Major Preliminary Findings of CRG Sub-projects

Sl No.	Project ID	Sub-Project Title	Major Preliminary Findings
1	301	Development of Climate Resilient Mangrove Ecosystems in the Sundarban	• A total of 48,000 seeds/prop gules of sundri, passur, vathkathi, jhana, kirpa, kankra, amoor, soila , baen, golpata, keora and amdhekur have been collected from the Sundarban. • A total of 36,000 seedlings of 12 different mangrove species have been raised and maintained in different nurseries of the Sundarban for planting in the experimental sites. • The average germination percentage of sundri, passur, vathkathi, jhana, kirpa, kankra, amoor, soila, baen, golpata, keora andamdhekur have been observed 70, 80, 95, 90, 60, 90, 90, 80,70, 90, 75 and 90 respectively. • The seedlings of Nypafruticans have been planted during September 2017 over an area of 1.2ha in three experimental sites of the Sundarban.
2	305	Breeding biology and induced breeding technique of the freshwater gangmagur, Hemibagrus menoda (Hamilton, 1822)	• Spawning of gangmagur took place once in a year but with longer duration spawning from May to July. • Successful ovulation occurred in the females injected 24, 25, 26, and 27 mgPG and 3500, 4500, 5500 and 6500 IU HCG /kg body weight. • Best spawning outcomes have been obtained from spawners injected double dose of 3500IU and 26 mg HCG and PG/kg body weight, respectively, in a 2♂:1♀ ratio.
3	307	Improvement of Coconut Harvesting and De-husking Machine	• Improved coconut tree climber and coconut de-husking machines have been developed with locally available materials for enhancing the coconut harvesting and de- husking. • Average climbing speed of the skilled operator in manual practice has been found 0.4 m/s while average capacity of de-husker has been observed 309 nuts per hour at the speed of 27rpm. • The payback period of de-husker has been observed 80 days and the benefit cost ratio has been found 1.33
4	309	Dietary effect of hydro-phonic legume sprouted fodder on Turkey production in Bangladesh	• Nutrient composition of hydro-phonic sprouts of maize, sesbania and wheat has been determined. • Optimum level of dietary hydro-phonic sprouts (15%) has been identified for better growth performance. • Hydro-phonic sprouts (up to 15%) may be used for economic production of growing turkey. • Seven rations have been formulated (0-4, 4-8, 8-12, 12-16, 16-20, 20-24 weeks old and breeding hen) for the heritage type of turkeys available in Bangladesh.
5	310	Scaling-up of farmer led agro-forestry p;lkjhgfzxcv ractices for livelihood improv74ement and resources conservation in the Madhupur Garh area	• 10 long-duration and 10 short duration crops based agro-forestry models have been selected through baseline survey of 20 local innovative farmers and their leading agro-forestry models. • The impacts of agro-forestry models on the soil nutrient status (e.g. OM, N, P, K) have been showed the trends of improving the soil quality through proper tree-crop management. • Five best agro-forestry practices eg. Akashmoni-Ginger-Banana, Akashmoni-Eucalyptus-Teak-Papaya-Ginger-Pineapple-Banana,

Sl No.	Project ID	Sub-Project Title	Major Preliminary Findings
			Akashmoni-Acacia hybrid-Goraneem-Gamar—Pineapple-Papaya--Banana,Akashmoni-Pineapple- Papaya-Aroid- YLB and Litchi-Pineapple-Papaya-Ginger-Banana have been selected on the basis of their performance (Net profit, BCR and LER).
6	311	**Inhibition of arsenic accumulation in rice with phytofortification of microelements for nutritional safety**	• Si and Fe have increased the yield of Aus, Aman and Boro rice grown in As contaminated soil due to their strong antagonistic behavior with As uptake. • Arsenic accumulation pattern has been found in order of root > shoot > grain. • Better effect has been found in naturally As contaminated soil (grain As < 0.2mg/kg) than artificially As incubated soil due to addition of different microelements (> 0.2 mg/kg) except for Fe treatment. • In most cases, phytofortification or bio-accumulation of microelements have been increased significantly at different varieties of rice grain.
7	313	Development of estrus synchronization protocols using hormones in anestrus cows for improved reproductive performance	• The prevalence of anestrus cows has been recorded 54.42 % which is alarming for sustainable dairy farming in Bangladesh. • The crossbreed Sahiwal, <4 years age groups, < 200 kg body weight, poor body condition, 1st parity cows and heifer factors have been found favourable for high percentage of anestrus. • The good housing system, medium size farm, good quality feed, sufficient fodder, good health care, allopath medicine, DLS health service, regular preventive measure, regular de-worming, > 5 years farming experience and having training of farmer have showed less change to anestrus in cows. • 90 % of anestrus cows have been come to estrus by using PG-GnRH-PG treatment protocol followed by PG-PG and PG-PG-PG fixed time AI (85 %). • The ELISA has been found effective pregnancy diagnosis method in dairy cows with minimum cost (285 TK. per cow). • Ultrasound method has been found good technique for early pregnancy diagnosis in dairy cows (from 28 days).
8	315	Arthropod Pests Infesting Ornamental Plants in Bangladesh: Strategies for Management	• A total of 51 insect and 4 mite species have been identified as pest of ornamental plants, and thrips, aphid, bud worm and mites have been observed as major pest. • Thrips, bud worm, aphid & bud worm, aphid, and mealy bug have been identified as major pest of gladiolus, thuja, tube rose, marigold and dahlia respectively. • Pest abundance has been observed highly correlated with weather parameters. • Application of different pesticides have showed effective results on the pest management.
9	316	Effects of vacuum and modified atmosphere packaging on microbiological and biochemical properties of fresh fish stored at refrigeration temperature (4 °C)	• Most of the consumers in the superstores of Dhaka are highly educated and job holder and spend around 1000-5000 taka/m in purchasing fish. • Most of the superstore consumers (58%) have preferred to buy refrigerated packaged fish if available. • The shelf-life of sliced tilapia fish has been determined at approximately 7 days for unpack and N_2 pack sample while 13 days for vacuum pack sample under refrigerated storage. • The shelf-life of sliced pangus fish has been determined at approximately 7 days for unpack and N_2 pack sample while 10

Sl No.	Project ID	Sub-Project Title	Major Preliminary Findings
			days for vacuum pack sample under refrigerated storage.
10	321	Serorevalence and identification of associated risk factors of Q-fever *(Coxiellaburnetii)* in ruminants, an emerging zoonotic disease in Bangladesh	• The overall seropositivity of Q-fever in goats and cattle has been found 11.9 % and 9.5 % respectively. • Milk-positivity of Q-fever in goats and cattle has been found 10.7 % and 8.3 % respectively. • The prevalence of tick infestation in male and female cattle has been found 42.6 % and 46.4 % respectively. • The prevalence of abortion in tick infested animals has been observed 17.6% and 15.2% in female cattle and goat respectively. • The seroprevalence of Q-fever has been found higher in female than male both for cattle and goat.
11	323	Development of ginger production technology under soilless culture using fertigation technique in Bangladesh	• The highest rhizome yield (45.2 t/ha) has been obtained from plants grown in Coco dust media × BARI Ada-1 using fertigation while the lowest yield (8.5 t/ha) has been found from Soil × BARI Ada-3. • The highest benefit-cost ratio of 2.40 has been recorded with the Coco dust media× BARI Ada-1 while the lowest benefit-cost ratio of 0.47 has been observed in Rice barn × BARI Ada-3. • The highest rhizome yield (14.34 t/ha) has been obtained from plants grown in SRC practices × BARI Ada-1 using conventional method and the lowest yield (6.66 t/ha) has been recorded from farmers practices x BARI Ada -3. • The highest benefit-cost ratio of 1.97 has been recorded with the in SRC practices × BARI Ada-1 while the lowest benefit-cost ratio of 0.72 has been observed in the farmers practices x BARI Ada -3. • Ginger can profitably be cultivated in coco dust substrates with BARI Ada-1 using fertigation technique.
12	328	The Nutritional Analysis and Popularization of Minor Fruits to Rural and Urban Communities of Bangladesh	• Macro and micro nutrients of 7 selected minor fruits (Chalta – Indian dilenia, Amra- Golden apple, Amloki - Aonla, Bilimbi, Satkora, Jara Lebu,Deo-phal – Egg tree) have been documented. • Antioxidant and phytochemicals namely total polyphenols, phenolic compounds (gallic acid, ferrulic acid, caffeic acid,courmaric acid and vanilic acid),total antioxidant capacity, reducing power capacity, DPPH free radical scavenging activity,ferrous iron chelating activity, carotenoid, anthocyanin and lycopene of 7 selected minor fruits have been documented.
13	333	Development of green mussel Perna *viridis* farming system in coastal areas for boosting blue economy of Bangladesh	• Maheshkali channel and Naaf River Estuary have been found the most suitable site for green mussel farming in Bangladesh. • Green mussel selectively has been fed on plankton and such ingestion has been found to vary with season, size and sex. • The major spawning season has been observed from January to March and a minor spawning has been observed in July to August in Bangladesh waters. • Long-lining rope culture and cage culture have been found the best culture techniques. • Green mussel rich in nutrients and good source of protein, essential amino acids and polyunsaturated fatty acids. Green mussel harvested in winter season has been found more rich with these nutrients
14	337	Integrated Pest Management (IPM) approaches to Major Pests of Tea for sustainable tea production	• A pest management laboratory with modern scientific equipments and an IPM field laboratory have been established at BTRI sub-station, Panchgarh. • IPM techniques have been developed in tea such as Plucking, Pruning & Field Sanitation as cultural control measures against major pests of tea.

