extract of the *Zingiber zerumbet* rhizome (MEZR) against Ehrlich ascites carcinoma (EAC) in Swiss albino mice. MEZR induced

Ehrlich ascites carcinoma (EAC) cell death in a dose dependent manner (at a range of concentration 15.625-500 µg/ml). EECZ significantly inhibited tumor cell growth rate (69.64%; $p<0.001$), decreases tumor weight (3.28; $p<0.01$), increased life span (53.40%; $p<0.01$) and restored the altered hematological parameters of EAC-bearing mice. MEZR induced nuclear condensation and fragmentation which are notable features of apoptosis as observed by fluorescence microscopy after staining EAC cells with DAPI (4,6-diamidino-2-phenylindole). Interestingly, cell growth inhibition of the MEZR was significantly reduced in the presence of caspase inhibitors. Administration of EECZ increased mRNA expressions of p53 and Bax genes and negative expressions of Bcl-2 and Bcl-X which confirmed the induction of apoptosis by MEZR. MEZR exhibits strong anticancer activity by inducing apoptosis. Thus, *Zingiber zerumbet* rhizome may be considered as a promising resource in cancer chemotherapy.

**Key words:** *Zingiber zerumbet* rhizome, Apoptosis, Gene expression, Caspase inhibitor.

## BCA-09

# Exploring the effects of chronic exposure to arsenic on the methylation status in long interspersed nuclear elements (LINE)-1 in human leukocyte DNA

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**Abstract**

Arsenic poisoning has become a major public health concern in many countries affecting millions of people. Chronic exposure to arsenic is associated with many diseases including cancers .Global genomic DNA hypomethylation is a hallmark of many types of cancers. Growing evidence suggest that hypomethylation in long interspersed nuclear elemen-1 (LINE-1) has potential to act as a molecular marker for detection and prognosis of many cancers. Effect of chronic arsenic exposure on LINE-1 methylation has not yet been widely studied. Therefore, this study was designed to evaluate the association of arsenic exposure with LINE-1methylation recruiting human subjects from arsenic-endemic and non-endemic rural areas in Bangladesh. A total of 236 subjects, 175 from arsenic-endemic and 61 from non-endemic areas in Bangladesh were recruited as study subjects. LINE-1 methylation levels were determined by pyrosequencing. Arsenic concentrations in the drinking water, hair and nails of the study subjects were measured by ICP-MS. In this study, we found that LINE-1 methylation levels were significantly ($p < 0.01$) lower in the individuals of arsenic-endemic areas than those in the individuals of non-endemic areas. Arsenic concentrations in the drinking water, hair and nails of the study subjects showed significant ($r_s$= - 0.216, $p < 0.01$ for water $r_s$= - 0.179, $p < 0.01$ for hair and $r_s$= - 0.247, $p < 0.001$for nail) negative associations with LINE-1 methylation. In multiple regression analyses, arsenic in drinking water, hair and nails but not other relevant variables (age, sex, BMI and smoking habits) showed significant associations with LINE -1 hypomethylation, though sex showed border line of statistical significance. In sex specific analyses, arsenic exposure in females but not males showed significant inverse association with LINE-1 mehyaltion. Finally novel dose-response relationships were observed between water, hair and nail arsenic concentrations with LINE-1 hypomethylation. Thus the LINE-1 methylation observed in this study may be a potential epigenetic mechanism of cancer and other kind of disease.

## BCA-10

# Occurrence of Allergic Dermatitis in relation with *Parthenium hysterophorus L* in Rajshahi City, Bangladesh

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**Abstract**

*Parthenium hysterophorus L* is a type of weed, having so many adverse effects on the environment. It causes allergic dermatitis along with other allergic manifestations to human health. It invaded Rajshahi city several years back and now it was grown abundantly in many areas of the city. This study was designed to find out the relation of the occurrence of allergic dermatitis in human population who are exposed to *Parthenium hysterophorus* in the community.

It was observed that allergic dermatitis was present in 28.57% of the exposed respondents, whereas it was only 12.73% in the unexposed ones and the difference was statistically significant ($X^2$ = 8.2853, df = 1, $p < 0.05$). Allergic dermatitis was reported in 36.67% of the males and 63.33% of the females of the parthenium-infested area, while it was 28.57% in males and 71.43% in females of the parthenium-free area. Comparing allergic dermatitis of the males and females of the two areas, the difference was found to be significant ($X^2$ = 5.3243, df=1, $p<0.05$)amongst the females of exposed (37.25%) and unexposed (17.54%) areas. However, no such significant difference was found amongst the males of exposed and unexposed areas(20.37% and 7.55 % respectively).
**Key words:** Parthenium, allergic dermatitis, Rajshahi

## BCA-11

# Evaluation of Antibacterial Activity and Susceptibility of Multi-antibiotic Resistance from Isolated Cellulolytic Bacteria

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**Abstract**

The rapid increasing emergence of antibiotic resistant bacterial strains causes new infectious diseases and a thread to public health. The resurgence of several infections that appeared to have been controlled and the increase in bacterial resistance have created the necessity for studies directed towards the development of new antimicrobials. In this scenario, the screening method is used for the identification of antimicrobials from cellulolytic bacterial sources (such as snail, termite and drainage waste) is of great importance. The objective of this study was to evaluate

antibiotic sensitivity & resistance by disc diffusion method and to determine antibacterial activity against human pathogenic bacteria. Commonly used thirty one antibiotics were tested against bacteria isolates and found that all isolates showed resistance to chloramphenicol, imipenem, bacitracin, vancomycin, azithromycin whereas sensitive to gentamicin, levofloxacin, ciprofloxacin, norfloxacin, azetreonam through measuring the zone of clearance. The ethyl acetate extract of the isolated strains displayed antibacterial activity that is proved to have the broadest specificity, inhibiting the growth of pathogenic bacteria tested. Isolated bacterial strain from snail and termite displayed a potential activity against *Bacillus subtilis* whereas bacterial strain from drainage waste exhibited its potentiality against *Staphylococcus aureus* among other pathogenic bacteria. All isolates showed MIC>32 µg/ml to amikacin, imipenem. It was investigated from MBC that all isolates were bacteriostatic. The consequences of this investigation suggest that the isolated bacterial strain of snail, termite and drainage waste can be used to discover antibacterial agent for developing new pharmaceuticals to control studied human pathogenic bacteria responsible for severe illness.

**Key words:** Antibacterial activity, antibiotics, disc diffusion MIC, MBC and bacteriostatic

## BCA-12

# Purification and Characterization of a Lectin from *Carissa carandas* Seeds

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**Abstract**

*Carissa carandas* an evergreen deciduous, generally 2-4 m tall shrub of the dogbane family Apocynaceae .In Bengali it is called as Koromcha. The plant is grown from seed sown in August and September. Flowering starts in March and the fruit ripens from July to September. The fruit is a berry, which is formed in clusters of 3-10 fruits, with 5-1 hard angles curving upwards, glabrous with five to seven wings, woody, and fibrous. Every part of *Carissa carandas* used for certain nutritional and medicinal purpose. Besides being a good source of protein, vitamins, oil, fatty acid, micro-macro minerals elements and various phenolics, it is also reported as anti-inflammatory, antimicrobial, antioxidant, anticancer, cardiovascular, hepatoprotective, anti-ulcer, diuretic, antiurolithiatic and anthelmintic. *Carissa carandas* seed lectin (CCSL) is known to have an interesting pharmacological activities and of great interest on biochemical research. In the current research a lectin (CCSL) was purified from *Carissa carandas* seed by using Ion Exchange chromatography, Hydrophobic chromatography and gel filtration chromatography on Sephadex G-50 column. The lectin migrated as a single band on SDS-PAGE with the molecular weight of 35±2kDa. The lectin agglutinated rat red blood cells.

## BCA-13

# Mechanism of Growth Inhibitory Effect of *Zingiber zerumbet* Extract in Ehrlich Ascites Carcinoma Cell

**Hanif Ali, Majidul Islam, Narayan Roy and Tanzima Yeasmin***

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**Abstract**

*Zingiber zerumbet*, a member of Zingiberaceae family, is commonly found in Bangladesh, Ceylon, Malay Peninsula, and South East Asia. For centuries, it has been used in traditional medicine systems for the treatment of various ailments. The present study is undertaken to evaluate *in vitro* & *in vivo* antitumor effect of methanolic extract of the *Zingiber zerumbet* rhizome (MEZR) against Ehrlich ascites carcinoma (EAC) in Swiss albino mice. MEZR induced Ehrlich ascites carcinoma (EAC) cell death in a dose dependent manner (at a range of concentration 15.625-500 µg/ml). EECZ significantly inhibited tumor cell growth rate (69.64%; $p<0.001$), decreases tumor weight (3.28; $p<0.01$), increased life span (53.40%; $p<0.01$) and restored the altered hematological parameters of EAC-bearing mice. MEZR induced nuclear condensation and fragmentation which are notable features of apoptosis as observed by fluorescence microscopy after staining EAC cells with DAPI (4,6-diamidino-2-phenylindole). Interestingly, cell growth inhibition of the MEZR was significantly reduced in the presence of caspase inhibitors. Administration of EECZ increased mRNA expressions of p53 and Bax genes and negative expressions of Bcl-2 and Bcl-X which confirmed the induction of apoptosis by MEZR. MEZR exhibits strong anticancer activity by inducing apoptosis. Thus, *Zingiber zerumbet* rhizome may be considered as a promising resource in cancer chemotherapy.
**Keywords:** *Zingiber zerumbet* rhizome, apoptosis, gene expression and caspase inhibitor

## BCA-14-Poster

# Dad Mardan and Ata Leaves: their Therapeutic Effects against Skin Lesion

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**Abstract**

The normal and healthy skin acts primarily as an organ of protection and maintains the body's homeostasis. Various skin diseases are prevalent in livestock, which may cause a serious loss in skin quality as well as in the production performance. A variety of medicinal preparations from the indigenous herbs and plants are nowadays actively used for therapeutic purpose in Bangladesh. The research work was conducted to investigate the therapeutic effects of indigenous medicinal plants, Dad Mardan (*Cassia alata*) and Ata (*Annona reticulata*) against skin lesion in calves. The protective efficacy was observed by the topical application of the 10% combined ointment (Dad Mardan and

Ata leaves) and 20% Dad Mardan ointment twice daily on nine calves irrespective of sex having skin lesions. From the 2nd treatment (on 3rd day) by the onitments, the healing was remarkable and a significant ($p<0.01$) reduction of lesion area was found in both treatments. Treatment with the combined ointment showed the skin lesions of calves were completely healed up at 21st day of post-treatment whereas calves treated with dadmardan ointment were completely healed up after 24th day of post-treatment with the formation of scar tissue and growth of new of hair around the scar tissue in both treatments and the healing rate was 99.73 % & 99.64 % respectively. The skin lesions of untreated calves were aggravated with time (5.51% lesion area increased at 24th day from the first inspection). The combined ointment showed the more effectiveness (99.73% healing at 21st days) than the dad mardan ointment (93.76% healing at 21st days) against skin lesions. It may be concluded the ointments of Dad Mardan and Ata leaves can be used as alternative drugs for the treatment of skin lesions or skin diseases in animals.

## BCA-15-Poster

# Study of Some Selected Medicinal Plants Used in the Treatment of Dental Caries and Gingivitis in Bangladesh

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**Abstract**

The present study was conducted a survey to document the medicinal plants used for dental caries and gingivitis in Bangladesh. This survey was done on the published documents of journals, thesis, books and internet. This survey found 15 medicinal plants those are very useful for the remedy of dental caries and gingivitis. Plant materials with potential medicinal value are considered as a low-cost alternative medicine for the treatment of dental caries and gingivitis. This survey would contribute to the knowledge on effective medicinal plants and help in exploration of new and novel kinds of bioactive compounds to fight against the dental caries and gingivitis.

## BCA-16-Poster

# Evaluation of the Antioxidant, Anti-Inflammatory and Anticancer Activities of Methanolic Extract of *Trichosanthes dioica*

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**Abstract**

Pointed gourd (*Trichosanthes dioica*) is a common and popular vegetable in our country. This vegetable is locally known as "Patal''. The shoot of pointed gourd (Pataler loti) is also used as a vegetable. The present study was undertaken to evaluate the inherent antioxidant, anti-inflammatory, thrombolytic and antineoplastic potential of methanolic extract of the shoots of *Trichosanthes dioica* (METDS). METDS contained a good amount of phenol, flavonoid, flavonol and proanthocyanidins. The $IC_{50}$ value of the methanol extract in the DPPH, ABTS+, Superoxide, Nitric oxide, Hydroxyl radical scavenging activity and Iron chelating assays were 3.45±4.53, 35.64±3.31, 47.22±2.14, 30.13 ±2.65, 56.18±3.06 and 49.93±2.19 µg/mL, respectively. METDS dose dependently showed a potent anti-inflammatory and anti-arthritic activity. In addition, thrombolytic activity was found to be 28.46±4.16%, 9.67±6.37% and 65.96±4.25% for METDS, normal saline and streptokinase (a positive control) respectively. The METDS showed cytoxicity against brine shrimp nauplii with the $LC_{50}$ value of 11.52 µg/mL. METDS-induced Ehrlich ascites carcinoma (EAC) cell death at a dose dependent manner (at a range of concentration15.625-500 µg/mL). It was found that the crude extract (METDS) at a dose 40.0 mg/kg/day (i.p) significantly decreased tumor weight (5.9 g; $p<0.05$), increased life span (44.35%; $p<0.05$) and reduced tumor cell growth rate (79.05%; $p<0.005$) in comparison to those of EAC bearing mice. METDS also alter the depleted hematological parameters like RBC, WBC, Hb % of EAC bearing mice towards normal. Moreover, fluorescence microscopic view of DAPI (4, 6-diamidino-2-phenylindole) stained EAC cells exhibited that METDS induced apoptosis of cancer cells. Therefore, it can be concluded that the shoots of *Trichosanthes dioica* possess promising antioxidant, anti-inflammatory and EAC cells anti-proliferative properties that may be a potential agent for prevention of inflammation and cancer.