Sl No.	Project ID	Sub-Project Title	Major Preliminary Findings
			• Resistant or susceptible clones/agro-types against major pests of tea have been screened out. • Solar power light traps, yellow & blue sticky traps as mechanical control measures against major pests of tea have been developed. • Garlic plant extracts, Bacillus thuringiensis and commercial bio-pesticides PEAK MOTI & PEAK MONA have been found most effective in controlling the red spider mite and looper caterpillar of tea.
15	339	Identification of VAM and Determination of their Potentiality on Tea Cultivation	• Among the tested 20 plant species, 8 have been found positive for AM association. The highest colonization has been observed in Leucas aspera (60%) followed by Tagetes spp. (35%), Albizzia lebbek (30%), Tripsacum andersonii (20%), Derris robusta (15%), Albizzia odoritissima (15%), Mimosa invisa (15%) and Indigofera teysmannii (10%). • Three AM species viz. Glomus, Gigaspora and Scutellospora have been isolated and identified from tea ecosystem. Glomus is found as dominant AM fungal species associated with the roots of higher plant. • A positive correlation between root colonization and AM spore population are found. • No association of AM fungi with the roots of transferred tea saplings is found in the nursery condition after 30 and 90 days of inoculation.
16	340	Determination of residue level of commonly used pesticides in tea	• The residue level of chlorpyrifos for green leaf and made tea have been found 0.164 mg/kg (above MRL of EU) and 0.013mg/kg respectively at 7 DAS while the residue level of quinophos for green leaf and made tea have been observed 0.022 mg/kg and 0.025 mg/kg respectively at 7 and 3 DAS which are below the MRL of EU (0.05). • The safe Pre Harvest Interval (PHI) of chlorpyrifos and quinophos has been found 10 and 7 DAS for green leaf of tea.
17	342	BTRI Clones and Improved Seeds to the Stakeholders	• Two nucleus clone plot (NCP) have been established in Madhabpur T.E. and Patrokhola T.E. • Planting materials have been supplied to Jagcherra T.E., Chatlapure T.E. and Luani-hollycherra T.E. for establishing seedbari. • A nursery has been established in which a total number of 8800 plantlets of different improved cultivar e.g. BT1, BT9, BT11, BT12, BT13, BT15, BT16, BT17, B207/39 and TV1 have been raised for further supplying to the tea estates for establishing NCP and Seedbari.
18	345	Productivity Enhancement of Promising Vegetable Varieties during Winter and Summer in Sylhet Region	• For summer season country bean production, “Sikribi sheem-1” has been found most suitable (40-50 kg/decimal) in Sylhet region. • Production of summer tomato in Sylhet region using grafted tomato seedling has been observed more productive (55 t/ha) in compare to non grafted seedling (28 t/ha). • BARI Hybrid tomato-5 has been found more productive (94 t/ha) in Sylhet region in comparison to other commercial variety during winter. • Production of broccoli in Sylhet region has been found promising (90-110 kg/decimal) and profitable. • BARI Jharsheem-1 has been observed very productive at October (77.0 kg/decimal) and November (75.0 kg/decimal) sowing in comparison to other genotypes.
19	349	Identification of the causes of high calf mortality in buffalo and their mitigation measures in	• Bacterial and parasitic causes of buffalo calf mortality in Bangladesh have been identified. Viral causes are being investigated. • Environmental and management related risk factors associated

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		Bangladesh	with calf mortality in buffalos has been identified. • Poster & Leaflet on disease calendar of buffalos along with vaccination schedule has been prepared to disseminate in buffalo farmers and policy makers as a means of mitigation of buffalo calf morality in Bangladesh.
20	362	Prevalence and molecular characterization of Shiga toxin producing Escherichia coli (STEC) in poultry and their products in Bangladesh	• Shiga toxin producing E.coli (Stx1 and Stx 2) from broiler, layer and indigenous chicken have been isolated and identified by PCR. • Shiga toxin producing E. coli such as O157: H7, O111, O26 and O45 has been successfully isolated and identified from the poultry and their products. • Suitable antibiotics have been identified against Shiga toxin producing E. coli (STEC) infection. Norfloxacin, Azithromycin and Amikacin have showed the highest sensitivity pattern against STEC.
21	363	Business Opportunities of Ornamental Fisheries in Bangladesh: Development of a Production and Economic Assessment Model	• Baseline information on the present status of ornamental fish business in Bangladesh has been collected. • Zebrafish breeding technique in the laboratory has been developed. • Goldfish breeding technique in the backyard hatchery has been developed.
22	364	Study on quality of fish feed, brood use and fingerlings produce in commercial fish farm of Bangladesh	• Most of the commercial fish farms owners have been used commercial feed instead of homemade feeds. • Manufacturers' declared proximate composition of most of the collected feed samples has been either lower or higher. • Brood stocks and fries of river, govt. hatcheries and BFRI have been found better than private hatcheries. • Several abnormalities of embryo and deformities of larvae have been caused in no brood stock and with brood stock but not good management compared to maintain brood stock properly.
23	367	Development of Live Attenuated Duck Plague Vaccine Using Local Duck Plague Virus Strains	• Ten duck plague viruses (DPV) have been isolated and identified from field outbreaks of duck plague. • All DPVs have been adopted into the embryonated duck eggs • Phyogentic analysis of three DPVs (BAU, DP1, DP2 and DP3) have showed complete similarly with Anatid alpha herpes virus 1 originated from China (KU216226.1) and Anatid alpha herpes virus 1 originated from Bangladesh (KX768734.1)
24	368	Morpho-molecular characterization of underutilized indigenous vegetables in Bangladesh	• Eighteen drumstick (Moringa sp.), 15 pigeon pea (Cajanus cajan L.), 3 roselle (Hibiscus sabdariffa var. sabdariffa L.) and 2 wild teasle gourd (Momordica cochinchinensis) (Lour.) germplasm have been collected. • Morphological characteristics like plant height, leaf, rachis, flower, fruit and seed characters of the collected moringa, pigeon pea, roselle and wild teasle gourd have been recorded. • Genomic DNA from 18 moringa, 60 (15x4) pigeon pea, 12 (3x4) roselle and 8 (2x4) wild teasle gourd plants have been isolated.
25	369	Development of sustainable biological weed management techniques through allelochemicals from crop residues	• Ten different crop residues eg. Grass pea, mustard, pea, barley, sunflower, lentil, sorghum, wheat, soybean and rice have been screened out based on potentiality of allelochemicals. • The trend of inhibition in the pot have been observed as Sorghum> Lentil> Grass pea >Sunflower > Mustard > Rice > Barley > Wheat > Acacia > Soybean. • The trend of inhibition in the aqueous extracts have been found as Sorghum> Lentil> Grass pea >Sunflower > Marshpepper > Mustard > Rice > Barley > Wheat > Acacia > Soybean. • Aqueous extracts of sorghum crop residues 1: 2 ratio (w/v) inhibited 51.81 % Bathua, 51.10% Mutha, 52.90% Durba,

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			53.85% Shama, 73.83% Tit begun, 55.58% Biskatali and 75.26% Angta. • Aqueous extracts of mustard crop residues 1: 2 ratio (w/v) inhibited 66.32 % Bathua, 60.98% Mutha,73.90% Durba, 66.40% Shama, 67.65% Tit begun, 67.52% Biskatali and 67.36% Angta. • Aqueous extract of allelopathic potential crop residues like sorghum, mustard, grass pea, lentil etc. could be a prospective source of weed control tool for crop production in modern agricultural science.
26	376	Adaption of a new species "Tomatillo (Physalis phyladelphica Lam./Physalis ixocarpa Brot.)"	• Adaption of a new crop species "Tomatillo" which is an eco-friendly (no pesticides are required) and short- durated (85-90 days) crop. • Two previously released varieties of tomatillo (SAU tomatillo 1 and SAU tomatillo 2) have been disseminated to the farmers' at three agro-ecological zones of Bangladesh. • A third line of tomatillo (PI 003) has been found promising for variety registration.
27	378	Socio-economic Impact on Wheat Research and Development in Bangladesh	• BARI Gom-24 covered 32.15% of wheat area followed by BARI Gom-26 (22.35%) and BARI Gom-25 (20.61%). • Growth rate of area and production of wheat increased significantly at the rate of 2.50% and 3.00% respectively during the period of 1986-87 to 2015-16. • Area, production and yield instabilities of wheat have been found 20.76, 26.91 and 13.65 respectively in terms of instability index during the period of 1986-87 to 2015-16. • The extent of fluctuations of area, production and yield ranged between -16.58 to 16.36, -24.64 to 28.05 and -12.14 to 20.07 percent respectively during the period of 1999-2000 to 2015-16. Production fluctuated more than areas and yield of wheat.
28	382	Development of existing maize based cropping patterns for sustain soil fertility in south-western region of Bangladesh	• In the existing Maize-Fallow-T.Aus cropping pattern Mungbean/ Blackgram can be grown successfully. • Maize-Mungbean-T. Aman /T. Aus cropping pattern has been produced 19-26% higher rice equivalent yield compared to existing Maize- Fallow- T.Aus pattern. • Farmers income has been increased 15-24% by adopting the improved Maize-Mungbean-T.Aman/T.Aus cropping pattern.
29	384	Characterization and Documentation of Minor Fruits in Bangladesh with Special Emphasis on Coastal and Hilly Areas Fruits	• Collection and conservation of selected minor fruits from coastal and hilly areas of Bangladesh have been completed. • Morphological characterization and nutritional status of all the selected minor fruits have been completed. • Five Monkey jack, eight Velvetapple, four Cowa, three Riverebony and one each of Governor's plum, Lukluki and Gutguti genotypes have been identified.
30	386	Agro-forestry for livelihood development of Jhumia community (shifting cultivators) in Chittagong Hill Tracts, Bangladesh	• Limited knowledge on agro-forestry practices; in-adequate availability of quality saplings, fertilizer and pesticides; scarcity of water and uncertainty of market price of farm products have been identified as major problems of hill farmers in agro-forestry. • Sixty hill farmers of Bandarban have been trained on agro-forestry systems, nursery establishment and pest & disease control measures. • 12 hectares bamboo plantation has been established in the farmers' field with other agro-forestry species of timber, fruits