## BCA-17-Poster

# *In Vitro* Evaluation of Plant Extracts on Seed Mycoflora and Seed Germination, Shoot Length and Root Length of *Cicer arietinum*

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**Abstract**

A laboratory experiment was conducted to evaluate the efficacy of plant extracts on seed mycoflora, germination, shoot length and root length of *Cicer arietinum*. The seed treatments reduced seed mycoflora and improved seed germination. In present investigation, four genera of fungi were identified on treated seeds and control by blotter method, such as *Aspergillus* spp., *Fusarium* sp., *Penecillium* spp. and *Curvularia* sp. Analysis of seed mycoflora showed that *Aspergillus* spp. were the most dominant fungi in all cases. Three plant extracts (fresh part of *Zingiber officinale*, *Curcuma longa* and *Allium sativum*) and ten plants leaf powder (*Datura metel*, *Jatopha gossypifolia*, *Azadirechta indica*, *Ocimum sanctum*, *Vinca rosea*, *Adhatoda vasica*, *Curcuma longa Tagetes patula*, *Cassia alata* and *Lantana camera*) showed different levels of antifungal activity in the seed mycoflora of *Cicer arietinum*. *Allium sativum* extract and *Vinca rosea*, *Adhatoda vasica*, *Curcuma longa* and *Lantana camera* leaf powder totally control all associated mycoflora with the seeds of *Cicer arietinum*. Rest of the extracts and plants leaf powder showed promising results against seed mycoflora. Increasing percentage of seed germination was also observed with decreasing of seed borne fungal population due to plant extracts and plants leaf powder. Hundred percent seed germination was recorded with *Allium sativum* extract and *Datura metel*, *Azadirechta indica*, *Ocimum sanctum* and *Lantana camera* leaf powder. The highest shoot and root length range was observed 35-112 & 10-55 mm in *Zingiber officinale* extract and 28-103 & 7-28 mm in *Adhatoda vasica*.

**Key words**: *Cicer arietinum*, Seed mycoflora, Seed treatment and plant extracts

## BCA-18-Poster

# Antifungal Activity of MytiLec-1, an R-type Lectin from the Mussel *Mytilusgalloprovincialis*

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**Abstract**

The recombinant form of MytiLec-1, a 17 kDa R-type lectin from the Mediterranean mussel (Mytilusgalloprovincialis) was purified by affinity chromatography using a melibiose-agarose column. This protein binds to the disaccharide melibiose, Galα (1,6) Glc, and the trisaccharideglobotriose, Galα(1,4)Galβ(1,4)Glc. Globotriose (abbreviated Gb3) is a component of glycosphingolipids that is prevalent on the surface of certain cell

types. MytiLec-1 already showed antibacterial activities against a number of gram positive and gram negative bacteria whereas the antitumor activity of MytiLec-1 against Burkitt's lymphoma cells has also been found. Because of the possibility of the presence of alpha-galactosides in the mesophilic fungal species *Trichodermareesei*, the biological activity of MytiLec-1 against the fungi was checked and 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay showed that MytiLec-1 inhibited the fungal growth (60% at a concentration of 0.5 mg/ml of MytiLec-1). It could also agglutinate the spores of *Trichodermareesei*. The findings were in line as another mussel lectin (CGL) inhibited the germination of spores and hyphal growth in the fungi *Pichiapastoris*. It indicates that mussel lectins like MytiLec-1actively participate in the defense functions of vertebrates and invertebrates where they play an important role in the recognition of foreign particles and gets involved in the innate immune response of mussels.

## BCA-19-Poster

# Antioxidant Properties Determination of Ethanolic Extract of Seaweed *Sargassum bindera* Cultivated in Bangladesh

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**Abstract**

Seaweed has become a very versatile product widely used for food in direct human consumption. Almost everywhere in the world, from ancient times, people have been consuming seaweeds. The Japanese, the Chinese, the Korean and the Filipinos consider seaweed a food of great delicacy and have been using it in their diets for centuries. Seaweeds are often eaten as fresh salads or cooked as vegetables along with rice. It is also used for making fish curry and meat dishes as well as soups. Seaweed has plenty of essential nutrients, especially trace elements and several other bioactive substances. The growth of seaweeds favor in high light and oxygen concentration but in these conditions photo damaging and free radical production may result. Since the seaweeds possess anti-oxidative mechanism and compounds, they protect themselves from stress due to free radical formation and serious photodynamic damage. During the last three decades the antioxidant-based drug formulations for the prevention and treatment of some oxidative stress related diseases have appeared. Reactive oxygen species can generate oxidative stress and play a role in the onset of nearly 150 pathophysiological disorders such as rheumatid arthritis, diabetes mellitus, inflammatory conditions, cancer, heart, genotoxicity diseases, early ageing. Therefore, algal species as alternative materials to extract natural antioxidative compounds have attracted much attention. In this study, seaweed *Sargassum bindera* was extracted by food grade solvent ethanol. Bioactive components like phenolic and flavonoid were determined from *Sargassum bindera* extract. Antioxidant analysis methods like DPPH, ABTS, total antioxidant and ferric reducing power were carried out of this extract. It was found that ethanolic extract of *Sargassum bindera* elicited remarkable total phenolic and flavonoid content, higher percentage scavenging activity of DPPH, ABTS, total antioxidant and ferric reducing power. Therefore we can say the ethanolic extract of seaweed *Sargassum bindera* has better antioxidant activity.

## BCA-20-Poster

# Antifungal Activity of a Lectin Isolated from Tuberous Rhizome of *Kaempferia rotunda*

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**Abstract**

Plant lectins represent a unique group of proteins with potent biological activity. Due to their ability to bind reversibly with specific carbohydrate structures, lectins have commonly been used as molecular tools in several applications of biology and medicine. The *Kaempferia rotunda* linn. has been used as food and traditional medicinal plant in Bangladesh. Recently, a methyl-α-D-mannopyronoside specific lectin (KRL) has been purified from *K. rotunda* Linn. tuberous rhizome with the molecular weight of 29±1.0 kDa. The lectin showed potent antitumor and antibacterial activities. In the present research work we have isolated another lectin with molecular weight of 21±1.0 from the tuberous rhizome of the *Kaempferia rotunda* Linn. by several chromatographic techniques. The lectin agglutinated mice and human erythrocytes. The lectin showed its optimum activity at slightly basic pH and was thermostable. The lectin showed antifungal activity against *Trichoderma* sp. as tested by MTT colorimetric assay using RPMI-1640 media. The growth inhibition was found in the range of 20–60% at low to high protein concentration. The lectin did not agglutinate *Tricodarma sp* upto 200μg/ml protein concentration.

## BCA-21-Poster

# Antifungal Activity of a Lectin Isolated from Mulberry Seed

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**Abstract**

Lectins are a class of proteins that bind with sugar specifically and reversibly and that agglutinate cells, are widely distributed in nature, being found in animals, insects, plants and microorganisms. Plant lectins have a broad range of biological implication. Mulberry is the only food and nutritional source for *Bombyx mori* L. It is the host plant of silkworm which produces silk. Mulberry seeds has lot of medicinal values so it is used as conventional therapeutic plant throughout Southeast Asia especially in Bangladesh. It was brought from the Sericulture Research and Training Institute, Rajshahi, Bangladesh. In this research sword bean lectin specific mulberry seed lectin (designated as MSL) has been purified from mulberry seed by affinity chromatographic techniques and characterized. Mulberry

seed lectin agglutinated with mice erythrocytes. The minimum concentration was found to be 3.5 µg/ml in mice erythrocytes. The pH dependence of MSL was showed the maximun activity at acidic pH and it was found to be active between the temperature ranges from 20 to 60ºC. MSL showed antifungal activity against *Trichoderma* sp. as tested by MTT colorimetric assay using RPMI-1640 media. The growth inhibition was found 78% to 2.6% at high to low protein concentration, respectively and did not show any fungal agglutination activity.

## BCA-22-Poster

# Development and Validation of Microbial Bioassay for the Quantification of Marketed Chloramphenicol Eye Drops

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**Abstract**

The purpose of this study was to develop a simple, sensitive, accurate and cost-effective ager disc diffusion method for estimation of potency of marketed 0.5% chloramphenicol eye drop samples using *E.Coli* DH5α as a test organism which has not yet been reported in any pharmacopeia. Athin layer chromatography (TLC) method was also performed to measure the chloramphenicol content by separation of the active fractions in TLC followed by UV-spectrophotometer. Statistically mean potency values for chloramphenicol eye dropsby the bioassay and TLC method was estimated to be 98.6±0.9% and 91.35±0.71, respectively. A linearity value ($r^2$= 0.9855), precisionwith relative standard deviationand accuracy showed the validity of this bioassay method. The specificity of the bioassay was checked by determining the potency of degraded (under sunlight-induced and heat-degraded conditions) chloramphenicol solutions. Both these methods were correlated with high performance liquid chromatography (HPLC) using the same sample and the estimated potency was99.6±0.15%. Results show that the microbial bioassay is an appropriate method to estimate the potency of chloramphenicol eye drops.

## BCA-23-Poster

# Combined Effects of Arsenic and Lead on Blood Biomarkers of Liver Functions in $F_0$ and $F_1$ Mice

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**Abstract**

Arsenic (As) toxicity has caused an environmental tragedy affecting millions of people in the world. Along this line of metal toxicity, co-exposure of lead (Pb) could aggravate the situation in the host. Little is known about the effects of arsenic and lead on the children's health. Therefore, this animal study was designed to investigate the combined effects of arsenic and lead on blood biomarkers of liver functions in $F_0$ and $F_1$ mice. Swiss albino male $F_0$ and $F_1$ mice were divided into four groups: a) control, b) arsenic-treated, c) lead-treated and d) arsenic plus lead treated. $F_0$ and $F_1$ mice were exposed to sodium arsenite and lead acetate (10 mg/kg body weight/day) individually and in combination of both metals for 60 days through drinking water. In this study, we analyzed blood serum for liver dysfunctions both in $F_0$ and $F_1$ mice. The results showed a significant ($p$<0.05) changes in the activities of ALT, ALP, BChE in arsenic and lead exposed $F_0$ mice whereas activities of ALT, ALP, AST, BChE were significantly ($p$<0.05) changed in all metal treated groups in $F_1$ mice compared to control mice. Result also showed that lead treatment causes a significant ($p$<0.05) increase in the activities of ALT, ALP and AST, but arsenic causes significant ($p$<0.05) elevation only in ALT activity in $F_1$ mice compared to $F_0$ mice. Taken together, all results showed that combined effects of arsenic and lead on liver are relatively less severe than arsenic and lead alone exposure both in $F_0$ and $F_1$ mice. Therefore, it may be possible that one metal blocks the intestinal absorption to accumulate thereby limits the distribution of the toxicant in blood. However, more study is needed in future to clarify the antagonistic effects of these two metals. Finally, results of this study strongly suggest that $F_1$ mice are more vulnerable to liver intoxication caused by arsenic and lead alone exposure than $F_0$ mice.

## BCA-24-Poster

# Studies on Bioactive Constituents from Isolated Cellulytic Bacteria

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**Abstract**

Two cellulytic bacterial strains $S_1$ and $S_2$ were isolated from food waste. These were then purified and their cellulytic activities were confirmed by filter paper degradation method, Congo red with carboxymethyl cellulose (CMC) media and gram's iodine test. These bacterial strains ($S_1$ and $S_2$) were identified as *Bacillus subtilis* strain

ATCC 19217 and *Klebsiella pneumoniae* strain ZJ-02, respectively based on molecular identification by 16S rDNA sequencing. The cellulase activity in each strain was measured by DNS method. Cellulase activity of $S_1$ and $S_2$ strains were determined as 0.333μmolml$^{-1}$min$^{-1}$ and 0.166 μmolml$^{-1}$min$^{-1}$ for $S_1$ and $S_2$ strain, respectively. Five antibiotics Ampicillin, Neomycin, Cephalosporin, Doxycycline and Erythromycin were used for antibiotic resistance and sensitivity test. $S_1$ strain showed drug resistance to Ampicillin and Erythromycin and sensitive to Neomycin, Cephalosporin and Doxycicline. $S_2$ strain was sensitive to all of the five antibiotics. Ethyl acetate extract of $S_2$ strain also showed antibacterial activity against some gram-positive and gram-negative pathogenic bacteria. The MIC values of the ethyl acetate extract of S2 were between 32-64μg/ml. The MBC value of the ethyl acetate extract of $S_2$ were between 64-128μg/ml. Higher MBC value than that of MIC indicates the ethyl acetate extracted compound from $S_2$ strain is bacteriostatic. The $LC_{50}$ value of the ethyl acetate extract of $S_2$ strain was 50.486 μg/ml indicating moderate cytotoxic effect measured by brine shrimp lethality test. The metabolites present in the active ethyl acetate extracts were profile using GC- MS, and the most prevalent metabolites present in the ethyl acetate extracts were identified as potential new sources of 1,2-benzenedicarboxylicacid, Pyrrolo [1,2-a] pyrazine-1,4-dione, 3,6-Diisobutyl 2,5piperazinedione, trimethylsilyl 3,5-dimethoxy-4-(trimethylsilyloxy) benzoate, 3H-cycloocta[c]pyran-3-one and phthalic acid.