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			and year round vegetables. • 5 nurseries at farmers' field have been established for raising seedlings of different timber, non-timber and medicinal plants. • Farmers have been producing seedlings of bamboos and other plants for selling and earning extra money to improve their livelihood.
31	389	Oxidative stress tolerance of maize under drought and salinity: Mechanism and identification of stress inducible proteins	• In-gel activity protocol of SOD (Superoxide dismutase), POD (Peroxidase), CAT (Catalase), APX (Ascorbate peroxidise), GPX (Glutathione peroxidise) and GR (Glutathione reductase) have been developed.. • Activity assay protocol of enzymes under anaerobic conditions like ADH (Alcohol dehydrogenase),PDC (Pyruvate dehydrogenase) and LDH(Lactate dehydrogenase) which have shown 10 times economic than the existing ones. • Cat3, APX1 and APX2 have been identified as responsive protein under salinity. • CAT1, CAT2, CAT3 and GPX2 have been found important for drought tolerant.
32	393	Cultivation, Marketing and Processing of Medicinal and Aromatic Plants (MAPs) in Bangladesh	• Nail setting and purchase costs are the major cost item to agar producer and processor respectively. Agar product moves from producer to the ultimate consumer using four major types of supply chain. • Appropriate pesticides and methods & machineries are not known to agar plant producers for spraying pesticides for controlling insects and diseases. • Due to poverty and urgent cash need, the producers are compelled to sell immature agar plants to the processors in advance at cheaper price. • Producers are seriously harassed in collecting No Objection Certificate (NOC) and Transport Permit (TP) for harvesting and transporting of plants.
33	395	Genetic improvement of indigenous cattle for beef production through crossing with Brahman cattle by farmers participatory breeding approach in Bangladesh	• A total of 724 Brahman crossbred calves have been born and phenotypic appearance of these calves have been observed very attractive. • Calve mortality (3.23%) and dystocia (0.61%) have been found to be negligible. • Birth weight, 12-month weight and average daily gain of Brahman crossbred calves have been found higher than the existing cattle genotype of Bangladesh.
34	397	Seed production of Bhagna, Labeo ariza (Hamilton, 1807) through line breeding trial in Bangladesh	Growth rate of Bhagna has been observed satisfactory but as it is a minor carp it does not grow as fast as the other commercially cultured carp species in Bangladesh. • Among the six different developed lines, line-4 (Kangsha ♀ x Attrai ♂) has been found best in terms of length and weight gain in the larval rearing period of 60 days. • Line-4 has the highest number of small new muscle fibre (mosaic hyperplasia) in comparison to other developed lines. • Line-4 may be used as a base population for the production of

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			good quality seed & brood stock of Bhagna (L. ariza) for better growth performance.
35	400	Evaluation of endocrine bio-pesticides against major sucking insect pests of vegetables	• About 80 to 85% sucking insect populations (aphid, jassid, white fly) have been reduced due to the application of Bio-pesticides like Buprofezin (Award 40 SC), Lufenuron (Heron 5 EC) and Pyriproxifen (Pyrifen 10.8EC). • Chitosan has been found to be ineffective against sucking insects and this result has been observed consistent with laboratory findings. • Initially, the action has been found to be slower but increased gradually. • Infested or curled leaves (%) have been reduced potentially following treated with selected endocrine bio-pesticides. • Endocrine bio- pesticides have been found to be safe for natural enemies in vegetable eco-system.
36	403	Characterization of Mycoplasma gallisepticum isolates from Bangladesh and their use in production of diagnostic antigen and development of vaccine candidate	• Five samples of Mycoplasma gallisepticum (MG) bave been collected from Goala bazar, Dokhin surma, Dhaka dokhin, Fenchugonj and Alutol of Sylhet district. • Three samples have been found positive in Hayflicks Agar and Freys broth. • All the three samples have been found positive with MG Specific primer which may be used for vaccine development to control the poultry disease.
37	406	Assessment of postharvest losses based on postharvest practices and marketing performances in selected vegetable supply chains in Bangladesh	• Both pre and post-harvest practices have been found responsible for postharvest losses of vegetables. The main cause of PHL has been observed improper sorting & grading of vegetables after harvest.. • Farmers have been used bamboo basket, plastic crate and jute/ plastic sac for harvesting as well as packaging containers. • Insect- pest infestation, virus infection, stem rot disease and lack of labourers have been identified as the major problems of vegetable production. Farmers have been used plenty of pesticides non-judiciously to protect their crops. . • Although most farmers have been sold their produce to Bepari at the local assemble/primary markets, a good portion has also been sold at the crop field. Both mechanized and non-mechanized van has been the major mode of transports. • The total postharvest loss of vegetables at farm level has been ranged from 5-8% due to odd size, insect-pest infestation, disease infection, over maturity, physical creak and injury, and ripeness of vegetables
38	407	Supply Chain Analysis of Major Vegetables Produce in Hill and Coastal Regions of Bangladesh	• Vegetable production techniques in hilly (Homestead, plain land & jhum cultivation) and coastal regions (Plain land cultivation, sorjon method and composite agriculture -Gher based agriculture) have been identified. • Maximum quantities of produced vegetables have been consumed within the district and minimum quantities have been marketed at distance market after fulfilling local demand. • Identified major supply chains are: Farmer cum Retailer-

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			Consumer, Farmer-Retailer-Consumer, Farmer- Bepari-Arathdar-Retailer-Cosumer and Farmer- Arathdar- Paiker cum Retailer – Consumer. • Major constraints have been found in the vegetables supply chains are in the area of production (salinity, heavy rain, drought, ignorance about the modern technology, lack of irrigation facilities etc.), marketing (high transportation cost ,lack of traders, shortage of capital, lack of permanent retail market etc.) and linkage of rural market with urban market (lack of market information & road communication, high transport cost etc.). • Vegetables cultivation has been found profitable in hill and coastal region.
39	410	Development of Sustainable Aquaculture System in the Inundated Low-laying Agriculture Land in the Coastal Region of Bangladesh	• Hygroryza aristata floating grass has been utilized as fish feed directly which is a new initiative for aquaculture in the fisheries sector of Bangladesh. • Aquaculture system has been established in the open water of low-laying agriculture land through maintaining water quality for good aquaculture practice by exchange water daily through tidal action. • Fish production has been observed possible without fish feed cost by using Hygroryza aristata floating grass except labor cost, and this technology might reduced 3.54 times fish production cost and may be benefited 5.91 times more.
40	413	Assessment of ecosystem services and benefits of rooftop gardening for climate-friendly city development using geospatial technology	• About 65% RTG (rooftop garden) owners of selected areas has been harvested 21-40 kg of various products/year. • Dhaka city rooftop gardens have possessed high species diversity (Shannon Weaver Diversity Index-4.51) and high interspecies diversity. • About 90% RTG owners have been consumed fresh products from their rooftop garden while only 9% RTG owners have been sold their products in the local markets. • The survey result showed that the air temperature has been reduced by 5.2^0C as compared to bare roof. • About 30% RTG owners have felt thermal comfort in their room as compared to without garden.
41	418	Growth and Productivity Assessment of Agar Plant (*Aquilariamalaccensis Roxb.*) through Management Practices	• The medicinal plants have been performed well in agar garden as intercrop. • Among five medicinal plants Bashok and Kalomegh have been found better performance in comparison to others. • High percentage of agar wood and oil have been produced from nail and insect wounding plants.

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42	419	Management of acid soils for sustainable crop production in Madhupur Tract and Northern & Eastern Piedmont Plains	• All crops of three cropping patterns (T. Aman rice - Wheat–Mungbean, T. Aman rice -Maize – Fallow and T. Aman rice -Mustard – Boro) have shown reductions in grain and straw yields in acid prone areas of Fulbaria and Nalitabari Upazilas. • Application of lime (Dolomite@2t/ha) has showed an increase in grain and straw yields of crops in all three cropping patterns. • Additionally, organic manure alone or in combination with lime has been remarkably increased the yield of all crops. • Addition of lime and organic manure to acid soils has been found beneficial for achieving sustainable crop productivity in the areas of Madhupur Tract and Northern & Eastern Piedmont Plains.
43	426	Molecular characterization of Babesia, Theileria and Anaplasma organism in livestock in Bangladesh	• Ninety blood samples of adult cattle have been collected from BAU teaching hospital, Dinajpur sadar, Rowmari upazilla of Kurigram, Sirajgonj, Mymensingh (Dewkhola, Fulbaria) and Rangpur (Kaunia) for characterization of Babesia, Theileria and Anaplasma organisms. • PCR has been performed targeting the 16S rRNA gene of Anaplasma spp and 18S for Babesia and Theileria. • Out of 90 samples, 28 positive samples have been observed in both microscopically and PCR, which has confirmed the methods of detection.
44	429	Impact of Improved Aquaculture Technologies on Productivity and Livelihood of Fish Farmers in Bangladesh	• Most of the respondents have been adopted improved crab production technologies in the study areas. • Education and extension contact has positively influenced the adoption decision. The farmers who have their own pond adopting more. Duration of trainings and more experienced farmers have been adopting more. • Adopters of improved technologies have been received significantly higher yield and profitability compared to the non adopters. • Consumption expenditure of the adopters have significantly higher than non adopters which indicated that standard of living of adopters have better than non adopters • The adopters have been spend more on purchasing fishing equipments compared to non adopters. • Adoption of improved crab production technologies has been positively enhancing the productivity, profitability and standard of living of the adopters.
45	432	Achieving adaptation to climate change and sustainable livelihood through Moringa based agro-forestry practice in Bangladesh	• A total of 220 Moringa planting materials (cutting) have been collected from eight districts. • The highest diversity of Moringa has been found in Rajshahi (4 types, seasonal, year round, pinkish coloured, and thin) followed by Pabna, Bogura and Mymensingh. The lowest diversity has been found in Manikgonj • Lack of stable market, quality planting materials, technical knowledge, and evidence of the benefits of Moringa products have been found the major constraints to further widening the plantation of Moringa. • Six vegetables namely red amaranth, stem amaranth, chilli, okra, mung bean and brinjal have been grown with Moringa saplings and found all the crops can successfully be grown up to 6 months in association Moringa without significant yield loss.
46	439	Evaluation of tree-	• Critical issues and composition of existing agro-forestry systems

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		crop interaction from existing agro-forestry systems in Sylhet region for food security by the lens of climate-smart agriculture framework	in Sylhet region have been identified. • Adoption of agro-forestry practices and climate-smart agricultural technologies have been influenced mainly by preferences and resource endowments of respondents. • Promising climate-smart Agar based agro-forestry production technologies i.e., Pineapple+Agar, Tea+ Agar, Bilatidhania+Agar, Zinger+Agar, Turmeric+Agar, Malta+Agar based agro-forestry model for Sylhet region have been developed. • Additional pineapple, zinger, turmeric, malta and / or tea could be grown without hampering the growth and development of agar tree.
47	440	Tobacco replacement through high value and nutrient rich crops for food security and nutrition of char land people under Bhuapur upazilla of Tangail	• Black cumin, chilli, bottle gourd, sweet gourd, groundnut, wheat and maize have provided more profits (97.13 to 740.41%) and nutrition against tobacco. • Black cumin, chilli and bottle gourd could easily be fitted in existing T. aman- Tobacco- Jute/Sesame cropping pattern which can replace tobacco. • Additional application of gypsum fertilizer (37 kg/ha) with modern cultivation practices (including irrigation) after flowering stage of groundnut has produced higher yield (54.66%) than the traditional cultivation practices. • BARI Gom-26, BARI Gom-28, BARI Gom-30, BARI Gom-33, BARI Hybrid Maize-7, BARI Hybrid Maize-9, BARI Chinabadam-8, BARI Chinabadam-9, BARI Chinabadam-10, BARI Kalozira-1 may be recommended for char land farmers due to its higher yield and more economic return. • Due to higher yield and market price char land farmers would be benefited economically and ensured food security which improved their livelihood and discourage them tobacco cultivation.
48	442	Increasing Productivity of Cropping System in Some Coastal Areas of Bangladesh	• Strip tillage and mulching have been found better for higher yield, net benefit and BCR of all Rabi crops in both saline and non-saline ecosystems. Sunflower is the best in respect of yield, net benefit and BCR. • In non-saline ecosystem, the highest net benefit (Tk.229651), REY (21.35) and BCR (1.98) are obtained from T. Aus rice (BRRI dhan55)- T. Aman rice (BRRI dhan77)-Sunflower (Pacific Hysun 33) cropping pattern with strip tillage of sunflower. This pattern also produced highest net benefit (Tk.199950), REY (21.08) and BCR (1.77) under mulching condition of sunflower. • In saline ecosystem, the highest net benefit (Tk.191835), REY (17.87) and BCR (1.82) have been obtained from T. Aus rice (BRRI dhan55)-T. Aman rice (BRRI dhan73)–Sunflower (Pacific Hysun33) cropping pattern with strip tillage of sunflower. This pattern also produced highest net benefit (Tk.181990), REY (19.6) and BCR (1.74) under mulching conditions of Rabi crops. • The farmers' practice Fallow-T. Aman rice (Moulata)-Mungbean (BARI Mung-6 with conventional tillage and broadcasting sowing) in non-saline ecosystem and Fallow-T. Aman rice (Swarnomusuri)-Fallow in saline ecosystem produced the lowest net benefit, REY and BCR.

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49	443	Development of Effective Vaccine Against Bovine Mastitis	• Forty eight samples have been collected and analyzed through cultural and bio-chemical test for isolating and identifying the microbial agents causing mastitis in cattle. • All the 48 samples have showed E. coli and Streptococcus spp. Positive. While 30 and 28 samples have showed Klebsiella spp. and Staphylococcus spp. Positive respectively.
50	444	Effect of Different Fruit Bagging Materials on the Production of Quality and Safe Mango	• Brown paper bag has been found best in respect of physico-chemical and microbial parameters of mango in comparison to polythene and white paper bag. • The usage of pesticides has been reduced. Pest and diseases free safe mango has been produced. • Quality of bagging mangoes has been almost unchanged. . • Some mango growers have been adopting bagging technology.
51	448	Monitoring and surveillance of duck diseases in Hakaluki and Tanguar hoar and development of suitable vaccination models and other preventive strategies	• A data base of selected infectious diseases of ducks in household and commercially raised ducks in selected areas of Hakaluki and Tangguar haor and their risk factors has been developed. • A benchmark for active surveillance of duck diseases has been established. • A GIS map of infectious diseases in haor areas has been developed. • A vaccination schedule fit for duck farming in haor areas has been constructed based on the risks identified and experts opinion through workshop.
52	451	Molecular identification of the tomato leaf curl virus (ToLCV) resistant/ tolerant tomato lines	• Twenty one line from eight germplasm have been found to be completely resistant against ToLCV in both field and molecular observation. • Three lines from eight tomato local germplasm have been found to be tolerant against Tomato Leaf Curl Virus and other lines have been observed to be susceptible. • Five promising lines have been identified that could be used as donor parents in breeding program. • BLAST results of the sequence has confirmed the presence of Ty genes in those five selected lines.
53	452	Effectiveness of non-chlorine sanitizers in improving the safety and quality of high value exportable fresh betel leaf	• Safe betel leaf production practices at field level have been developed. • Non-chlorine sanitizers and washing practices to eliminate pathogens from betel leaf surfaces at commercial level have been developed. • Low cost hygiene improvement materials to improve personal hygiene practices of farmers at the field level have been introduced.
54	454	Agricultural Practices and livelihood Patterns of Selected Tribal Communities in Bangladesh	• Tribal peoples are lag behind the mainstream of the country in terms of socioeconomic development and livelihood. • Tribal farmers have been engaged in agriculture as well as other income generating activities where majority of them produced agricultural commodities. • The most common farming practices have been observed- Crop-Livestock-Poultry (C-L-P), Crop- Poultry-Homestead enterprise (C-P-H) and Crop-Livestock-Homestead enterprise (C-L-H), which have also been found more or less profitable. • Agricultural technologies like betel leaf, betel nut and ell fish production (Cuchia), agro-forestry plantation, coffee tree

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			cultivation, jhum cultivation, medicinal plant cultivation and rice cultivation (local) have been practiced by the tribal farmers. • Constraints like lack of knowledge on agricultural technologies, lack of extension service, high price of inputs, etc. have been hindered the agricultural development of the tribal communities. • Training, motivation, support and extension services of different government and non-government organizations might raised the awareness about modern agricultural technologies for increasing the agricultural production as well as improving their livelihood.
55	459	Selection of Salt Tolerant Sunflower and Mustard Genotypes Based on Physiological and Biochemical Traits	• Two sunflower (BD-4017 & BARI Surzumukhi -2) and three mustard (BD-10115, Jun-405336 & BARI Sarisha-16) genotypes have been selected under salinity based on the physiological and bio-chemical traits. • In comparison with the salt tolerant cultivar (Hysan), selected sunflower & mustard genotypes have higher or similar trends of physio-biochemical changes and anti-oxidant enzymes activities and have showed the better tolerance performance to the salt sensitive cultivars. • SOD1, SOD2, CAT1, CAT2, APX2, APX3, POD1 & POD3 have been observed the responsive protein under salt stress.
56	462	Study on environmental and socio-economic impact of Daudkandi model floodplain fisheries management	• Fish production, income, employment, rice production and diversification of business have been increased while rice production cost has been reduced. • Disparity, shifting occupation and social conflict (due to control over water) etc. have increased. • Environmental degradation as well as loss of biodiversity have been happened due to use of pesticides and industrial affluent. • However, this model could be adopted in other floodplains of Bangladesh.
57	464	Production of Asian Seabass (Lates calcarifer) in brackish and freshwater earthen pond under natural and artificial feeding regime in South-west Coastal zone of Bangladesh	• Recorded physical and chemical parameters of water have been observed in suitable range. • Higher final weight has been recorded at a density of 25 seabass / decimal in monoculture system. • Final weight has been found higher in polyculture than monoculture. • Higher final weight in fresh water environment has been observed through adding Nacl with artificial feed.
58	465	Validation and up scaling of fresh cut fruits and vegetables processing technologies	• Demand of fresh cut fruits and vegetables have been increasing in the city especially in Dhaka. • Fresh cut (FC) control carrot (no heat treatment) stored in refrigerator has been found acceptable up to 4 days where as carrot treated with warm solution of 2% NaCl kept in PP box has been observed good up to 8 days and carrot treated with warm solution of 2% citric acid has been found good more than 10 days.

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			• Fresh cut (FC) cauliflower packed in perforated LDPE bag, sealed LDPE bag, PP box and cling wrapped stored in refrigerator has been observed acceptable up to 16 days while vacuum packed cauliflower has been found acceptable more than 20 days. • Fresh cut pineapple washed with sanitizers (2% citric acid solution, 200 ppm sodium hypochlorite) stored in refrigerator has been observed good up to 6 days and without wash has been found good up to 5 days whereas tap water washed pineapple has been observed good up to 4 days. • Fresh cut jackfruit bulb washed with sanitizers (2% citric acid solution, 200 ppm sodium hypochlorite) stored in refrigerator has been found good up to 12 day and bulb without wash has been observed good up to 9 days while bulb washed with tap water has been found good up to 6 days.
59	471	DNA Barcoding of Freshwater Fishes of Bangladesh: Implication for Conservation and Management	• A total of 225 specimens belong to 136 species have been collected and identified during the study period (May 2017- June 2018). • 211 DNA sequences have been generated of 136 species belong to 17 Orders of 60 Families. Gen Bank accessions of 136 species have already been completed. • At least seven new species have been recorded and reported- Clupisoma prateri, Batasio convexirostrum, Badis tuivaiei, Botia rostrata, Schistura fasciolata, Devario annandalei and Oryzias javanicus • A standardized reference library as 'Bangladesh Barcode of Life' (www.bdbol.net) Data base system has been developed for the use of researchers, students and policy makers.
60	473	Develop a hydrogeological framework and a sustainable crop establishment period for haor areas of Bangladesh	• Cultivation of non rice crops as well as Aus has not been possible before November and after May respectively. • Early maturing Aus may be cultivated with irrigation if normal flooding has not been expected within three months. • Rainfall difference between the driest and moist month has been recorded 692mm. • Average annual temperature, temperature changes and water level increase have been observed 24.90c, @ 18.40c and up to 1.5mrespectively. • Cultivable lands have been observed inundated at the beginning of flood. • Higher price of agricultural inputs, lack of quality seed, labour, storage & transportation facility, institutional support and income instability have been found the major constraints of farmers.
61	474	Status of insect biodiversity and ecosystem functions in tea estates of the Sylhet region	• Variations in microclimatic conditions (i.e., temperature, relative humidity, dew point, light intensity, etc.) of four microclimatic habitats have been recorded. • Variations in abundance of tea bush (as understory vegetation) of four microclimatic habitats have been recorded. • Arthropods (Insecta) samples of eight collection dates have been identified. • Relative abundance of pest, beneficial and mixed group have been determined.
62	477	Survey, Monitoring	• Some sucking pests (thrips and mite), borer complex