## BCA-25-Poster

# Occurrence and Association of Arbuscular Mycorrhizal Fungi in Plants of Rajshahi University Campus

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**Abstract**

A mycorrhiza is a mutualistic symbiosis between fungi and roots of plant in which fungus provide essential nutrients to the plant whereas plant provide carbon sources for fungi.To identify mycorrhizal occurrence and association among different plants in Rajshahi university campus, 34 plants roots samples were processed , bleached and stained with trypan blue. Mycorrizal association were observed in 30 plant roots. Percentage of root colonization were varied from 10-90% belongs to the Euphorbiaceae, Solanaceae, Malvaceae,Crucifereae, Cucurbitaceae, Myrtaceae, Gramineae, Moraceae, Lamiaceae ,Asteraceae family etc. *Codiaeum variegatum* of Euphorbiceae family showed the highest intensity and percentage of colonization. The frequency of mycorrhizal infection were significantly correlated with soil pH, moisture, water holding capacity, texture, total nitrogen, organic, calcium, magnesium, potassium etc. Especially phosphorus and nitrogen in the soil greatly influenced the plant root infection by AM. Vesicular arbuscular mycorrhizal spores were extracted from rizhosphere soils using sucrosedensity gradient centrifugation, wet sieving method which were grown on TDA and PDA media. Mycorrhizal endophyte fungi were cultured and identified as namely *Aspergillus niger*, *Penicillium sp* etc. This investigation indicated that *Codiaeum variegatum* could be considered as the initial natural source of AM and used as the stock plant to provide inoculum of AM for biofertilizer.

# BCA-26-Poster

# Effect of *Musa Sapientum* Extractives on Nine Industrial Isolates

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**Abstract**

The Petroleum ether(PetE), $CHCl_3$ and $CH_3OH$ extracts of *Musa sapientum* (leaf, stem and root) were tested against 9bacterial isolates *Bacillus cereus, Klebsiella oxytoca, Staphylococcus aureus, Escherichia coli* (I), *Escherichia coli* (II), *Citrobacter freundii, Proteus vulgaris, Bacillus subtilis, Salmonella typhimurium* along with a standard antibiotic, Kanamycin 30µg $disc^{-1}$. Among the 9 Isolates *B. subtilis* was responsive to the PetE and $CHCl_3$ extracts of *Mu. sapientum* root (10 and 10mm) respectively; to the PetE extracts of stem (10mm). Next to *B. subtilis* it was *K. oxytoca* responsive to the Pet.E. extract of leaf (15mm) and root (10mm); followed by *B. cereus* which was responsive to the PetE extract of stem (8mm) and root (10mm); and this was followed by *St. aureus*, which was responsive to the PetE extracts of root (08mm); followed by *C. freundii* where PetE extract of leaf (10mm) were found responsive. For Kanamycin 30µg $disc^{-1}$ the inhibition zones for the Isolate 1, 2, 3, 4, 5, 6, 7, 8 and 9 were 50, 35, 35, 40, 36, 42, 42, 55 and 40mm respectively.

However, the activities of PetE, $CHCl_3$ and $CH_3OH$ extracts of *Mu. sapientum* (leaf, stem and root) were mild in activity in comparison to the standard antibiotic, and *P. vulgaris, S. typhimurium*, both *E. coli* and *C. freundii* didn't give any considerable clear zone. Thus, it could be mentioned that *M. sapientum* plant materials are not so much effective against the biodegrading bacteria and obviously they are helpful in biodegradation of industrial effluents causing very insignificant harm to biodegrading bacteria.

# Environmental Pollution and Climate Change

## EPC-01 (Key Note Paper)

## Impact of Climate Change on Horticulture

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**Abstract**

Climate change is the furthermost concern of mankind in the present era. It increases the green house gases like carbon dioxide, nitrous oxide, ozone and methane which may cause impact in terms of increased temperature, more demand for water and increase in biotic and abiotic stresses. The established marketable and profitable varieties of horticultural crops will perform disappointingly in an erratic manner due to deviation of climate. Due to high temperature physiological disorder of horticultural crops is becoming more obvious *eg*. Spongy tissue of mango, fruit cracking of litchi, flower and fruit abscission in solanaceous fruit vegetables, etc. The global warming has caused loss of vigour, fruit bearing ability, reduction in size of fruits, less juice content, poor colour, reduced shelf life and escalating attack of pests consequential low production and quality of apples. Heat stroke causes leaf scorching and twig dying symptoms in bearing and non-bearing mango plants. Air pollution considerably reduced the yield of several horticultural crops and increases the intensity of certain physiological disorder like black tip of mango. Fruit fly in guava is becoming more severe due to hot and humid conditions. Melting of ice in the temperate regions is plummeting chilling effect necessary for the flowering of many of the horticultural crops like Apple, Cole crops, Saffron, Rhododendron, Orchid, *etc*. Unusual high temperature during winter cause poor flowering, irregularity in flowering duration, pattern of flowering and poor yield in horticultural crops due to non-availability of sufficient chilling hours during winter months. To maintain the productivity, amendment of present horticultural practices and greater use of greenhouse technology are some of the solutions to lessen the effect of climate change. Development of new cultivars of horticultural crops tolerant to high and low temperature, resistant to pests and diseases, short duration and producing good yield under stress conditions will be the main strategies to meet this challenge. The most effective way is adoption of hi–tech horticulture and judicious management of natural resources conservation agriculture, using renewable energy, forest and water conservation, reforestation etc.

**Key words**: Climate change, horticultural crops, yield and productivity

## EPC-02

# Arsenic Accumulation into Different Varieties of Rice (*Oryza sative* L) Cultivated with Arsenic Contaminated STW Water

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**Abstract**

Rice was grown in an open-field Gangetic soil conditions with arsenic contaminated STW irrigation water in experimental plots at Mandal para village of Shahbajpur union under Shibganj upazila of Chapai Nawabganj district in Bangladesh to see the effect of arsenic (As) on rice (*Oryza sativa* L.) and to observe the effect of arsenic contaminated pump distance and paddy field elevation on arsenic accumulation into HYV Boro rice in dry period and local Aman rice in rainy season. A popular HYV Boro rice variety named BRRI dhan-36 and local rice variety named Somsi were cultivated with 0.5 mg/L arsenic contaminated STW ground water in an actual paddy field situation during Boro season. Distance of the experimental plots were 10, 50,100, 200, 300 ft from the irrigation pump. Elevation of the experimental plots were 65.54 ± 0.09, 65.38 ± 0.08, 65.15 ± 0.13, 64.95 ± 0.09, 64.47 ± 0.14 ft from mean sea level. Local Aman rice variety named Mowka and Shorna were cultivated in the same experimental plots during Aman (rainy) season. Arsenic accumulation in drainage sediments, paddy field soil, rice straw and grain were decreased significantly ($p < 0.01$) with increasing of pump distance from paddy field during dry season for Boro cultivation period. Arsenic accumulation in paddy soil, rice straw and grain had significant ($p<0.01$) negative correlation with paddy field elevation from mean sea level during Aman (rainy) season. Arsenic accumulation in rice straw during Boro and Aman season ranged from 2.58 ± 0.01 to 2.75 ± 0.02 mg/kg and 1.51 ± 0.04 to 1.76 ± 0.01 mg/kg, respectively. Arsenic accumulation in rice grain during Boro and Aman season ranged from 0.76 ± 0.02 to 0.97 ± 0.01 mg/kg and 0.10 ± 0.01 to 0.07 ± 0.01 mg/kg, respectively. Dry season rice varieties accumulated more arsenic than rainy season rice varieties. HYV rice varieties accumulated more arsenic than local rice. Highest arsenic accumulation in rice grain was 0.97 ± 0.01 mg/kg, but not exceeded the WHO recommended permissible limit 1 mg/kg.

## EPC-03

# Exploring the Association of Arsenic Exposure with Circulating Eosinophil Chemoattractant Protein (eotaxin): A Cross Sectional Study in Bangladesh

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**Abstract**

Arsenic is a potent environmental pollutant. Arsenic poisoning has caused an environmental tragedy affecting millions of people in the different parts of the world especially in Bangladesh. Arsenic exposure is associated with several chronic inflammatory diseases including asthma. Eosinophil chemoattractant protein (eotaxin) is an immunoregulatory and inflammatory cytokine that mediates asthma. However, effect of arsenic exposure on eotaxin has not yet been explored. This study for the first time demonstrated the associations of arsenic exposure with serum eotaxin levels by recruiting human individuals from arsenic-endemic (n=135) and non-endemic (n=65) areas in Bangladesh. Arsenic exposure levels of the study individuals were determined by measuring the arsenic concentrations in drinking water, hair and nails through Inductively Coupled Plasma Mass Spectroscopy (ICP-MS). Serum eotaxin levels were quantified using immunoassay kit through micro plate reader. Serum eotaxin levels in arsenic-endemic individuals were significantly ($p < 0.001$) higher than those in non-endemic study individuals. Arsenic exposure levels of the study individuals showed significant positive associations ($r_s = 0.410$, $p < 0.001$ for water arsenic; $r_s = 0.358$, $p < 0.001$ for hair arsenic and $r_s = 0.381$, $p < 0.001$ for nail arsenic) with serum eotaxin levels. In multiple regression analyses, each of the arsenic exposure metrics (drinking water, hair and nail arsenic ) but not other variables (age, sex, BMI and smoking) were found to be a significant contributor for the elevation of serum eotaxin levels. Thus the elevated levels of serum eotaxin in arsenic-endemic individuals may be implicated in the pathogenesis of arsenic-induced asthma and other inflammatory diseases.

## EPC-04

# Heavy Metal and Mineral Composition in Different Body Parts of Freshwater Crab (*Paratelphusa lamellifrons)* From Padma River

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**Abstract**

Crabs play a significant role in the fishery wealth of many nations. Bangladesh has got diverse freshwater habitat and ecosystem where crabs are found in almost aquatic ecosystem and also exportable fishery items and hidden resources of Bangladesh. In the present study the mineral and heavy metal composition of the freshwater crab *Paratelphusa lamellifrons* of the river Padma of Rajshahi district of Bangladesh were investigated using instrumental technique. Mineral components like K, Ca, Fe, Cu and P among the different body parts of the collected freshwater crab were observed in the ranges of (1037.03-1192.79) mg/kg, (5385.87-5640.81) mg/kg, (423.22-487.03) mg/kg, (6.63-64.78) mg/kg, (6539.21-7729.15) mg/kg and heavy metal Pb (144.29-242.56) mg/kg respectively. Among the tested minerals Phosphorous was observed as the dominant and copper as the least mineral matter among all the body parts of crab followed by calcium (Ca) potassium (K) and Iron (Fe). The levels of phosphorus, calcium potassium, iron and copper were found to be higher in Cephalothorax compared to cheliped and legs. Same trend were observed in the case of heavy metal (Pb) where, cephalothorax content highest amount lead (242.56 mg/kg) and the lowest in legs (144.29 mg/kg). Minerals were present in the different body parts of the crab following the similar trend for all the mineral matter and heavy metal as cephalothorax > cheliped > legs. The present study revealed the presence of significant amount of essential mineral components in all the body parts of the crab and the investigated crab *Paratelphusa lamellifrons* may be useful as a potential indicator of metal pollution of the river Padma.

**Key words:** *Paratelphusa lamellifrons,* Freshwater Crab, Heavy metal, Mineral Composition, Padma River, Different body parts.

## EPC-05

# Arsenic Contamination in Drinking Water and Skin Manifestations in Eruain Village of Laksham Upazila in Bangladesh

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## Abstract

A community-based, statistical study on arsenic contamination tube-well was conducted in Eruain village of Laksham upazila of Bangladesh. That was highly contaminated with arsenic in the ground. It is a big village, but we have selected only 113 houses of 15 Bari for our study. The people of these houses were of middle and low class in the society. There was 571 respondents in these houses, among them 243 (42.6%) arsenic affected people were found. Within these arsenic affected people 61.4% female and 38.6% male patients were found. In 78.3% married people, 48.9% female and 29.3% male; and 7.6% female and 9.2% male were in 16.8% unmarried personals. We have studied 48 tube-wells, which were used by the arsenic affected people. Among them only one tube-well was in zero level, two up to 50 ppb, 33 found in 201-300 ppb and the highest was 401-500 ppb As found in two tube-wells. It was known that a level of 0.01 mg/L (10 ppb) As poses a risk of 6 in 10000 chance of lifetime skin cancer risk. Only two months they can harvest and drink rain water in a year.