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		and Eco-friendly Integrated Management of Major Insect Pest and Disease in Chilli at Jamalpur Region	(Spodoptera litura and Helicoverpa armigera) and diseases (Fusarium wilt, Bacterial wilt and choanephora) have been identified as barrier of chilli production. • Spraying of Spinosad (Success 2.5SC) and Abamectin (Toximite 1.8EC) along with blue & yellow sticky traps has been found effective for controlling sucking insect pest of chilli. • Mass trapping of Spodoptera litura and Helicoverpa armigera + spraying of SNPV and HNPV along with Spinosad (Success 2.5SC) has been found effective for controlling borer complex of chilli. • Alternate spraying of Carbendazim (Autostin) and Pyraclostrobin+Metiram (Carbio Top) along with seed treatment has been found effective for controlling wilt disease of chilli. • Spraying of Tebuconazol+Trifloxistrobin (Nativo) @ 0.6g/l of water has been found effective for controlling anthracnose and choanephora disease of chilli.
63	479	Collection, Evaluation, Characterization and Bulb Preservation of Lilium in Bangladesh	• 19 attractive coloured lilium germplasm have been collected. Among them, 14 and 05 genotypes have been found suitable for cut flower and pot culture respectively. • One genotype Lil-001 has been found to be cultivated under various shade (UV poly film and shade net) and open condition. • Both Asiatic and Oriental lilium could be cultivated in Bangladesh successfully.
64	484	Management of Indigenous Fishes in Wetland (Gajner Beel, Pabna) Ecosystem	• A total of 51 fish species have been found in the Gajner Beel Wetland ecosystem, where 45, 03 and 01 fishes have been observed as indigenous, Indian major carps and exotic species respectively. • Current Jal and monofilament mosquito net have been found the most destructive fishing gears for indigenous fishes in the Gajner beel. • Major threats to the fisheries resources in the Ganjner beel have been observed the reduction of water level, destructive fishing gears, indiscriminate killing of fish fry, fingerlings and gravid fish, habitat destruction and climate change etc. • Size at sexual maturity has been estimated for a total of 23 indigenous fish species from the Gajner beel, where the mean value has been observed 9.4 cm total length with 95% confidence level having 7.25 to 11.61 cm. • Spawning season for most of the fishes has been extended from March to September with its peak in June –July.
65	488	Mass seed production and culture technology of threatened fish Cirrhinus reba for sustainable aquaculture in Bangladesh	• Morphological and genetic variations of wild stocks of C. reba among the natural populations in Dinajpur, Bogura, Mymensingh and Jessore have been assessed. • Induced breeding of C. reba by applying pituitary gland extract @ of 1.5 mg/kg as 1st dose for female, 7.5 mg/kg as the 2nd dose, and 2 mg/kg for male has been done successfully. • Seven lines of C. reba by mating between and within different wild stocks have been developed. Within population, the stocks of Dinajpur and Mymensingh have showed better performances, and within populations,the females of Dinajpur and males of Mymensigh have showed the highest performances in terms of

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			ovulation, fertilization and hatching rate. • Development of larval rearing and nursery management technique for fingerling production, using of boiled egg yolk for the 1st feeding, traditional handmade feeds and manuring have been found effective for fingerling production. • C. reba sperm have showed high sensitivity to salinity gradients during motility activation. Sperm have been found motile for 24 seconds at 0.1% NaCl but motility endured over 20 minutes at 0.8% NaCl. • Exposure of embryo to pesticide have resulted degeneration of nucleus leading to embryo death.
66	489	Development of Quality Value Added Fish Products and Utilization of By-products	• Two waste sources eg.shrimp(23190.24 ton/year) and fish (17605.71 ton/year) have been found predominant. • The highest amount of shrimp waste has been found in the seafood processing industries of Khulna (12016 ton/year) followed by Chittagonj (7965ton/year), Cox,s Bazar (2155ton/year), Dhaka (771 ton/year) and Sylhet (284 ton/year) regions respectively. • Egg has been observed the most frequently consumed. 77% respondents have been eaten egg once daily. The chicken has been found the most consumed (62%) whereas, fish in the third place (%(%). Mutton has been observed in the fourth place of consumption frequency level. • More fish has been consumed in Khulna division followed by Barishal and Sylhet. • Considering all aspects, fish burger prepared by using 70% fish mince has been found better.
67	490	Crop Productivity Enhancement through Agronomic Practices in Sylhet Region	• BARI Sarisha-14 and BARI Sarisha-15 have produced higher yield under limited water condition. • BARI Mashur-8 has performed better in relay cropping with T.aman rice under residual soil moisture. • BARI Mashur-8 performed better in relay cropping with T.aman rice under residual soil moisture • Liming @1.5 t/ha has increased grain yield of wheat. • BARI Gom-28, BARI Gom-31, BARI Hybrid Maize-9 have been produced higher yield under residual soil moisture conditions. • Mustard, Mungbean and Wheat have been grown successfully in T.aus-T.aman cropping pattern in Sylhet region and total productivity and profitability have been increased considerably over existing farmers practice.
68	491	Improving the performance of mechanized seeding through innovations in seed metering system	• The Chinese Precision Seed Meter has been found better than the BS, WS and VMP types. • Use of Precision Seed Meter has been recommended for planting maize with or w/o tillage. • The precision seeding system has been found capable to save time & cost as well as reduce drudgery compared to traditional manual planting.
69	492	Conservation Agricultural Practices for the Improvement of Soil Health, Cropping System Productivity and Farmers' Income	• Strip tillage (ST) with residue retention has conserved more available soil moisture in soils in wheat field relative to conventional practices (CT) which has resulted higher grain yield of wheat (3.91 t/ha) in ST compared to CT (3.0 t/ha).This practice has also contributed significantly higher system productivity in terms of REY under wheat-mungbean-T. aman cropping pattern. • Under ST practice, 25% higher dose of N has produced higher yield of rabi crop, mustard yield might be due to lower mineralization for conservation tillage. • Under jute-onion-T.aman cropping pattern, conservation tillage

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			has produced identical yield with conventional tillage. • For jute, 125% STB dose of CF has produced higher yield but for the subsequent crops T. aman and onion, 100% STB applied as IPNS providing 80% CF and 20% CD has resulted higher yield. Conservation tillage in combination with 100% STB applied following IPNS approach (80% CF and 20% organic manure) has resulted higher REY. • Positive trend of improvement of soil fertility has been observed under conservation tillage practice.
70	493	Characterization of commercial probiotics using for fish and shrimp culture in Bangladesh	- 31 commercial aqua probiotics have been collected and enlisted with the product level information. -118 isolates have been isolated from different commercial probiotics using selective media. • Biochemical characterizations of some isolates including gram staining, catalase and oxidase have been completed. • Most of the tested isolates have showed moderate tolerance in acidic condition whereas highly in bile salt. • Most of the isolates have showed diverse range of susceptibilities in different kind of antibiotics. • 30 isolates from different commercial probiotics have been tested for hemolytic activity but no activity has been found.
71	497	Evaluation of the suitability and efficacy of potato and wheat as probiotic compounds on the growth performance, survaivality and tissue composition of Labeo rohita and Catla catla	• Wheat and potato as prebiotic supplement has been enhanced the growth performance of rohu and catla. • In both cases inclusion of 15% potato and wheat has showed the best performance. • 15% prebiotic compound has showed the most bacterial load. • Potato and wheat may be used as prebiotic supplement to enhance the growth performances of rohu and catla and may be used for other species.
72	499	Nutrient management for a rooftop garden	• In case of soil, organic and inorganic fertilizer combination, application of 80% of STB doses + 2 kg vermicompost /6kg soil has been found more effective for maximizing the yield of vegetables, fruits and flowers grown on the rooftop garden. • In case of soil and organic fertilizer combination, vegetables (capsicum & bottle gourd), fruits (strawberry) and flowers (periwinkle, gladiolus & gerbeara) grown on the rooftop garden have performed better in 1 kg vermicompost for 1 kg soil while the lowest yield has been obtained from 1 kg cowdung for 2 kg soil.
73	502	Molecular identification of local and exotic strains of koi (Anabas testudineus) for strategic conservation management	• Local and exotic koi can be identified using mtDNACR gene sequences. • Mitochondrial CR gene can be used as molecular marker for koi fish in Bangladesh. • Information about cross koi from the field can be diagnosed.
74	504	Risk Assessment and Development of Management Approach(es) Against Tomato Leaf Miner, Tuta Absoluta	• Among five locations, the highest and lowest infestation of tomato leaf miner Tuta absoluta has been observed at Panchgarh and Comilla respectively. • The peak period of Tuta attack has been nobserved in the month of March- April in winter and May-June in summer season. • The population of this pest has been observed higher during nsummer season than that of winter season. • The Tuta population has been found positively correlated with the

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			temperature, %relative humidity and rainfall (mm). • Application of Metarrhizium anisolpiae bio-pesticide in soil @ 5g/l of water + Foliar spray of Azadirachtin (Bio-Neem plus1 EC @1ml/l of water) + Mass trapping through installation of Delta sex pheromone trap has showed the best performance considering the reduction of Tuta infestation, increase of marketable yield and maximum marginal benefit cost ratio.
75	510	Development of nanomaterial mediated feed for improving growth and immunity of fishes	• More active nanoparticles for different metals under oil bath heating have been prepared. • Active series of NPs have been found- Zn> Fe >Cu. • Nanomaterials mediated feed for disease free fish growth has been developed.
76	512	Development of a sustainable agricultural risk management technology in areas affected by flash flood using numerical climate modeling data analysis	• Flash Flood trend for Sylhet district has been developed. This trend line already fit for past scenario (2010-2017) in both model synthesis (EdGCM and CCSM) and EdGCM predicted flash flood in the upcoming days of 2018 (completed) to 2020 (in Process) at the study area. • Although, there are variations in data of different models of flash flood, all models have their numerous potentiality on predicting flash flood and in all the cases, the test hypothesis of this research serves as a key indicator of flash flood in this area. • Different information about the negative effects of flash flood on crop production has been collected to develop a scenario of the study area.
77	518	Identification of different species of bacteria causing bacterial diseases of silkworm (Bombyxmori) L. and their control	• Some bacteria like Streptococcus sp.,Staphylococcus sp. and Bacilli sp. have been isolated and bio-chemically tested from the infected silkworm. • The relationship between host and pathogen incidence has been observed high during the period from May-September at the high temperature or high humidity. • Bleaching powder, Para formaldehyde, Ammonia. Benzoic Acid, Calcium carbonate, and Sodium carbonate have the potentiality to control the bacterial diseases.
78	519	Development of modern reeling machine and its use for quality and quantity raw silk production in the field	• Comparatively improved reeling machine has been designed and fabricated. • The reeling performance of the fabricated reeling machine has been found superior than the existing reeling machine. • Quality raw silk production cost has been found less than the existing reeling machine. • Renditta has been comparatively improved.
79	520	Study on the nutritional quality of underutilized mulberry fruits, leaves & silkworm pupae and their value addition	• Mulberry tea (Cha) from mulberry leaves has been prepared. • Mulberry Sauce from mulberry fruits has been prepared. • Mulberry Jelly from mulberry fruits has been prepared. • Pupae Oil has been extracted from silkworm pupae. • Fatty acid profile of pupae oil has been analyzed.

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			• Nutritional quality of mulberry leaves (% of moisture, crude protein,crude fibre, reducing sugar, total sugar& starch) and silkworm pupae (% of moisture, crude protein, oil & ash) have been assessed.
80	521	Vertical farming : The future solutions for organic vegetables production in urban area	• Among the five winter vegetables, Lettuce, Red amaranth, French bean and Pak-choi (Bati-shak) have showed good performance in vertical frame cultivation. Spinach has not showed good results. • All the vegetables in vertical frame cultivation have showed better results when soil mixed with vermi-compost. • In summer, vertical frame cultivation of Indian mint, Water spinach, Indian spinach and Thankuni have showed good performance in the soil mixed with vermi-compost.
81	526	Studies on the Species Complex and Their Bio-Rational Based Management of Fruit Flies Infesting Fruits and Vegetables in Bangladesh	• Among the four major species group viz. Bactroera dorsalis (13 isolates), B. tau (8 isolates), B. cucurbitae (4 isolates), and B. scutellata (2 isolates), three group viz. Bactroera dorsalis, B. tau and B. cucurbitae have been found the most prevalent. • Ceratitis capitata, which is popularly known as Mediterranean fruit fly (Medfly) is one of the world's most destructive fruit pest has been collected and morphologically identified from Rahmatpur, Barishal. However, through COI sequencing it has been identified as Bactroera tau. • Sanitation + Pheromone Mass Trapping followed by sanitation + attract & kill method has been found very much effective against cucurbit fruit fly, while sanitation + attract & kill method has been observed effectively control fruit fly complex in different fruit crops.
82	528	Up-scaling Of Lac Production Technologies for Poverty Reduction of the Ultra Poor and Marginal Farmers	• Apple kul and BAU kul have been found as good hosts of lac at Jamalpur region while Sirish & Babla have produced good yield of lac both at Nachole & Chapainawabgonj. • Lac production efficacy of ber has been found better at Jamalpur region next to Chapainawabgonj.. • Both of Eublemma amabilis and Pseudohypatopa pulverea have been observed the major pest of lac at all of four locations. • Spraying of Neem seed extract and Azadirachtin have reduced the predator population effectively and increased lac yield. • Basal application of water has reduced lac insect mortality during extreme hot weather condition in Barind area resulting in increased lac yield.
83	529	Determination of adulteration of commonly used pesticides and their left over residue in major fruits and vegetables	• Out of 250 analyzed vegetable samples (viz. yard long bean, hyacinth bean, cauliflower, bitter gourd and brinjal), 33 samples (13.2%) have been found contaminated with chlorpyriphos, diazinon, acephate, quinalphos and dimethoate residues while 217 samples (86.8%) have been found contained no detectable residue of the sought pesticides. Among the 33 contaminated samples, 28 has been observed (11.2%) above the MRL with chlorpyriphos, diazinon, acephate, quinalphos and dimethoate residues. • Out of 60 analyzed mango samples,3 have been found contained cypermethrin residues (0.063mg/kg, 0.085 mg/kg and 0.280mg/kg) collected from Rajshahi and Ishurdi while 1 has

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			been found contained dimethoate residue (0.192 mg/kg) collected from Rajshahi, which has been found above MRL. Out of 60 litchi samples, 2 have been observed contained cypermethrin residues (0.056 mg/kg, and 0.074 mg/kg) collected from Rajshahi and Ishurdi and 1 has been found contained chlorpyrifos residue (0.127 mg/kg) collected from Ishurdi, which has been found above MRL. • Four supervised field trials have been conducted with the recommended dose of fenvalerate (1ml/l of water) and dimethoate (2ml/l of water) in tomato and hyacinth bean. The PHI has been found 10 days after spray (DAS) in tomato and 14 DAS in hyacinth bean while for dimethoate 10 DAS in tomato and 12 DAS in hyacinth bean. • Around 71% marketed brands of tested pesticides (cypermethrin, carbofuran, diazinon, dimethoate, chlorpyriphos and quinalphos) have been found pure in terms of AI presence. In addition, 12% of the tested brands have been found between 80%-90% pure while14% of the tested marketed pesticides have been observed equal or below 80% pure and the remaining around 3% brand has been found sub-standard level (≤ 50%) of purity which has supported the claim of overusing pesticides due to impurities. Pesticides collected from Bogura (50% a.i in chlorpyriphos) and Comilla (26% a.i in cypermethrin) have showed more impurities than other region.
84	532	Development of commercially feasible pro-biotic food products for human and feed products for poultry using native isolates through biotechnological interventions	• Forty two native pro-biotic isolates (Presumptive Lactobacillus spp.) have been obtained from yogurt samples. • All the isolated probiotics have been found gram positive, catalase negative, non-motile, coagulase positive and have showed significant tolerance against low pH(3.0), bile salt (0.3 %), NaCl(1-6%) and phenol (0.1-0.4%) and positive sugar fermentation patterns. • Probiotics have showed significant positive results on diarrhea, hypercholesterolemia, immunoglobulin E (IgE) and E. coli in induced mice as well as have improved the glycemic and lipidemic status in type-2 diabetic rats. • Buffalo milk yogurt has showed antibacterial activity against seven human enteric pathogens and two enteric fungi.
85	533	Establishment of suitable fracture management techniques in different animals (cattle, goat, dog, cat) at Sahidul Alam Quadery Teaching Veterinary Hospital (SAQTVH) in Chittagong	• A total number of 6163 fracture cases of cattle, goat, dog and cat have been occurred. • Among them 13.45% and 10.25% have been found surgical and long bone fracture cases respectively. • The highest fracture incidence has been observed in goat (42.35%) followed by dog (23.52%), cat (22.35%) and cattle (11.76%) respectively. • The maximum causes of fractures have been observed falling from height (34.11%) followed by trauma by fighting, beating etc. (21.18%), unknown (20%), automobile accident (12.94%) and stuck in cot (11.76%) respectively.
86	538	Development of production package	• Off-season production of dragon fruit has been made possible by manipulating the environment through artificial lighting using

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		with special emphasis on off season flowering of dragon fruit	100-watt incandescent bulb (normal bulb), 20-watt LED (Light Emitting Diode) bulbs or 36-watt CFL (Compact Fluorescent Lamps). • Irrespective of time cutting length has been observed important for dragon fruit propagation. The longer cuttings have showed superiority over shorter cuttings. The cuttings prepared with 30 cm length have performed better followed by cuttings of 20 cm length in all the growth parameters. But considering number of propagule 20 cm length has been found suitable. • Higher doses of fertilizers have been observed positive effect on plant growth and reproductive behavior compared to control (no fertilizer). 250 % of the fertilizer dose (540g N, 315g P and250g k_20) applied in three to four split application has been found suitable considering growth, flowering and fruiting of dragon fruit. • Fruits of BARI Dragon fruit-1 have been reached physiological maturity at 28 DAA. At this stage of maturity, fruit has attained 250 g in weight in an average having light pinkish colour. Moreover, fruit has contained 12.2% TSS, 78.45 mg/100g of vitamin-C and 5.58 µg/100g of β Carotene, which are the important quality attribute of fresh fruit. Besides, shelf life of fruits has been observed 14 days at ambient condition. •
87	545	Effect of Nitrogen, Phosphorus and Potassium on Growth, Yield and Leaf Quality of Mulberry	• In case of different level of N, the average maximum total leaf yield/ plant (802.0g), Chlorophyll-a (5.34 microgram/gm), Chlorophyll-b(59.19 microgram/gm) and also the biochemical properties: moisture (%), moisture retention capacity (%), crude protein (%), reducing sugar (%), total mineral (%) and total sugar (%) have been obtained from the application of 320 kg N/ha/yr + 150 kg P/ha/yr +100 kg K/ha/yr in 6-10 years old Mulberry plants. • In case of different level of P, the average maximum total leaf yield/ plant (833.33g), Chlorophyll-a (2.69 microgram/gm), Chlorophyll-b(58.73 microgram/gm) and also the biochemical properties: moisture (%), moisture retention capacity (%), crude protein (%), reducing sugar (%), total mineral (%) and total sugar (%) have been obtained from the application of 300 kg N/ha/yr + 120 kg P/ha/yr +100 kg K/ha/yr in 6-10 years old Mulberry plants. • In case of different level of K, the average maximum total leaf yield/ plant (941.30g), Chlorophyll-a (2.92 microgram/gm), Chlorophyll-b(63.49 microgram/gm) and also the biochemical properties: moisture (%), moisture retention capacity (%), crude protein (%), reducing sugar (%) and soluble carbohydrate (%) have been obtained from the application of 300 kg N/ha/yr + 150 kg P/ha/yr +90 kg K/ha/yr in 6-10 years old Mulberry plants.
88	548	Design and development of a compensated emitter for efficient drip irrigation system in Bangladesh	• Pressure compensated emitter has been designed. • The manufacturing flow variation along the lateral in this system has been found less than 15% (Excellent according to ISO 9261). • This emitter has been found able to work under very low pressure. • Initial investment required for the production of this emitter by

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			small scale manufacturer has been found to be BDT 35000.00.
89	551	Identification and economic analysis of existing agroforestry practices in the northern region of Bangladesh for better agroforestry practices	• In Kaharole upazila, 9 categories of agroforestry (AF) practices have been recorded out of 60 practices studied. Net income (NI) of orchard having AF system has been found the highest among others. Among the practices, both mango and guava based practices have been found more profitable than others. • In Jaldhaka upazila, 13 major categories of practices have been identified out of 60 practices studied. Orchard having AF system has been observed more profitable than other AF systems. Among the 13 categories of practices, betel nut based AF practice has been found the highest profitable. • In Panchbibi upazila, 11 major categories of practices have been identified. Net income of orchard having AF has been found higher than homestead and cropland AF. Among the practices, highest NI has been recorded in mahogany + eucalyptus based practices than that of others. • In Gurudaspur upazila, 4 major categories of practices have been identified. The analysis has showed that the NI and BCR have been found the highest in orchard having AF compared to other systems. Among the practices, mango+ litchi has been recorded more profitable than others.
90	553	Performance of induce breeding of threatened small indigenous species (*Botia Dario and Lepidocephalichthys guntea*)with different stimulate hormones	• Breeding season (Monsoon-from April to mid July) of L.guntia and Botia dario have been identified. • Gonadosomatic index (GSI) of the targeted species have been measured. • Dose of hormone for induce breeding of L. guntia has been optimized. • The viable fry of L. guntia has been produced. • Nutritional value of those species has been measured.
91	554	Agricultural Imaging System for Rice and Mungbean Disease Detection and Management in Agro-Field	• Asoftware, AgRMD has been developed for detection and classification of rice and mungbean diseases automatically. • A new algorithm development for rice and mungbean disease analysis through image processing with ANN model. • Wireless networking system for real time monitoring of agro-field with obtaining near surface soil characteristics.
92	556	Development and evaluation of formalin killed inactivated egg drop syndrome virus vaccine using local isolates	• The virus has been successfully reactivated in duck embryo. • The virus sample @ EID_{50}-$10^{8.6}$ /ml has been successfully inactivated by formalin. No growth of bacteria in bacteriological media and no growth of virus in duck embryo have indicated the virus is sterile, completely inactivated and safe to use as vaccine in chicken. • Three different experimental EDS vaccines have been prepared by using three different oil adjuvants, named as BAU-EDS1, BAU-EDS2 and BAU-EDS3. • Experimental EDS BAU-EDS3 has been found to induce higher antibody titre and gave higher protection compare to other experimental vaccine like as commercial vaccine