**Key words**: Arsenic contamination, Tube-well water, Drinking water, Affected people, Lifetime risk of skin cancer.

## EPC-06

# Middle Pleistocene Vertebrate Fossil Records and Paleoenvironments In the Western Barind Tract, NW Bangladesh

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### Abstract

The generally warm and humid climate of Bangladesh is not suitable for good preservation of fossil. As a matter of fact, it is very difficult to find vertebrate fossils particularly in older deposits other than Holocene. Some bones of elephant, cow and buffalo are reported only in the Holocene deposits in some parts of Bangladesh. Two pieces of vertebrate fossils were recorded in Middle Pleistocene deposits at depth of 9m in a stream cut section at Babudanga (24°34′48″N latitude, 88°20′60″E longitude), in the western Barind Tract, NW Bangladesh. The fossil site is a relatively higher land mass of the Barind Tract- about 35m AMSL comprising highly dissected undulating to rolling Pleistocene terraces. These fossils are recognized as a molar tooth of Bovid and part of antler of Antelope. These are the first vertebrate fossil records in the Pleistocene deposits in Bangladesh. These fossils were embedded in

pedogenic soil carbonate nodule rich paleosol horizon. It is well known that secondary soil carbonate can only be formed in soil when the average rainfall never exceeds 750 mm/year. Comparing the present rainfall rate (i.e., >1500mm/year), no doubt climate was extremely drier during the soil formation that favoured fossilization process and good preservation of fossils in sediment. Both $\delta^{13}C$ (average value +1.23‰) and $\delta^{18}O$ (average value -4.03‰) records of soil carbonates also support the prevalence of drier climatic conditions during the development of the paleosols horizons and fossil preservation. Besides, Paleovegetations calculated from the $\delta^{13}C$ value indicate that the C4 types of plant (i.e., xerophytes, herbs and shrubs) were dominated by some ~ 90%. Several pedogenic and biogenic features, stable carbon and oxygen isotopic compositions, calculated paleovegetations along with vertebrate fossil evidences prove that the paleo landscape seems to be savanna type that prevailed during one of the glacial period in middle Pleistocene in the Barind Tract, NW Bangladesh.

## EPC-07

# Water Quality Evaluation in Terms of Water Quality Index and Statistical Approach around the Maddhapara Granite Mine Industrial Area, Dinajpur, Bangladesh

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**Abstract**

An assessment of the water quality around the Maddhapara Granite Mine area of Dinajpur in north western part of Bangladesh is conducted in order to evaluate the influences mining activities on water quality. Therefore, 31 samples from both surface and groundwater during rainy and dry seasons were collected from this area to assess their hydrochemistry in order to evaluate the suitability of water for drinking purposes as well as to identify the potential sources of contamination. Water samples were analyzed in laboratory of Barapukuria Thermal Power Plant in order to determine 24 parameters such as pH, Electrical Conductivity, TDS, TH, $Ca^{2+}$, $Mg^{2+}$, $K^{+}$, $Cd^{2+}$, $Cr^{3+}$, $Cl^{-}$, $SO_4^{2-}$, $PO_4^{3-}$, $NH_4^{+}$, $NO_3^{-}$, $HCO_3^{-}$ etc. using standard methods. The hydrochemical analysis of the water samples shows that there are wide variations of pH, Sp. EC, turbidity, total alkalinity, total hardness, Iron, Sodium, Chloride, Cadmium and soluble silica have found in the amount beyond the acceptable limit for drinking water. Multivariate statistical methods were adopted for determining the water quality and their sources of contamination. Cluster analysis groups the water samples into three main groups where cluster I includes 70.97% of water samples, cluster II and cluster III includes 22.58% and 6.45% of the water samples respectively. Principal components analysis shows 75.89% of the total variance considering five factors. The plot of the principal components suggests that the variation of water quality is mainly due to the mining activities and anthropogenic sources. Water quality indices (WQI) based on 12 parameters suggests that water samples are in excellent to good quality water types for drinking and domestic purposes. A combination of the WQI and cluster analysis suggests that water quality is excellent in cluster I and tends to be good towards cluster III.

## EPC-08

# Arsenic Exposure-related Elevation of Serum Matrix Metalloproteinase-2 and -9 Levels and their Associations with Circulating Markers of Cardiovascular Diseases

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**Abstract**

Arsenic is a potent environmental pollutant. Arsenic poisoning has caused an environmental tragedy affecting millions of people in different parts of the world. Cancer and cardiovascular diseases (CVDs) are the major causes of arsenic exposure-related morbidity and mortality.However, underlying mechanism of arsenic-induced CVDs and cancer has not yet been documented clearly. Matrix metalloproteinase-2 (MMP-2) and -9 (MMP-9) are deeply implicated in the pathogenesis of cancer and CVDs. The effect of arsenic exposure on MMPs is not conclusive. Therefore, this study was designed to evaluate the associations of arsenic exposure with serum MMP-2 and MMP-9 levels especially in relation to circulating biomarkers associated with CVDs. A total of 373 human subjects, 265 from arsenic-endemic and 108 from non-endemic areas in rural Bangladesh were recruited for this study. Arsenic exposure (water, hair and nail arsenic) of the study individuals were measured by inductively coupled plasma mass spectroscopy (ICP-MS), and serum MMP-2 and MMP-9 levels were quantified by commercially available immunoassay kit. MMP-2 and MMP-9 levels in arsenic-endemic population were significantly ($p< 0.001$) higher than those in non-endemic population. Both MMP levels showed significant positive interactions with water, hair and nail arsenic concentrations. MMP-2 levels were 1.02, 1.03 and 1.05 times, and MMP-9 levels were 1.03, 1.06 and 1.07 times greater for 1 unit increase in log-transformed water, hair and nail arsenic concentrations, respectively. Further both MMPs were found to be increased dose-dependently when the study subjects were split into three groups (≤ 10 μg/L, 10.1-50 μg/L and > 50 μg/L) based on the regulatory upper limit of water arsenic concentration set by World Health Organization (WHO) and Bangladesh Government. MMPs were also found to be significantly ($p < 0.05$) associated with each other. Finally, serum MMP-2 and MMP-9 levels showed differential correlations with several circulating markers related to CVDs. Taken together the results of this study suggest that arsenic exposure to arsenic increases the serum MMP-2 and MMP-9 levels that may be implicated in arsenic-induced CVDs.

## EPC-09

# Dose- and Sex-dependent Prevalence of Hyperglycemia in Chronic Arsenic-exposed Individuals in Bangladesh

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**Abstract**

Arsenic toxicity and diabetes mellitus (DM) are both emerging public health concern worldwide. Epidemiological results indicate that the diabetogenic role of arsenic is still controversial. We investigated the dose-dependent effect of chronic exposure to arsenic on hyperglycemia. A total of 434 human subjects, 316 from arsenic-endemic and 118 from non-endemic areas in Bangladesh were recruited for this study. Arsenic concentrations in water, hair and nails were measured by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS). Oral glucose tolerance test (OGTT) was performed to determine hyperglycemia. Prevalence of hyperglycemia, included impaired glucose tolerance (IGT) and DM were significantly ($p < 0.001$) higher in arsenic-endemic areas than those in non-endemic area. Multivariable-adjusted risk of hyperglycemia were significantly higher in medium and high arsenic exposure group (OR = 2.80, 95% CI 1.32 - 5.95 and $p < 0.01$ for medium and OR = 3.73, 95% CI 1.78 - 7.81 and $p < 0.001$ for high group of water arsenic; OR = 2.59, 95% CI 1.22 - 5.34 and $p < 0.05$ for medium and OR = 3.89, 95% CI 1.86 - 8.14 and $p < 0.001$ for high group of hair arsenic; OR = 3.13, 95% CI 1.46 - 6.71 and $p < 0.01$ for medium and OR = 3.29, 95% CI 1.58 - 6.87 and $p < 0.01$ for high group of nail arsenic) compared to low arsenic gradient group. Female showed more pronounced and precise nature of dose-response relationship between arsenic exposure and risk of hyperglycemia than males. The risk of hyperglycemia were higher in the study subjects with low to moderate (50.01-150 μg/L) and high levels (> 150 μg/L) of water arsenic than the study subjects with drinking water arsenic levels set by WHO (≤ 10 μg/L). Thus the results suggested that exposure to high, and low to moderate levels of arsenic in drinking water were associated with increased risk of hyperglycemia, and the hyperglycemic effects of arsenic was more pronounced in females than males.

## EPC-10

# Potable Drinking Water Insecurity in South-West Coastal Bangladesh: Prominence of Pond Users in Shyamnagar Upazila, Satkhira District, Bangladesh

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**Abstract**

The South-Western coastal region of Bangladesh has been categorized by climate-induced, hazard prone, heard-to-reach, lower income level people's inhabitant who are facing extreme drinking water crisis over the years. Households are mainly dependent on rainwater collection and rain-fed pond with pond sand filters for drinking purposes due to high salinity in both surface and ground water. This research explored the scenario of pond water use as a drinking water source at Shyamnagarupazila, Satkhira district. A questionnaire survey was conducted to the pond users to know the causes of pond water use, satisfaction and public health status. The results showed that frequently occurring natural disasters, lack of maintenance and repairing facilities after being damaged restricted the use of Pond Sand Filters (PSFs) while time and distance difficulties were greatly present for these scattered community based water supply systems. Hence, people generally used and were also being forced to use direct pond water in the dry season when rainwater was unavailable. To analyzed water quality, 12 ponds water were collected in the dry season. The results revealed that pond water turbidity (up to 134 NTU) and salinity (up to 4.2 ppt) highly exceed the standard limit. But the main concern was higher microbial concentration (both Fecal Coliform and Total Coliform) that led to different water-borne diseases among the pond users particularly children and majorities were dissatisfied with existing systems. The results led to a recommendation that along with existing systems, there require to develop a dependable water supply option to secure these communities by ensuring safe drinking water access in the context of climatic, geographical and socio-economic difficulties of South-West coastal Bangladesh.

**Key words:** Drinking water, Insecurity, Pond water, Health risk, Shyamnagar, Coastal Bangladesh.

## EPC-11

# Governing the Metallic Dust Meant for Defending Environmental Pollution and Worker's Wellbeing through Industrial Ventilation System and Techniques in a Metal Industry

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**Abstract**

Industrial ventilation system is used to throughout the ventilation flow, controlling temperature and humidity, removes toxic air from the workplace and naturally to control occupational and environment health hazards. This system is capable of controlling exposures to the workers. Because workers can be affected by cancer, lung disease, pneumoconiosis, and effect on the skin. From a metal industry, the environment can be polluted by cadmium (Cd), nickel (Ni), iron (Fe) andcobalt (Co). When this dust is exist to the industrial area from the heavy machineries, anyone can get exposed to it and inhale it. Toxic metal dust affects the blood, kidneys and nervous system. Duct and Air Filtration system is used in an industry to reduce dust or polluted air from the working zone. This dust absorbs to the atmosphere and after that this is deposited to the soil, water and vegetation depending on their density. So, surrounding area can be polluted normally by the metallic dust.

**Key words:** Industrial area, Ventilation system, Environment pollution, Local exhaust ventilation, Air filtration system, Duct system, Dust collector.

## EPC-12

# Assessment of Irrigation Water Quality using Several Indices and Statistical Approaches in Central Bangladesh

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**Abstract**

Sustainable groundwater quality has become a major concern in Bangladesh. This paper explores groundwater quality in the Faridpur district of central Bangladesh for irrigation uses based on preselected 60 samples. Several indices and a number of statistical approaches such as multiple regression, correlations and geostatistics were applied to assess the groundwater quality in term of irrigation purposes. The Ca-Mg-$HCO_3$ water type is the main geochemical facies in groundwater as represented by Piper diagram. Based on IWQ index; 68.33% of the samples (41 locations) belong to high suitability water type, whereas 30% (18 locations) samples exhibit low suitability type for irrigation purposes in the study area. Results of the EC, sodium adsorption ratio (SAR), magnesium hazard (MH), and Kelley's ratio (KR) values reveal that the general groundwater quality belongs to fairly good and mostly suitable for irrigation purposes. A correlation matrix was used to assess the possible inter-elemental relationships among irrigation indices parameters. Multiple regression model was developed for prediction of each irrigation indices of groundwater samples. The results of semivariagram model showed that most irrigation indices have weakly spatial dependence demonstrating agricultural and residential influences. Correlation and multiple regression models results also support the outcomes of parameters for the spatial distribution of irrigation water indices. It is hoped that this paper helps for water planners for taking adaptive measures for irrigation water quality management in central Bangladesh.

## EPC-13

# Impact of Environmental Degradation on Tribal Traditional Food System

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**Abstract**

The term "Tribal traditional food system" means food system of those food items which are available in local natural resources and culturally acceptable as edible in tribal community for consumption. It also includes the sense of socio-cultural factors, acquisitions and processing of food, composition and nutritional consequences for the tribal people using the food. Depletion of natural resources by degrading environment has a significant effect on the traditional tribal food systems. This study identified that, 80% indigenous fruit plants have disappeared over last 50 years that were collected from nature and consumed by the tribal people. In our study, we also found that, the tribal people of the plain land used to collect 48 types of edible weeds previously. Among the foods they used to collect from the nature 17 are leafy variety, 3 flower variety, 5 whole plants, 3 herbs and 12 are tuber food. But now they can only managed 22 types edible weeds food items. In the study area, 90.98% tribal people opine that the environment is degrading due to anthropogenic activities. As a result, the natural food items used to available earlier are not available in their surrounding nature at present. That forced tribal people to change their traditional food pattern. In the study area, rice is main food of all types of tribal people. Some households use bread for breakfast. 79.17% tribal families have three meals in a day and 20.83% HHs have at least one meal daily. Tribal families take fish 66.66 % and pulse 62.50% once in a week. For protein only 37.5% HHs take chicken at least once per month and 54.17% HHs take chicken occasionally or in festivals. It is important to understand the change in their food system as well as the nutrition intake tribal people are getting. To understand how anthropogenic activities hampering their nature based diet there should be more study in this field.