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			Nobilis®. • After challenge with virulent field isolate EDS virus in laying hen, BAU-EDS3 has been found to give higher protection (90-95%) compare to other experimental vaccine.
93	557	Benchmarking cost of milk production in typical dairy farms in selected regions of Bangladesh: Implications for milk market price and livelihood improvement policy	• Average milk yield (kgECM/cow/year) has been found 1801,the highest (2673 kg) and the lowest (770 kg) yield have been observed for business farms in Sirajgonj and household small farms in Bogura. • The average cost of milk production (COMPO) has been found BDT 3239/100 kg ECM while the average for Bogura has been observed higher (BDT3482/100 kg ECM) than Sirajgonj (BDT 2995/100 kg ECM). • Looking into total cost of the dairy enterprise, BDT 6096 /100 kg ECM, Sirajgonj has shown the lowest average costs (BDT 5800/100 kg ECM) compared to Bogura (BDT 6393 /100 kg ECM). • The differences between COMPO and total costs have been found significantly different which has not been known by the farmers and processors.
94	559	Symbiotic and molecular characterization of potential saline tolerant rhizobial strains and bio-fertilizer production for soybean and groundnut	• About 273 root samples from soybean and groundnut have been collected from different fields of saline soils of Bangladesh and 273 Rhizobium bacteria have been isolated and preserved at 4^0C and -20^0C. • A total sixty salt tolerant (48 dS m^{-1}) Rhizobium bacteria (30 for soybean and 30 for groundnut) have been selected and bio-fertilizer has been produced. • All the selected bacteria have formed nodulation. • Among all bacteria, Rhizobium SR7 and Rhizobium SR15, and Rhizobium GR9 and Rhizobium GR13 have been performed better in soybean and groundnut respectively. • Rhizobium strains have been found belongs to Rhizobiales order, Rhizobiaceae family, and genus Rhizobium.
95	570	Improving crop yield by using polythene mulch and potassium fertilization in saline soils	• Polythene mulch has produced several fold higher yield of bitter gourd, snake gourd, sweet gourd, water melon and melon than the control (no mulch) in the salt affected areas of Bangladesh. • Application of potassium @ 100% recommendation has been found good to obtain better yield of vine crops in Rabi season at south coastal saline soils of Bangladesh. • 100% K (STB) has been found sufficient to get optimum yield of T. Aman rice in coastal region of Bangladesh. • Split application has been found somewhat better than the sole basal application of K.
96	576	Design and Development of Power Operated Oil Palm Fruit Stripper	- Power operated Oil Palm fruit stripper has been designed, fabricated and assembled. • The best performance has been resulted from the sterilization time 15 minutes at 120^0c temperature. • The efficiency and capacity of the machine has been found 98.89% and 0.81 ton/hr, respectively for the sterilization time 15

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			minutes at 120^0c. • The inclination of the fruit outlet tray should be slightly increased (current inclination is 10^0 which need to be increased by 20^0) and the diameter of the cylinder should be increased also for big size branch (current diameter is 460 mm which should be increased by 550 mm).
97	582	Development of agro-forestry model for conversion of rice–cotton based hill farming system in the Chittagong hill tracts	• Inter-Cropping of Rice and Cotton with Banana/Papaya have been found more profitable than Jhum crops. • Banana and Papaya have been covered the fallow land after crops harvest and farmers have been earned money throughout the years by selling Papaya or Banana. • It seems to be better than shifting cultivation from social and environmental perspectives.
98	583	Testing of cotton cultivation technology in the drought prone area of Barind Tract of Bangladesh	• The highest seed cotton yield (3.23 t/ha) has been obtained from 10 July sowing followed by 25 July (3.14 t/ha) and the lowest seed cotton yield (2.81 t/ha) has been produced in 10 August sowing. • Straw mulch has produced higher seed cotton yield (3.13 t/ha) than no straw mulch (2.99 t/ha) but straw mulch has not positive effect on lint quality. • Different locations of Barind have been found effect on seed cotton yield and lint characters. • Straw mulch cannot effect lint quality.
99	584	Eco-friendly Management of Sucking insects Cotton	• Application of Azadiractin (Bioneem plus 1% EC) @ 1 ml/ L of water) + Spinosad (Success 2.5 SC) @ 1 ml / litre of water) + Yellow sticky trap has been found effective against jassid population. • Application of Azadiractin (Bioneem plus 1% EC) @1ml/litre of water) + Yellow sticky trap has been observed effective for controlling whitefly population.
100	587	**Impact of aquaculture on agricultural production in greater Noakhali districts**	• High content of organic matter, organic carbon, total nitrogen and salinity have been released from fish farm to nearby agricultural land that has been influenced the productivity of agriculture in Greater Noakhali district. • Many crops have not been produced after the establishment of fish farm except rice. • Larger aquaculture farms with hatcheries have found detrimental effects on its nearby waterlogged agricultural land through less crop production where the small farms helps to get more agricultural productions.
101	593	Development of a business model on crops and cattle for low carbon farming technique: An initiative for farm	• The low carbon farming has been able to decrease 25 % production costs and enhances yield, thus improving farm profitability. The farmers have been using BINA-8 and BINA-10 rice in the saline prone coastal area. The average yield of rice has been found 3.575 MT /hectare • The new crop-cattle mix business model has been provided

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		level in coastal region of Bangladesh	supplemental farmer income. The extra net benefits of farm having 5 cows have been estimated BDT 66,000 per year other than the rice, milk and net change in animal inventory. • The bio-gas and compost sell have been found to ensure this extra income to the farm. • Low carbon farming has been able to provide additional short- and long-term co-benefits to the environment, including improving saline soil and resilience to climate change.
102	595	Up-scaling of Multistory Agroforestry System for Diversified Production, High Income and Ecosystem Services	• The growth performance of understory crops in the orchard of jackfruit has been inhibited by the multistoried agro-forestry system (MAS). • Among the different crop-associated jackfruit based multistrata agroforestry systems, turmeric-papaya-jackfruit has been found the highest BCR (51.42%) followed by cabbage-papaya-jackfruit (32.71%) while the lowest BCR has been observed in bottle gourd-papaya-jackfruit orchard (4.17%) compared to un-managed open field. • On an average, a jackfruit orchard has been added 23.03 kg of leaf litter to the ground, which might add 10.40 and 90.15 g/kg of N and organic matter respectively in a year. • All of the crop-associated jackfruit based multistrata agroforestry systems have been observed to augment soil-N, organic carbon, organic matter and pH in compared to open unsupervised field. • Shade loving crops have been grown well in multistrata agroforestry systems in compared to open fields.
103	596	Rice-based agroforestry in Bangladesh – status and opportunities for sustainable land use system and combating future climate change challenges	• Rice based agroforestry system has been observed the 2nd most dominant land use practice in the study areas. Farmers usually have been found to plant mango trees in the field and few cases in aile and aile plus field. Farmers have been believed that agroforestry system has been improved the fertility status of soil. • Higher profit has been found the main reason of practicing agroforestry system and farmers have been influenced by their neighbor in practicing agroforestry system and now they have beennow getting the desired yield. • Yield of rice has been decreased by 25-30% when grown in association with mango trees but the yield loss has been compensated by mango. However, higher yield loss has been noted in Rajshahi followed by Chapainawabgonj and Dinajpur.
104	599	Collection and molecular characterization of resurged phytopathogen Sclerotinia sclerotiorum causing white mold disease of different crops and its integrated management	• A total of 180 isolates of S.sclerotiorum have been collected, isolated and maintained as pure culture or sclerotia stock at the Plant Pathology Lab., BARI,Gazipur. • Morphological characterization of all the isolates have indicated that mycelia growth and sclerotial formation have been varied among the isolates ranging from 2.65cm to 8.10cm at 72 hrs and 9 to 64 sclerotia/petri dish respectively. • Molecular characterization of the14 isolates (out of 180 isolates) by ITS sequencing has indicated that all of the tested isolates have been identified as publicly available S. sclerotiorum. • Phylogenetic analysis of the 14 isolates based on ITS sequences has revealed that the isolates have belonged to a similar group of

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			publicly available S. sclerotiorum and dissimilar with the group of S.minor, S.trifolium and distinctly differ from S.nivalis group. • Integration of saw dust burning + soil amendments with Trichoderma based bio-fungicide + bacillus based bio-control agents + application of fungicide Rovral 50 WP has been found the best treatment in reduction of white mold disease and increasing plant growth as well as yield of mustard, bush bean and garden pea. • Application of only fungicide Rovral 50 WP has also performed better in reducing white mold disease increasing plant growth as well as yield of mustard, bush bean and garden pea.
105	601	Molecular characterization and integrated management of Cucumber mosaic virus infecting Cucumber (Cucumis sativus) in Bangladesh	• Occurrence of cucumber mosaic virus (CMV) (10.75-28.5%) in major cucumber growing areas of Bangladesh has been determined. • Five CMV biotypes like mild mosaic, mosaic, mosaic & stunting, mosaic & curling and leaf narrowing have been identified by DAS-ELISA, EM and RT-PCR. • Strong positive correlation has been observed in developing CMV disease in the cucumber field with the aphid population. • Management package against CMV of cucumber has been developed (Integration of netting seedling, sticky yellow trap, polythene mulch and 4 sprays of Imidacloprid/Bioneem at 15 days interval has been found effectively reduced CMV incidence and increased the yield of cucumber)
106	603	Substantial development of genetic potential for improved productivity in cattle through manipulative reproduction technology	• Farmers education and breed of bull have been observed to play an important role for the adoption of AI. • Sex hormones oestrogen and testosterone present at the time of AI might play a major role for sex characterization. • Income/ cows have been slightly increased after breed up-gradation by AI in cattle. • Marked breed variation has been observed in sperm morphometry in breeding bull. • 72% male calves and 85% female calves have been obtained from Fraction-1 and Fraction-4 respectively. • Head wide larger Fractioned sperms have produced more female calves. • Estrus synchronization protocols have been increased pregnancy and calving rates have also been varied markedly at commercial farms.
107	605	Standardization of Trichoderma fortified compost for growth promotion and Eco-friendly management of Tomato diseases	• 100 isolates of antagonist fungi Trichoderma harzianum and 20 isolates of pathogenic soil-borne fungi Rhizoctonia solani, 20 Sclerotium rolfsii, 10 isolates of Fusarium oxysporum f. sp.lycopersici have been collected, isolated and identified. • Highly antagonist isolate of Trichoderma harzianum Pb-22, Pb-24 and Com-7 have been selected against different soil-borne