**Key words:** Tribal food system, anthropogenic activity, environment degradation, natural food resources.

## EPC-14

# Slope Stability Problems at Different Locations in Cox's Bazar District of Bangladesh

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**Abstract**

Slope instability in the Cox's Bazar Districtsis believed to be produced by heavy monsoon rainfall, which solely as the consequences of excessive hill cutting for urbanization and deforestation in the area, causing fatal accident including the loss of lives and property loss. In this paper, we present the main causes for landslide determine the engineering and geological properties of the in situ soil samples. The analyzed slopes are consisting of different types of formations with steep slope angles (52-84°). Soil samples in the cliffs on the Cox's Bazar-Teknaf road section is very hard and compact. Field investigation evident that slope failure in this area is solely caused by weathering processes of barren slopes. Most of the slopes of the study area are deforested or steep sloped by some greedy local people. The laboratory analyses show that soils having medium cohesion (0.76-4.4KPa) and Young modulus (7.6-142KPa). A wide range of internal angle of friction (50.32-73.85) also measured, however it reduces at wet condition. The numerical modeling using both limit equilibrium (SLIDE6.0®) and finite element method (PHASE2®) shows that the analyses slopes are relatively stable (Factor of Safety and Shear Reduction Factor is more than 1) at dry condition. However, in the wet condition most of the slopes are vulnerable for landslide due to lowering the values of soil properties (e.g., cohesion, Young modulus, internal angle of friction). We have suggested different remedial measure, includingBioengineering (Plantation of tap root trees) saving the people from fetal accidents and injury that occurred in the recent years.

**Key words**: Slope stability, Soil sample, Rainfall, Cox's Bazar, Bioengineering

## EPC-15

# Corruption in Disaster Management Efforts in Bangladesh

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**Abstract**

Bangladesh is highly vulnerable to natural disaster. Natural disasters include greater scarcity of water for agriculture production during the dry season, greater river bank erosion, more frequent and severe floods and cyclones, and high level of soil salinity in the coastal areas. These natural disasters particularly threaten the lives and properties of the people lives in low lying coastal areas in Bangladesh. However, in the areas after being hit by a natural disaster, the affected people immediately expect some instant help from their relatives, government, NGOs, local voluntary

organizations and social groups. Some common expected helps are the supply of cooked/dry food, pure water, medicine, materials for house reconstruction, agricultural materials and seeds, and financial assistance in cash. However, there have been many evidences of mismanagement and corruption in the distribution process of such emergency relief, particularly by the local corrupt politicians, local union council chairman/members, many corrupt government servants and also the discretion of the government policy itself. However, providing sustainable livelihood support to the affected coastal people is considered as a success criteria for disaster management. As experienced in cyclone Aila (2009) in the coastal areas, there were weaknesses and inefficiency in managing the natural disasters. In addition, there was a lack of accountability and transparency in implementing and monitoring of disaster response and rehabilitation programs. In many cases, negligence and corruption were reported in relief and rehabilitation programs. The findings suggest without increasing integrity, disaster management efforts will not get a success story. This paper seeks to examine whether disaster management efforts are subject to corrupt practices in Bangladesh.

## EPC-16

# Governance of Urban Solid Waste Management in Bangladesh: Policies and Practices

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**Abstract**

Solid waste management is one of the mandatory functions of urban local governance institutions in Bangladesh. The annual growth in urban population in Bangladesh is over 3.3%. Solid waste generation has also increased proportionately with the growth of urban population. As such, urban governing institutions are facing difficulties to keep pace with the demand for adequate solid waste management and conservancy services. With the current practices in collection, transportation and crude dumping of solid waste, municipal areas of Bangladesh, especially the City Corporations are generally faced with rapid deterioration of environmental and sanitation conditions. This results in unhygienic and filthy living conditions. With the multiplicity of environmental problems created by urban waste, now the question of governance in urban solid waste management is more important than ever.

Obviously, as an urban governance institution, City Corporation is mainly responsible to enforce existing policies in managing its solid waste through recycling and non-polluting disposal methods. This paper is an endeavor to evaluate the effectiveness of these policies at the urban centers of Bangladesh, using Rajshahi City Corporation (RCC) as a case study. It is an empirical research mainly based on primary data. Questionnaire survey, key informant interview, and observation were used to discover the actual use of waste management policies into practice. Data were collected from local government officials and field staff involved in implementing solid waste management laws and policies, as well as non-governmental stakeholders from the communities, such as residents and civil society members. The central finding of this research is that RCC lacks developed facilities, a strong institutional and legal framework, adequate human resources and consistent practice of solid waste management policies. The paper also proposes some workable solutions so that RCC can govern its solid waste management in a better way.

## EPC-17

# Land Encroachment: A Challenge of Conserving Forest Biodiversity in Bangladesh

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**Abstract**

Land is a scarce resource and forested areas have become vulnerable in Bangladesh. In this context, a growing population needs more agricultural, commercial and habitable land. Vast areas of forests are completely destroyed as civilization encroaches upon wilderness. Out of 46,000 acres in Madhupur Sal forest, 7,800 acres have been given out to Commercial plantation, 25,000 acres has given into illegal possession. At hilly forest area, tobacco farming is increasing rather than the mainstream food. About 10 national and international companies are involved in tobacco farming. In 2000, about 300 hectares land was used which has increased 4232 hectares in 2010. Now the farming area is about 10,000 hectares. On the other hand, shrimp farming has increased the rate of land encroachment more than double from 45,596 hectares in 2000 to 96,283 hectares in 2010 at Mangrove forest area. Commercial plantation and illegal possession in Sal forest and inappropriate jhumming, illegal logging, stone exploitation, brick fields, Bengali expansionism in Hill forest as well as apiculture, shrimp by catching and animals hunting in Mangrove forest area - all issues are raising a concern about conservation of forest biodiversity. In resulting, land encroachment by local elites or corporate grabbers in the name of agricultural development and industrialization, affects the totality of genetic potential, species and ecosystem stability, degrades the humus and topsoil, changes the food chain, decreases the capability of hydrological cycles and circulation of nutrients as well as the aesthetic value of forest in Bangladesh. This study highlights the land encroachment at forest area and challenge of conserving forest biodiversity in Bangladesh. Finally some recommendations have been placed for restoration and collective future of forest biodiversity in Bangladesh.

## EPC-18

# Leather Industrial Effluents: Chemical and Microbial Approaches to Reduce the Toxicity for Green Environment

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**Abstract**

Leather industrial effluents are a serious environmental pollution and social concern in Bangladesh. The effluents contained pollutants can cause undesirable effect on the ecosystem. The physico-chemical and microbial approaches have been considered to reduce the toxic level before discharging the effluents into the environment. The effluents were yellowish brown in color, having basic pH, very high values of TSS, TDS, TS, $BOD_5$, COD, $SO_4^{2-}$, Na, Ca, Cr, As, Cd and Pb. These values were far above the standard permissible limits for ISW in BDS, ISI-2000 and USEPA-2000. The effluents were treated with various doses of $FeCl_3$, $FeSO_4.7H_2O$ and $Fe_2O_3$ after settling and a subsequent filtration of raw effluents through sand-stone, saw-dust and sand-stone combined with saw-dust. The coagulants $FeCl_3$ and $FeSO_4$ showed maximum removal efficiencies for majority of the parameters at an optimum dose of 150 mg/L and neutral pH. The other coagulant $Fe_2O_3$ showed the maximum efficiency at a dose of 100 mg/L and pH around 9. The mean removal efficiency for all parameters were 91%, 89% and 85%, for the coagulants $Fe_2O_3$, $FeCl_3$ and $FeSO_4$, respectively, indicating that $Fe_2O_3$ showed the best removal performance among the coagulants. The analysis results of the chemical treated effluents illustrate that most of the physical and chemical parameters were found well below the prescribed limits. The study also carried out microbial treatment with bacterial species for the synthetic and composite untreated tannery effluents to remove heavy metal ions. The isolated bacteria showed resourceful tolerance against some selected heavy metal ions, i.e., Cr, Cd and Pb without producing any byproduct. The results reveal that Cr concentration in the treated synthetic effluent was found almost 100% while the Cr removal efficiency showed 84%, when treated the composite effluent. The bacterial isolate was identified as *Enterobacter species* by 16S rRNA sequencing and biochemical studies. It may conclude that a combine treatment approaches, i.e., physical, chemical and microbial processes could be promising in order to reduce pollution for green environment.

## EPC-19-Poster

# Effects of Agricultural Practices on Biodiversity in Bangladesh

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**Abstract**

Biodiversity is declining from Bangladesh day by day due to anthropogenic activities. Agricultural practices along with modern farming technics causing depletion of biodiversity. The study was conducted to determine the impacts of agriculture practices on biodiversity in the study area. Cultivable land increase only 1% but total cultivable land came under irrigation. Cropping in wetland area got popular and increase 95% in term of land area. As water level goes down, digging pond in wetland area became a trend recently. Simultaneously, use of submersible water pumps gaining popularity. Agricultural practices shift dramatically from chemical fertilizer to organic fertilizer. The numbers of pesticides use reached three folds. On the other hand, floral and faunal species is losing its diversity in the study area. 29% fruit plants, 38% timber plant and 42% medicinal plant species extinct. In case of fauna, 33% wild animal, 26% birds and 46% fish species extinct form the study area. People perception mentioned cultivation / land used pattern, use of chemical fertilizer, pesticide etc. irrigation, cultivating hybrid, HYV and exotic plant, use of modern agriculture technology, habitat destruction, infrastructural development, urbanization etc. as the causes of loss of biodiversity. But Study finds most of the biodiversity caused by anthropogenic activities. Farmers of the study area have no training of any kinds of fertilizer using but they admit that conserving biodiversity is important. Anthropogenic agricultural effects on biodiversity are a field needs further research, particularly about the conditions where native and diverse species may sustain and flourish.

**Keywords:** Agricultural activities, biodiversity, chemical fertilizer, flora and fauna, conservation.

## EPC-20-Poster

# Impact of Climate Change on the Outbreak of Infectious Disease among Children in Rajshahi District of Bangladesh

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**Abstract**

The impact of global warming as a consequence of climate change is a new threat to human health through providing favorable environmental requisites for infectious diseases. Bangladesh is unfortunately home to many infectious diseases. A cross sectional study to observe the impact of climate factors on the incidence of infectious

diseases among children in Rajshahi district of Bangladesh was carried out. Analyses of both collected secondary and primary data of infectious diseases and Time Series data of climate factors from Bangladesh Meteorological Department for the period of years 1964 to 2011 were performed. Primary data were collected from the study area for the period of years 2009 to 2011.

The long-term changes of annual and seasonal mean, maximum and minimum temperature of the study area were found in general increasing trends. Long-term annual rainfall showed declining trend. Seasonal rainfall pattern also showed markedly reduced in winter and post autumn season with shifting of raining periods. Incidence of diarrhoea showed positive correlation with both annual and seasonal rainfall and temperature; Kala-azar positively correlated with rainfall and annual maximum temperature but negatively with annual minimum temperature. The primary data revealed that temperature is the main and rainfall comes next as causes for diarrhea, kala-azar and measles like disease. Only measles like cases and their outbreaks were found among the vaccinated children in the study area. In addition to laboratory confirmed measles outbreak a large number of measles like outbreak were identified as laboratory confirm rubella outbreak which is newer in the study area.The study exposes that significant co-relationship between climatic factors and incidences of infectious diseases among children in Rajshahi district is evident. Accordingly, climate sensitive infectious disease surveillance and continuous monitoring to be considered immediately throughout the country to protect the public health.

Key words: Climate Change, Diarrhoea , Kala-azar, Measles, Rubella, Bangladesh

## EPC-21-Poster

# A Study on Different Impacts of Climate Changes in Bangladesh

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**Abstract**

Bangladesh is a highly vulnerable country in the world to Human induced changes in the global climate. This study focuses on the possible impacts of climate changes in Bangladesh through the sea level rise, temperature rise, salinity rise, increased evaporation, decreased rainfall and also discussed on adaptability. According to the study, the long-term trend in atmospheric temperature of Dhaka (max. -8.9% and min. 105%), Rajshahi (max. -14.6% and min. 85.7%) and Chittagong (max. -6.9% and min. 50%) are increased in last 40 years. In all respects, annual maximum temperature has a tendency to lower, but the minimum is higher in distinct position. The trend in minimum temperature of 2030 will be 21.66˚C, 16.56˚C and 19.15˚C respectively. The long-term trend in highest salinity of river Passur (1322%) of Khulna and river Kirtankhola (120%) of Barisal are increased in many folds in last 30 years. In 2030, the trend of the highest salinity of the rivers will be 49643.23 ppm and 720.56 ppm. The maximum tidal ranges are increased randomly in last 20 years at different selected meteorological river stations, such as Barisal (15.78%), Khulna (24%) and Elachar (20%) stations for the rivers Kirtankhola, Passur and Satkhira khal. But the value of Chapra (-2.27%) station of the river Betna is decreased. It is important that the station Chapra is situated on the height of ten meter from the sea level and the others are on three meter level. As a result the back water effects (BWE) from the sea to the rivers are increased. In correspondence to the water level of the rivers are

not much raised, due to the scarcity of fresh water coming through the hills surrounding Bangladesh. The trend in water level of Gomti river of Comilla point is slight increased (high11.4% and low -2.7%), but the records of other sea level river points are not available. The high range of water level can be increase upto 13.45 meters, but the lower level will be as usual, due to the consumption of fresh water is not increasing within 2030. Six meteorological centers rainfall data are collected in this paper, which are two hilly areas, two plain lands and two coastal areas. The trend in rainfall intensity of last 37 years is slightly decreased in Sylhet (-15.32%), Barisal (-11.58%), Dhaka (-9.68%), Khulna (-2.06%) and Rangpur (-0.13%); but Chittagong is increased (1.96%), of which about 50% falls during the months of June, July and August. The $R^2$ (correlation coefficient) value of these area are very low (0.0861, 0.0373, 0.0504, 0.001, 4E-06 and 0.0013). In 2030, the trend for rainfall level can be decrease at 3308.77 mm, 1780.92mm, 1896.68mm, 1833.78mm, 2270mm and 2999.88mm respectively. In a gist, desertification can be made in some places (>10 m height), due to the scarcity of fresh water and decreased rainfall; and in some places (<3 m height), agricultural lands will be destroy, due to increased rate of salinity in the rivers.

**Key words:** Bangladesh, climate change, trend for changes, temperature rise, highest salinity, maximum tidal range, water level, rainfall, correlation coefficient, back water effect.

# Environmental Sustainability and Development

## ESD-01-Key Note Paper

## Integrated approach in environment management: context Bangladesh

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**Abstract**

Bangladesh is an environmentally stressed land of high resource imbalance in critical status of management. The scenario is further threatened due to possible climate change impact and its consequences, potential of creating an aftermath massive exodus of population destabilize internal as well as international demographic structure. The source sectors of problems are (i) shrinking natural resources including overstressed ecological setup, (ii) increasing population with expanding need for economic development, and (iii) pressure due to the interaction between the two, causing environmental stress and bio-physical degradation. The gap-minimizing effort is targeted at grass-root level in physical aspects for conservation, and to increase optimum use of resources as well as socio-cultural awareness buildup programs. From the government's plan and policies give legal coverage to strengthen management, occasionally ratifying international protocols for global linkage. There is of course trace of increasing integrated approach for addressing sectoral issues anticipating better sustainability, although the question of success depends significantly on cross-cultural trans-disciplinary approach. The environmental sectors are identified by the scientists and government, but it is not a limited list of generalized issues. A large number of non-governmental local/international organizations are working with government agencies playing role of integration. Major government policies directly addressing environment management were developed mainly during 1995-2010. Many partial/indirect laws and policies relating to environment management were inherited from British rule since late nineteenth century. Although presence of overall intellectual infrastructure at local level is reasonably bright, a significant amount of in-coordination is identified as priority matter. The major setback arises from local poverty, lack of alternative methods of development, slow growth of quality education and from poor international/cross-cultural partnership. The scenario is particularly related to the availability of international fund and weak role of developing nations in the forum of north-south dialogue.

## ESD-02

# Environmental Impact Assessment Procedures and Practices in Bangladesh

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**Abstract**

Environment Impact Assessment (EIA) is a tool that helps decision makers to understand and develop environment friendly projects. After the introduction of National Environmental Policy Act (NEPA) 1969, USA emphasize on the environmental protection and environmental management worldwide. Due to speedy increase of multi dimensional disaster and climate change vulnerability, social and environmental life became more hazardous. Furthermore, human intervention and excessive use of nonrenewable resources create more complex situation for today and for the future, therefore, global community is highly motivated to focus on the pre- preparation for the upcoming environmental risks. In order to overcome risks an EIA has been developed. Considering the risk factor, the government of Bangladesh has also been conducting and following up of EIAs in all the relevant industries and projects by Environment Conservation Act, 1995 and the Environment Conservation Rules, 1997 as legislative formats. More significantly, Rule 7 of Environment Conservation Rules, 1997 clearly says about the industrial categorization for issuing environmental clearance from Department of Environment (DOE) under the Ministry of Environment and Forest (MOEF). Afterward, the EIA system had been more developed through amendments of the Act and the Rules and the issuance of the Environmental Court Act in 2000. Noticeably, red categorical industry or project will not get any kind of environmental clearance certificate from the DOE without a proper EIA. Moreover, Bangladesh Government has EIA guidelines for Industries by the DOE 1997 for clear and specific direction of the procedure of EIA. This paper describes critically the theoretical development of EIA procedure in Bangladesh and it also explores the reality of practice with some experiences of red categorical projects in Bangladesh

**Keywords:** Environmental Impact Assessment, Department of Environment, Bangladesh.

## ESD-03

# Environmental Impact of Coastal Polder: A Case Study of Polder-22 under PaikgachaUpazila of Khulna District

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**Abstract**

This paper is a part of Environmental Impact Assessment (EIA) on Polder 22which focus only the existing environmental condition ofthe polder area. This study was conducted during March 2014 to April 2015following the EIA guidelines of Water ResourcesPlanningOrganization(WARPO), Focus Group Discussion, Key Information Informant and In-situ test.The Polder-22 was constructedin 1970-72 in Deluti union under PaikgachhaUpazila of Khulna.Itsarea is 1,485 ha with a Net Cultivable Area of 1,070 ha.The polder was designed to save the people and protect crop damage from cyclonic storm surges, tidal flooding,salt water intrusion.The infrastructure of which are peripheral embankments, drainage sluices, drainage outlets and flushing inlets.During study, most of the structures were found non-effectiveandintrusion of saline water continued. The soil and water salinity were found to increase from January and toreach highest in April-May. Soil salinity is found to vary from 12 to 16 ds/m.Cropping pattern have been changed and cropped area have also been reduced.Salt water intrusion has contaminated both the surface and ground water.The highest salinity in canal and ground water are observedupto 20 pptand 3 to 4 ppt respectively.As such,ponds water, pond sand filter and harvested rain water are used for drinking. The internal channels have been silted up and dry upduring dry season.Open water fish habitat has severely been degraded and small indigenous species, deep water dwellers fish species are reported as rare to extinct in the channels. The density of homestead trees along the periphery of the polderbecame lowwhileterrestrial fauna and aquatic fauna are found nearlyto extinct.

**Key words:** Polder, salinity and environment

## ESD-04

# Bank Erosion of Padma River in Charghat and Bagha Upazilas, Rajshahi and its Socio-Economic Consequences

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**Abstract**

River Bank erosion is one of the silent disasters that strike frequently different places of Bangladesh. As the country is a riverine and floodplain, river bank erosion occurs randomly along the major river systems. In the present study river bank erosion along the left bank of the mighty Padma River in the Charghat and Bagha Upazilas of Rajshahi District has been assessed using temporal Landsat imageries and socioe-conomic approaches. Remote sensing data analysis indicates that about 7297 hectare bank areas have been eroded during last 40 years since 1975. In 2015, erosion poses high threat to the Pakuria and Gargari Unions that is estimated 5392 hectare comprising 74% of the total eroded area. Excessive sedimentation within the channel and change in thalweg as well as flow directions due to the adverse effects of the Farrakka barrage are the main causes of the left bank erosion. Based on the social survey findings, about 79% of the respondents found river bank erosion, while 69% of them thought river course changing, 55% observed less water flow during summer and 45% realized flood are the major disasters in the area. Most of the respondents (97%) mentioned that river bank erosion affected their daily life and livelihoods. About 84% of the sampled population opined that they lost homestead and operated lands due to the bank erosion. Additionally, 100% of the respondents mentioned that migration and accommodation insecurity, loss of agriculture and crops, original place and property with economic crisis (95%), increase poverty level. Ultimately hampering of children education (85%) and food insecurity (91%) are the significant consequences of the left bank erosion in the Padma River.

**Key words:** Remote sensing, river erosion, socio-economic impacts, Padma river, Bangladesh

## ESD-05

# Rainwater Harvesting to Alleviate Water Scarcity in Drought-Prone Barind Tract, NW, Bangladesh: A Case Study

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**Abstract**

This paper aims to evaluate the potentiality for rainwater harvesting (RWH)through dug well system in agro-based drought prone Barind Tract, NW Bangladesh - the granary. Meteorologically, the climatic condition leads to vulnerability of drought resulting hydrogeological as well as agricultural droughtwhere annual average rainfall is about 1300mm(national average of 2550 mm), but due to the agricultural practices huge amount of groundwater is required for irrigation.The annual average temperature 25.93$^0$Cwith high average humidity valuesof 75.29 %.The geophysical survey shows that the top most clay layer of thickness (17m) of infiltration capacity is a great barrier for natural groundwater recharge and below top most clay layer sandy layer of 31m thickness is considered as a potential aquifer.Groundwater depletion for the period of 1991-2013 is nearly 10 m with an average rate of 0.40 m/per year but this rate has abruptly increased after 2004. The aquifer for large scale groundwater development exists at greater depth, but not fully recharged even during rainy season and the groundwater table (GWT) does not reach at original position after 2004. So groundwater resource is under stress and is becoming worse due to simultaneous increasing irrigation demand and extension of command areas.Moreover, temporal variability of precipitation along with the declining trend of GWT due to huge withdrawal of groundwater for irrigation is the main governing factor for burning need for effective utilization of the RWH systems as adaptation measure is expected to altered the future under the effects of climate change as sustainable water management measures in water scarce area like the Barind Tract.In the present study, a rainwater harvesting system is operated in the Kakonhat PourashavaGodagari Upazila through construction of dug well structure where rainwater is harvested from the roofs of Pourashava Auditorium and the Administrationbuilding with a catchment area of 692 m$^2$. Here the amount of water which consumed by each house hold purpose per day is 224 liters.The groundwater recharge with rainwater harvesting is operating through dug well of 1 m diameter with a depth of 23 m and the recharge box structure is filled with sands of different texture acts as rainwater filtering is constructed as 2.5 m width, 2.5m length and 3.5m depth.Considering the runoff coefficient of 0.85 and the annual rainfall of 1300 mm, this dug well RWH structure can harvest 765 m$^3$of rainwater that can be stored in the aquifer for further use as adaptation measure. Otherwise if this amount of rainwater from buildings is not harvested though this way then this amount of rainwater would be lost as evaporation due to high temperature and low infiltration capacity of soil in the area, or flowing as runoff water into streams and ultimately to rivers.The research findings presented in this paper could be applied in areas with similar socio-economic status and climatic conditionas a novel technique for adaptation measure in meteorological, hydrological and agricultural drought prone area in Bangladesh.

## ESD-06

# Soil Quality Assessment for Agricultural Purposes Around the Barapukuria Coal Mine Industrial Area, Bangladesh: Insights from Chemical and Multivariate Statistical Analysis

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**Abstract**

Bangladesh is a small, densely populated and developing country which is gifted with limited natural resources. This study has been done over Phulbari upazilla where Barapukuria Coal Mine is situated. Most of the inhabitants of the study area are agriculture dependent. For this research work, 18 soil samples were collected from different surrounding locations of the Barapukuria coal mine. Research has been carried out on the basis of Field observation, Chemical analysis and Statistical analysis such as Correlation Matrix, PCA, Cluster analysis and One Way ANOVA by using different software in order to get the most updated and precise results. Correlation Matrix, PCA and Cluster analysis have been done by using Statistica software, ANOVA by SPSS. The chemical analysis has been done for determining the concentrations of some major chemical parameters such as pH, P, K, Mg, Fe, S, As, Ni, and Cu. The results of different chemical parameters have been found varied from one place to another due to the mining activities. The statistical analysis has been done for correlating with the chemical analysis and for acquiring the most correct and specified idea about the soil quality of the study area. Correlation matrix has been done for determining correlation between different chemical components. PCA has been executed for determining the factor which involves in the contamination process. Cluster analysis has been done for determining the homogeneity of the soil samples. ANOVA has been carried out to identify the differences between the parameters of the different locations. Investigation shows that soil quality is degraded significantly from that of their normal standards. The soil quality is mainly degraded due to the untreated water and coal stock pile of the mine. This is a great problem for the agriculture of the study area. This research work has been identified that there is a lot of spatial variability of soil samples around the study area. Thus, both chemical and statistical analysis can be efficiently applied to determine soil quality; ultimately it would be helpful in recognizing the impacts of soil quality on agriculture of the study area.

## ESD-07

# Rockburst and Gas Emission Hazard Potential Associated with LTCC Mining Method in Barapukuria Coalmine, Bangladesh

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**Abstract**

Rockbursts are currently the tremendous threats for the safe operation of coalmines worldwide. A rockburst is defined as damage to an excavation that occurs in a sudden. For the case of coalmine, a rockburst is associated with a strong and sudden brittle failure induced by high stresses due to mining excavation. It usually occurs as in a short period when the surrounding stress is redistributed during the excavation mining panels in high geo-stress conditions. It can be classified into three major types, like- (a) strain-burst, (b) pillar burst, and (c) fault-slip burst. Apart from rockburst event, gas emission is another dangerous event for underground coal mines worldwide. Up to 90% of the methane gas that enters longwall mining may come from adjacent seams. Due to the redistribution of mining-induced stresses, the gas permeability of the coal strata is substantially increased by the development and dilation of joints, bedding planes, fractures, and faults. The Barapukuria coal mine is located in Dinajpur district of northwest Bangladesh and currently, this is the first underground coal mine of the country. Numerous extensive fractures and tectonic faults affect the thickest coal seam (seam VI) and Gondwana formation of the Barapukuria coal basin. In addition, a long igneous intrusion (dyke) has been detected that across the mine panels of the northern part. Thick Gondwana sandstone sequence exists in the overlying strata of the mine panels. Therefore, it is assumed that a large amount of elastic strain energy can be accumulated in the process of mining. The thick main roof of mineable seam VI associated with Gondwana sandstone and remaining coal seam can cause periodic dynamic pressure which may induce rockbursts and gas emission hazards. For the case of Barapukuria coal mine, the ground deformation behavior around the LTCC mining panel/face and their impact on rockburst occurrences associated with gas emission potential through fault and dyke zones have not been made clearly yet. In the present study, boundary element method (BEM) numerical simulation was used to evaluate the mining-induced stress redistribution, ground deformation, strength factor and spaling (failure) criterion of rock strata around a LTCC mine panel when coal panel/face passed through tectonic fault and dyke. In the present study, two models (A and B) have been considered. Model A considers the LTCC geometry with a face angle of about 10° dipping to the east. Model B involves two tectonic disturbances, like- fault and dyke. Modeling results reveal that for the case of a $120 \times 10$ m$^2$ opening associated with LTCC mining method in Barapukuria coalmine, severe damages can be characterized by fractured or loosened rocks of about 16.39 m height at the right-side and 14.53 m at the left-side for the case of model A. For the case of model B, severe damages can also be characterized by fractured or loosened rocks of about 16.59 m height at the right-side and 13.80 m at the left-side of the model.

# ESD-08

# Persistence and Degradation Dynamics of Fipronil in Sugarcane

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**Abstract**

Fipronil, a phenyl pyrazole insecticide effective against a wide range of insect pests was used to control early shoot borer and termite in sugarcane. Persistence and dissipation kinetics of fipronil and its metabolites viz., fipronil desulfinyl, fipronil sulphone was studied in sugarcane following thrice application of fipronil (5% SC) @ 100 g ($T_1$) and 200 g ($T_2$) a.i. $ha^{-1}$ along with untreated control ($T_3$). The sugarcane and soil samples were collected from each replicated plots at 0 (after 2h), 1, 5, 10, 15, 30, 45 and 60 days after treatment. Residues of fipronil and its metabolites were analysed by modified QuEChERS technique and estimated using GC-ECD with satisfactory method recovery of 80% or above (LOD: 0.01 mg/kg; LOQ: 0.03 mg/kg). The initial residues of fipronil in sugarcane, leaf and soil varied from 0.13-0.79 mg/kg which dissipated following 1st order reaction kinetics. Half-life ($t_{1/2}$) of fipronil varied from 4.4-6.8 days in plant and 5.2-6.4 days in soil. Fipronil residues could be quantified up to 10-15 days in soil and 10-30 days in plant. Fipronil was degraded in plant and soil after 1 day to fipronil desulfinyl and fipronil sulfone. The maximum concentration of the metabolites in plant was 0.19 mg/kg and in soil it was 0.15 mg/kg. No residue of fipronil and its metabolites was detected in harvest samples (at 60 days) of sugarcane, juice, bagasse and soil. Therefore, the use of fipronil for plant protection in sugarcane may be considered safe for food and environmental sustainability.

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## ESD-09-Key Note Paper

# Chronic arsenic exposure and its effects on human health

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**Abstract**

Heavy metal pollution especially arsenic pollution has caused an environmental tragedy in Bangladesh and| India affecting millions of people. Main cause of arsenic pollution is the presence of excessive amounts of inorganic arsenic in the ground water. Many people have died of diseases caused by chronic exposure to arsenic. Tens of millions of additional people are currently at risk of toxicity because of consuming arsenic through drinking water greater than the permissive limit set by World Health Organization. My research group is addressing arsenic crisis in Bangladesh through the investigation of the routes of human exposure to environmental arsenic and its adverse effects on human health. We are also exploring the ways to reduce arsenic toxicity in human through phytobioremeidation. Along with other groups, previously we found that arsenic-contaminated drinking water is a major cause of human exposure to arsenic. However, our recent study (unpublished observation) suggests that rice and vegetables cultivated in arsenic-endemic areas have significant contributions to increase arsenic burden of the people. Our preliminary investigation indicates that contaminated rice in arsenic-endemic areas causes higher risk of cancer compared to the rice in non-endemic areas. In our population based epidemiological study, we have found that arsenic exposure is positively associated with circulating biomarker of organ damages. We have also found that arsenic exposure dose-dependently induces liver intoxication. Further arsenic exposure is found to be associated with the elevated levels of plasma Big Endothelin (Big ET-1). BigET-1 is a specific marker of endothelial damage and precursor of well known vasoconstrictor Endothelian-1 (ET-1). Elevated levels of plasma Big ET-1 in arsenic-endemic residents are also correlated with hypertension. Very recently we have reported the proatherogenic effects of arsenic showing the associations of arsenic exposure with blood biomarkers of cardiovascular diseases (CVDs). High-density lipoprotein cholesterol (HDL-C) inhibits several pro-oxidative and inflammatory steps required for the formation of atherosclerotic lesion because of its anti-oxidants and anti-inflammatory activities. In our study, we have observed that arsenic exposure decreases plasma HDL-C levels with the concomitant increases in oxidized form of LDL, and adhesion (ICAM-1 and VCAM-1) and inflammatory (CRP) molecules involved in atherosclerotic process leading to CVDs. In our recent research, we have also found that arsenic exposure increases several circulating markers involved in angiogenesis and vascular remodeling. These results indicate that arsenic exposure may shift the physiological microenvironment toward proangiogenesis which may cause chronic arsenic-exposed individuals susceptible to cancer and CVDs. Taken together our results provide deeper insight into the effects of chronic arsenic exposure on human health.

## ESD-10

# Investigation of Irregular Waves by Different Types of Distributions

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**Abstract**

This paper is concerned about the irregular waves and its various consequences. To investigate the irregular waves, it is needed some techniques that make the irregular waves to regular waves. For this purpose, we have introduced the concept of different types of wave height distributions such as, Rayleigh distribution, Gaussian distribution, Poisson distribution, Rician distribution etc. The design of coastal structures, knowledge of the wave height distribution is an important factor. In deep water, Rayleigh distribution is valid but not so significant in shallow water.

Although we have used the Rayleigh distribution and BG2000 distribution for deep water and GK96 distribution for shallow water, but a modified method named Rician distribution has used for both cases. Finally, model result of Rician distribution is compared with Rayleigh, GK96 and BG2000 distributions in Fig. 1 and it is observed that Rician distribution is more accurate among other distributions in shallow water. This information might be helpful to investigate the wave reflection in the coastal area of Bangladesh and India during tsunami and storm surge.

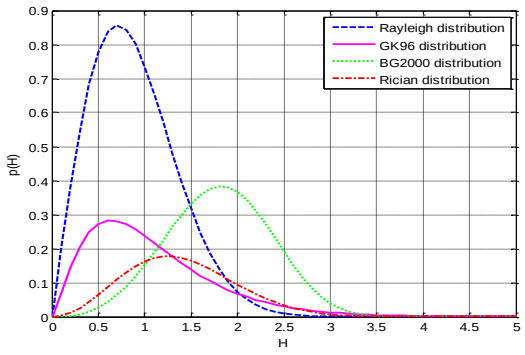


Figure 1: Comparison of wave height distributions by several methods.

## ESD-11

# On the Generation of Tidal Oscillation at Some Stations along the Coast of Bangladesh Using Cubic Spline Interpolation

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**Abstract**

In this study, the tidal data at some coastal stations of the Bay of Bengal region are generated through cubic spline interpolation from some hourly observed data collected from Bangladesh Inland Water Transport Authority (BIWTA). To develop a tide surge superposition model for operational storm surge forecasting purpose tide has to

be generated properly as it is the initial state on the sea. Since the astronomicaltide is a continuous process in the sea then considering the tide at a point on the sea in the mean sea level as a continuous function with respect to time, we have generated it through cubic spline interpolation method from 0200 UTC of 28th April to 0200 UTC of 30th April at 3 coastal stations; (a) Hiron Point, (b) Charchenga (Hatiya) and (c) Chittagong and the same from 2000 UTC of 23rd May to 2000 UTC of 25th May at the same 3 coastal stations.The generated water levels due to tide can be used to develop a proper storm surge forecasting model due to the superposition of tide and surge.

**Key words**: Cubic Spline Interpolation Method, tidal data, coastal station and Bay of Bengal

## ESD-12

# Characteristics of Biomass Fuels from Local Agricultural Residues: Bangladesh Prospects

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**Abstract**

The main biomass sources in use for energy production varies from agricultural crops and residues, forest crops and residues, animal residues, municipal solid wastes, sewage and industrial residues to energy crops. The energy form biomass can be converted to useful forms by using a number of different processes. This can be classified broadly into two types: thermo-chemical process and biochemical process. Proper understanding on the thermo chemical properties of biomass is necessary for the design of thermo-chemical conversion systems. The present study was conducted for the selected species of Bangladeshi biomasses. In this study seven different types of biomass from Bangladeshi agriculture residues such as rice husk, rice straw, jute stick, sugarcane bagasse, water hyacinth, dhaincha (Sesbania aculeata) and wheat straw were considered for detailed analysis. The analysis includes moisture content, bulk density, proximate analysis, elemental analysis, calorific values and thermo-gravimetric (TGA/DTG) properties. This study reports that the moisture content in all samples investigated is suitable to serve as feedstock for thermal conversion technologies. Compared to coal, agricultural residues biomass has a lower energy density and also lower ash content. Results from proximate analysis and TG-DTG curve also indicates that higher amount of ash content in rice straw and rice husk among the studied samples and highest decomposition rate is obtained from rice husk but lowest from water hyacinth. Highest activation energy was obtained from rice straw and lowest from sugarcane bagasse. Preliminary results of this study could serve to establish a database of Bangladeshi biomass fuels or feedstock that would support decision making in terms of energy conversion technology selection and operating conditions setting.

**Key words:** Irrigation water indices, indices parameters, geostatistics and Central Bangladesh

## ESD-13

# Eco-Tourism: Challenge & Prospect

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**Abstract**

Eco tourism in simple terms means management of tourism and conservation of nature in a way so as to maintain a fine balance between the requirement of tourism and ecology on one hand and the needs of local communities for jobs, on the other. Eco-tourism industry in India is facing various challenges due to lack of strategic business plans, lack of well trained nature guides, lacks of suitable marketing techniques, lack of methods for gaining community consensus on development projects, and lack of infrastructure etc. India's track record in tourism is abysmal.

## ESD-14

# Sustainable Development through Indigenous Knowledge: A Study in Aila Affected Area of Satkhira District

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**Abstract**

This has been in the practice of common flood or cyclone affected people in southern part of Satkhira District in Bangladesh that from the time immemorial and generation to generation they had some traditional knowledge for saving themselves from the natural calamity. They, basically achieve it from the nature and their previous generation. These traditional skills are, somehow, very effective for disaster management and ecosystem development. The fishermen, farmer, boatmen and all type of professional people have different type of knowledge in safeguarding themselves; for example, they get some signals (forecast) from animal or insect even from the waves of water about the cyclone or storm or tornado. This article aims at exploring the using of the knowledge for particular areas and cases. The main focus will be given to the ecological resources used the farmer in growing special type of paddy crops after flood in saline water and the people making sustainable development of their life. Both primary and secondary sources are used here for this research, but primary sources are very important in this context. Several case studies have taken for collecting data from different professions.

## ESD-15

# Conservation of Potato (*Solanum tuberosum* L.) Cultivars by Slow-growth Condition *in vitro*

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**Abstract**

In this investigation an experiment was conducted to find out the most suitable culture media formulation to induce slow growth and reduce the frequency of sub culturing of conserving potato germplasm by employing different concentrations and combinations of osmoticums. Factorial (9 media x 2 genotypes) randomized complete block design with 10 replicate culture tubes were used in this experiment. After establishment of *in vitro* shoot cultures nodal segments were excised and were sub cultured on MS medium solidified with agar and supplemented with 30 g $l^{-1}$ sucrose, sorbitol and mannitol alone and sucrose with mannitol, sucrose with sorbitol combination. The potato microplants in media without any sucrose were less responsive in microplant survivability, microplant condition, and root growth, shoot length, number of nodes per microplant in both the cultivars. The results also showed that in media with sucrose alone the microplants failed to survive after 6 and 12 months of conservation. So, it can be concluded that single treatment is not feasible for long term conservation. In contrast the media with sucrose plus mannitol or sucrose plus sorbitol the microplants performed better in plantlet survivability, plantlet condition, root growth, shoot length and number of nodes per microplant. These microplants were healthy and deep green and were suitable for further cultures. Thus, it might be practicable treatment group. The combined group of MS medium with sucrose plus mannitol was also effective treatment for long term conservation but it was comparatively less effective than MS medium with sucrose plus sorbitol. Among the three combinations the media with sucrose and sorbitol, the microplants for both the genotypes showed significantly higher survival rate in treatment T-8 medium formulation (MS medium with 10 g $l^{-1}$ sucrose plus 20 g $l^{-1}$ sorbitol) with better plantlet condition, reduced root growth and enough number of nodes for sub culturing after 12 months of conservation.

Key words: Microplant, In-vitro, Germplasm, Potato, Slow-growth, Osmoticum

## ESD-16

# Identification of Potential Aquaculture Zones in Chalan Beel, Bangladesh Using Multi-Temporal Landsat Imageries

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**Abstract**

The Chalan Beel is one of the largest wetland in Bangladesh that has been experiencing adverse impacts on its water bodies due to rapid urban development and other anthropogenic interventions. Three Upazilas of Natore District were considered for the study to interpret spatio-temporal changes in water coverage and wetland using multi-temporal Landsat imageries of the year 1979, 1989, 2004, 2009 and 2015. To extract these five water body maps, Normalized Difference Vegetation Index (NDVI), Normalized Difference Water Index (NDWI) and Water Ratio Index (WRI) were intensively used, while post classification of change detection method was followed for estimation of spatial changes of wetland. A total 76 square kilometres water covered areas have been diminished within 36 years (1979-2015) in the study area due to climato-anthropogenic causes, of these, about 21 square kilometres only during 1979 to 1989. It is interpreted that about 14, 24 and 17 square kilometres water covered lands have been changed into different land use classes during 1989-2004, 2004-2009 and 2009-2015 respectively. Finally, a suitability map for identifying potential aquaculture zones was derived using these five temporal resultant water bodies based on a common geographic rule. About 12% of the total lands (123 square kilometres) were identified as for future aquaculture management considering local climate change impacts. The overall image classification accuracy for the all classified maps was more than 96%.

**Key words**: Bangladesh, Chalan Beel, Aquaculture, Water Covered Area, NDVI, NDWI, WRI.

## ESD-17

# Livelihood Status of the Fishers Community in the Chalan Beel Area (Singra Upazila, Natore District) in Bangladesh

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**Abstract**

The study on Socio-economic Condition of Fishermen of the Chalan Beel under Singra Thana of Natore District in Bangladesh represents the actual fishers' community of Bangladesh. The socio-economic position of the fishing communities were presented on the basis of age group, family size, educational status, main and subsidiary

occupation, fishing trends, daily income patterns, housing patterns, use of television-radio, fuel use, credit supply, health, nutrition, sanitation etc. The study was conducted in Singra Thana under Natore District of Bangladesh from September 2010 to August 2011. It was found that 20-30 age groups were the major manpower of the community. Families consisting of 4-6 members were majority and they were 70% of the sample respondents. Most of the respondents of the study area were illiterate (60%), they can sign only. Out of the total number of children 49% were boys and 51% were girls, 52% fishermen were involved in fishing profession from the period of their father and 75% fishermen sell their labour in agricultural sector in off-fishing period. The study revealed that 55% fishermen earned Tk. 200-250 per day; 18% earned Tk. 150-200 per day; and 10%, 8%, 7% and 2% fishermen earned Tk. 100-150, Tk. 250-300, Tk. 300-350 and Tk. 350-400 per day respectively during the full harvesting period. Only 2% fishers' lived in brick-wall and tin roofed house. 72% fishermen have no radio or television but 78% fishermen use mobile phone. It was also observed that 75% loanees took loan from NGOs, 50% of loanees borrowed money to buy their fishing equipments and 85% fishermen were involved with Samittee/ Association. The survey disclosed that 74% families use semi-pacca latrine surrounded by nylon bag and 12% families use open latrine. 80% fishermen visit the doctors for their treatment. Most of the fishermen do not know the fishing law, although the law mostly made for the fishermen.

**Key words:** Fishers Community, Socio Economic Status, Chalan Beel.

## ESD-18

# Channel Dynamics of the Old Brahmaputra River within the Kishoreganj-Narshingdi Districts (from 1922-2015)

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**Abstract**

Bangladesh is a riverine country and stands on a thick alluvial deposit. It is the result of deltaic activity of the Ganges and the Brahmaputra. The Old Brahmaputra is one of the main distributaries of the Jamuna (Brahmaputra ) that distributes part of Jamuna discharge over a large area of North Central region of Bangladesh. The materials, data and information are used in the study to prepare digital maps of the river for different time series are given below :

1. Toposheet map L/16 of 1922.
2. Toposheet map L/16 of 1961.
3. Google earth map of 2 January 2015.

The following steps are adopted to carryout to the present work.

1. Preparation of geomorphic maps of each year.
2. Bank line map of the study area have been prepared from the toposheet maps and google earth map by Adobe Illustrator CS5 Software in order to identify various morphological units.

3. Superimposition of bank line maps of each year.
4. Interpretation of channel dynamics in terms of fluvial processes and neo-tectonic activities.

Analyzing the image of part of the old Brahmaputra River among the year 1922 and 2015, it is found that significant changed has been occurred in southeastern and northwestern part of toposheet map and less change is found in the central part of toposheet map. Transportation of sediment is the major contributing factor of morphological changes.

## ESD-19

# Economics of Fish Fry Collection: A Study on the Halda River of Chittagong

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**Abstract**

Halda is one of the most important rivers of Bangladesh because of its unique nature and ecosystem. It is the only tidal river in the world where major Indian carp fishes spawn and also the only river in Bangladesh where carp brood fishes release fertilized eggs. It has been offering numerous other benefits through fishing, fish fry collection, irrigation, drinking water, water transportation and sand extraction services along with being the only pure Indian carp fish seed source. This study aims at determining the direct use value from fish fry collection, total contribution Halda carp seeds to the national economy, the size of the stock of carp fish. This study has also analyzed reasons for the declining catch size and provided policy inputs to deter further deterioration. The direct use value from Halda has been estimated as BDT 3,34,497 per year based on the data provided by department of Fisheries (DoF). Furthermore, following the same data source, total contribution in the national economy and the stock size of brood fish has been estimated to be BDT 4, 237 crore per year and 280 in 2016 respectively. However, all findings have also been calculated from primary data source and expert's (Professor Kibria) data source. It has been observed from the exponential trend line forecast of all data sources that around 2019 brood fish of Halda will go extinct where smaller stock size, reduced water flow, merciless killing of brood fish and pollution are found to be the main reasons for this decline. To counter the threat of extinction and enjoy continuous benefits from the river, co-operative approach involving all parties must be initiated by the government.

**Keywords**: Common pool resources, brood fish, fertilized egg, fish fry, fingerling, food fish

## ESD-20-Poster

# Visitor's Perception on Existing Tourist Facilities and Future Ecotourism Potentialities in Modhupur National Park of Bangladesh

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**Abstract**

Modhupur National Park is a tropical deciduous forest, popularly known as sal (*Shorea Robusta*)forest in Bangladesh .This Park has a rich diversity of flora and fauna which located in the northeastern part of Bangladesh, about 160 km away from Dhaka city. It is assumed that sustainable tourism development in this park will be beneficial for the visitors and local inhabitants. Therefore, a survey on existing tourist facilities was conducted among the visitors in this park. From this survey, it was found that, 73.9% of visitors were in the age between 20-29 years, of them 38.9% are female. Most of the visitors expressed dissatisfaction about the existing tourist facilities and infrastructures in this park. They preferred to see the facilities like bunglow, shopping center, zoo, parking lot, water supply, good toilet, restaurants, security, gaming zone, hilly space and VIP zone for night pass. A major part of the visitors (96.1%) wanted to pay the entrance fee and 98.3% wanted to pay parking fee. About 89.4 % visitors expressed for forest trekking and 94.4% visitors wanted to attend at the local cultural show whereas 85% visitors showed eagerness to purchase handicrafts made by the local people. From this study, we found that Modhupur National Park has a high potential for ecotourism if some new tourist facilities are developed.

**Key words:** Ecotourism, ecology, tourist, local community and community development

## ESD-21-Poster

# Investigate of a Waste Power Plant: Sustainable Energy and Environmental Prospects

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**Abstract**

Global fossil fuel reserves are finite and the world is facing significant challenges to find alternate sources of energy which have directed the researchers to look for new sources of energy. Fossil fuel reserve is depleting in unprecedented speed [1]. A lot of researches have been going on to find new sources of energy to reduce dependability on fossil fuels; increase fuel efficiency and decrease environmental pollution.However, to find out new sources of energy is not a piece of cake and the abandoned organic and inorganic municipal wastes (MWs) are

produced in a huge quantity in domestic and industrial sectors which can be a good source of energy. Many conventional technologies (Incineration and Pyrolysis, Composting engineered land filling, Gasification, Biochemical conversion technologies, Anaerobic digestion/Fermentation under controlled conditions to produce methane etc.) has been attempted to find out an efficient way to harvest energy from MWs and make it useful for the mankind. However, almost all the methods have resulted either in poor or in partial satisfactory results due to low energy conversion efficiency (due to low calorific value, liberating low waste to energy, incomplete combustion, inadequate fermentation and other limitations). Therefore; to find an economic, proper and efficient way to convert this easily available resources to energy, this research will implement an innovative technique to produce bio fuel (methane) form MWs and will use this methane to produce electricity by a highly efficient low friction gas turbine. This research aims to investigate the energy conversion efficiency of the fuel cell (Digester), performance characteristics of the gas turbine and the generator. This research will also investigate the amount of MWs required to produce unit amount of electricity (MW-hr).This technology will reduce the waste of energy around us, find alternative source of energy, and find out some efficient means of bio fuel production through "Anaerobic digestion/Fermentation" from MWs and using this bio fuel to run gas turbine to produce electricity. Extensive uses of MWs in production of alternative energy to reduce the cost and wastage of resources have been targeted as research predicted outcomes.

## ESD-22-Poster

# Environmental Impact of Biomass Energy from Rice Husk: Bangladesh Context

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**Abstract**

Energy demand around the world has been increasing rapidly especially in the developing countries.Rice husk has a great potential to be used as a source of renewable biomass energy. About 50modern varieties of rice,including the recently developed one, are available in Bangladesh. Rice husk is uniform and small in physical size,and it is a bulky material. A variation in the content of volatile matter, as hand fixed carbon has been observed indifferent types of husks. Global annual rice husk production is137million tonnes, and 9.0million tonnes are produced in Bangladesh. In Bangladesh context, out of 38.75 million tonnes of total biomass produced from agro-residues, rice husk is about 26% by mass. The major portion of rice husk is consumed by burning in traditional rice parboiling boilers, and some portion is used form a king briquette fuel in Bangladesh. Rice husk briquette is a substitute of wood fuel. There is extra pressure on the forest due growth of an extra million of population every year. This can be reduced by using rice husk briquette as substitute of wood fuel. Results of deforestation reduction model show that the reisa potential of 4.50million tonne of wood fuel substitution by rice husk briquette, thus saving 25.41 thousand hectare equivalent of forest land annually. This forest creates a carbon sink by renewing 7.8million tonne of $CO_2$ equivalent annually. Hence reduction of deforestation would develop a carbon sink in the existing forest, thus would lead to sustainable development of forest resources in Bangladesh. Thus use of rice husk biomass can create enormous opportunity for energy production and value-added product preparation in addition to clean energy production and bio-material preparation for both industrial and daily life use.

## ESD-23

# Trend of Land Use Change and Environmental Degradation in Dhaka City: A Case Study in Three Selected Areas

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**Abstract**

Dhaka, the capital city in Bangladesh has been going through a hasty process of urbanization and population growth since the last few decades. Some factors like rapid growth of population, unplanned urbanization and unwise industrialization have created a tremendous pressure on the changes of its land using pattern. The aim of this paper is to evaluate the trend of land use change and environmental degradation in Dhaka city. This study is based on some collected data through the topographical map of 1960, SPOT Satellite image of 1991 [Landsat TM, 1991 (21 August 1991)], Google image in 2010 and relevant studies. Remote sensing and GIS based software (ArcGIS, Erdas Imagine) were used to produce and analysis the land use maps and least square method was functioned to identify the trend of land use change and environmental degradation in the study areas. It reveals that the historical process of suburban development of Dhaka city produces various trends based on its political, social and structural developments. The rapid urbanization of the Dhaka city since its emergence as the capital of an independent state is responsible for the massive migration of rural population. This paper, however, argues that the experience of unplanned land use change in the Dhaka city follows the pattern of urbanization without unplanned development. As a result, the trend of unplanned land use change in Dhaka city will make it a haphazard city in the world within a few times.

**Key wards:** Land use change, environmental degradation, Dhaka city

## ESD-24

# The Global Burden of Oral Diseases and Risks to Oral Health: An Analytical Study

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**Abstract**

This paper outlines the burden of oral diseases worldwide and describes the influence of major sociobehavioural risk factors in oral health. Despite great improvements in the oral health of populations in several countries, global problems still persist. The burden of oral disease is particularly high for the disadvantaged and poor population groups in both developing and developed countries. Oral diseases such as dental caries, periodontal disease, tooth loss, oral mucosal lesions and oropharyngeal cancers, human immunodeficiency virus/acquired immunodeficiency

syndrome (HIV/AIDS)-related oral disease and orodental trauma are major public health problems worldwide and poor oral health has a profound effect on general health and quality of life. The diversity in oral disease patterns and development trends across countries and regions reflects distinct risk profiles and the establishment of preventive oral health care programmes. The important role of sociobehavioural and environmental factors in oral health and disease has been shown in a large number of socioepidemiological surveys. In addition to poor living conditions, the major risk factors relate to unhealthy lifestyles (i.e. poor diet, nutrition and oral hygiene and use of tobacco and alcohol), and limited availability and accessibility of oral health services. Several oral diseases are linked to noncommunicable chronic diseases primarily because of common risk factors. Moreover, general diseases often have oral manifestations (e.g. diabetes or HIV/AIDS). Worldwide strengthening of public health programmes through the implementation of effective measures for the prevention of oral disease and promotion of oral health is urgently needed. The challenges of improving oral health are particularly great in developing countries.

## ESD-25

# The Global Increase in Dental Caries: A Crisis in Public Oral Health

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**Abstract**

A current review of the available epidemiological data from many countries clearly indicates that there is a marked increase in the prevalence of dental caries. This global increase in dental caries prevalence affects children as well as adults, primary as well as permanent teeth, and coronal as well as root surfaces. This increase in dental caries signals a pending public health crisis. Although there are differences of opinion regarding the cause of this global dental caries increase, the remedy is well known: a return to the public health strategies that were so successful in the past, a renewed campaign for water fluoridation, topical fluoride application, the use of fluoride rinses, a return to school oral health educational programs, an emphasis on proper tooth brushing with a fluoride dentifrice, as well as flossing, a proper diet and regular dental office visits. If these remedies are not initiated, there could be a serious negative impact upon the future oral health (and systemic health) of the global community, as well as a strain on the dental profession along with a major increase in the cost of dental services.