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			fungal pathogen. • Poultry refuges have been selected as the most compatible compost to fortify with Trichoderma harzianum colonized with wheat grain. • Standard dose of poultry refuges to mix with wheat grain colonized Trichoderma harzianum has been selected. •
108	607	Mining nobel probiotics from Red Junglefowl (*Gallus gallus*) as the alternatives to antibiotics for the safe poultry production	• A total of three Red Junglefowl(RJF) have been collected from Shonaichhari mouza, Betbunia union of Rangamati district and Baishari union, Naikhongchhari upazila of Bandarban district. The captured RJF have been identified by evaluating their phenotypic characteristics. • Thirty nine isolates have been purified from different parts of the gastrointestinal digestive tracts (crop, small intestine, large intestine and cecum) of RJF. • Molecular characterization of the 39 pure isolates based on 16S rRNA gene revealed the predominant isolates have been identified as Lactobacillus reuteri (74.35%) followed by Lactobacillus salivarius (17.9%) and Weissella paramesenteroides (7.69%). • The antimicrobial activity of the representative 13 isolates against E. coli and Salmonella sp. (isolated from chicken intestine) has been evaluated by the agar well diffusion assay. Seven of them have showed very good inhibition effect by forming inhibitory zone around the well. • Out of 14 representative isolates three and two have been observed highly auto-aggregated and moderately auto-aggregated respectively. The surface hydrophobicity of these isolates has also showed good ability to bind hydrocarbon. • Five isolates have showed ability to survive in 0.3% bile solution. • None of the isolate could not to grow in highly acidic condition (pH 2.5). However, in other pH (ranges from 5.0 to 7.5) they could grow well.
109	609	DNA barcoding and metabarcoding of coral associated fish and zooplankton community of Saint Martin's Island for effective conservation of marine life	• 109 coral fish species have been identified morphologically and 32 new species have been recorded in Bangladesh marine water. • One fish species Cryptocentus maudae has been extended its new distribution from South-west Pacific to the Bay of Bengal. • Bay of Bengal populations have showed a separate genetic structure i.e a unique habitat has been existed near St. Martins Island.
110	612	Enhancing Agricultural Research Information Services through digitization of research outputs	• Procurement of Hardware & Software have been made as par Procurement plan • Installed Server and Linux based Operating System and customized for local needs • Installed RFID Staff Work station and Tag reader software for personalization and circulation and Introduced RFID Security System for check-in check-out system • Installed Koha (Library and Information Management System) and Dspace (Full-text Depository Management System)

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			• Identification of the Information sources for Tagging has been completed for the RFID Security System • 2000 tags have been attached to the selected important documents • Populated 1300 records in to Koha database and more data input is underway • Process of digitization of necessary documents and the materials required for enhancing library housekeeping operations e.g. accession, acquisition, circulation (check-in, check-out) have been started • Documents like Annual reports, BARC Newsletters, Proceedings, EC and GB meetings Proceedings, MoU, etc. have been (digitized and) uploaded in the institutional repository • Installed Kiosk for making library database available for user. (Kiosk help user to find out their expected document without help of library professional) • Customization of on-line publishing process of research results (journal) is under process/trail • RFID Security gate and display board have been renovated
111	613	Distribution, severity, species diversity and damage assessment of papaya mealy bug	• Papaya mealy bug has been found in ten surveyed papaya growing region in Bangladesh. • Papaya mealy bug has been observed a major insect pest causing high intensity of damage. • All collected species have been found as Paracoccus marginatus.
112	623	Rooftop Gardening: An Initiative to Spread Urban Horticulture with Changing Environment	• Rooftop garden has reduced both roof upper and lower surface temperature in comparison to bare roof. Oxygen percent has been observed higher where as carbon dioxide (CO_2) concentration has been found lower in the garden than the bare roof indicating the contribution of roof gardening in conserving environment with changing climate. • Both concrete and wooden bed have showed better performance than plastic or earthen simple pot with reference to morphological and yield contributing characters and fruit yield of tomato. • Application of cow dung (10% w/w) and vermin compost (10% w/w) has increased fruit yield by improving morphological and yield contributing characters of tomato than sole application of cow dung or vermin compost or control conditions. • The wooden or concrete bed along with the application of cow dung (10% w/w) and vermin compost (10% w/w) has produced the highest fruit yield of tomato.
113	624	Developing a model-	• About 10% area of the Agolpa haor has been flooded due to local

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		based water management plan for haor wetlands of Bangladesh to reduce the vulnerability of Boro rice crop to flash floods	rainfall during the harvesting time (May 2018) whereas overflowing of the river Dhanu has been claimed 17%. • Elevating the height of field bunds has been observed an excellent measure to reduce the vulnerability of Boro crop to early floods that has been generated from local rainfall within the haor catchment. • This management approach has been found the potential to decrease inundated area of the haor by 89%. • The study site has been projected to be experiencing increasing rainfall and temperature in the future period (2031-2050) with respect to the baseline period (1991-2010). • Present flooding risk of Boro rice has been projected to be increasing in the future period particularly during the harvesting time.
114	629	Development and up-gradation of digital contents of National Agricultural Display Center (NADC) at BARC	• ICT related documents including updated technological information (72 varieties, books, poster, leaflet) have been collected from 12 NARS institutes for Physical and Digital parts. • First version of web based application software has been developed and has been collecting feedback from the focal points of NARS institutes. • Up-gradation of switch room , replacement of 4 circuit breaker, LED bulb in two floors & Installation of 6 UPS, maintenance of digital touch screen, Kiosk and 9 split type AC have been completed.
115	633	Innovation of flashflood coping rice technology for haor area through participatory approach	• BINAdhan-14 has been found more prospectus variety in regards to yield (6.0t/ha) and duration (130days). • Transplantation within first week of January has resulted early harvesting (April) which can easily avoid usual flash flood damage of Boro rice. • Farmers have showed their interest about the evolved technology. • Longer duration variety BRRI dhan 81 has been also found as promising one due to its tremendous tillering capacity (28 tiller/hill) and yield (7.8 t/ha).
116	638	Qualitative assessment of bottled drinking water and evaluation of pesticides residue of raw, washed and cooked vegetables	• Around 96 % of marketed jar water have been found contaminated with coliform while branded bottled water have been found germ free. • The total colifirm and faecal coliform have been recorded between 17-1600 MPN/100ml and 11-240 MPN/100ml respectively. • Most of the marketed jar drinking water has not been authorized by BSTI/WASA. • Residue levels of different vegetables at raw, washed and cooked samples have been recorded 62.5%, 37.5% and 18.75% respectively. • About 70-85% of pesticides residue has been removed while washing vegetables before cooking. • 12.5% of raw and 6.25% of the washed samples of vegetables have been found with pesticides residue above MRL. • Residue of pesticides namely Cypermethrin, Chlorpyrifos, Carbendizam and Dimethioate have been found remained even after cooking in few samples, but all of these residue levels have been found below MRL. • Pesticides residue of vegetables have been either removed fully and/or reduced below MRL when cooked at 100^0C or above temperature

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117	647	Floating bed fodder cultivation in submerged and flooded areas in Sylhet District: A tool for climate resilient livestock production	• Production of green fodder (German grass) in floating bed has been found similar or some cases superior compare to land and growth of fodder has been observed higher in rainy season than winter. • In vitro degradiability of fodders produced in rainy season have been found higher compare to fodders produced in winter. • Fodder quality has been observed a positive correlation (r =.746) with dissolved oxygen of water. • Production of German grass has been found higher than dal. • In vitro degradiability of silage has been observed higher than fresh fodder. • Floating bed may be used as alternative of land for fodder production in flood prone or haor area.
118	648	Potentials of modernization in fisheries sector of Bangladesh: Study on the peoples' profile, technologies and policies	• For pond farming, cooperative farming of multiple ownership pond, access to new and available technologies, soft loan facilities, training and extension services are required. • For shrimp industry, practice of semi intensive farming, ensure SPF, improved hatchery, training, awareness and maintenance of bio-security and management are important. • For lake fishery , overfishing, illegal gear fishing, pollution by agriculture practice should be controlled through implementing fish act and awareness and ecosystem based management. • Jamahal Policy is required for maintenance of baor fisheries productivity. • Establishment of Marine Protected Areas in the coastal critical habitat and migration routes. • Strict regulation and strengthening quarantine system are required for importing and use of aqua drugs and chemicals. • Indiscriminate use of pesticides should be prohibited to prevent from aquatic environmental degradation in floodplain • GAP rules and regulation should be practiced in fish drying practices.
119	649	Economics of Adoption of Bio-security Measures for Controlling Avian Influenza in Bangladesh`s Poultry Farms	• Comparing level of bio-security knowledge and practices for both broiler & layer farms have been found layer farms (78.26%) are more bio- secured than broiler farms (21.74%). • Most of the poultry farms have been found not totally bio-secured.
120	654	Small scale farming of guineafowls and turkeys in Bangladesh- a tool for poverty reduction	• Both guineafowl and turkey have been found to rear successfully as part of poultry production under small and medium scale farming. • As a new species of poultry in Bangladesh, turkey has well adapted with local environment. However, production of quality poults has been observed the major challenge. • Small and medium scale rearing of guineafowl and turkey has been observed profitable with some specific interventions.
121	656	Enhancing the crop	• Major existing cropping pattern has been identified in the study

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		productivity through adoption of climate smart technologies in the salinity area of Bangladesh	area as Fallow – T. aman rice – chilli / bean/ groundnut/ boro rice . • Irrespective of variety, application of gypsum fertilizer has improved the yield of transplant aman rice nearly 10% in both the research locations. • Effect of gypsum fertilizer has been found more pronounced in rabi crops like maize and sunflower. In combination with mulching, gypsum fertilizer has improved maize and sunflower yields more than 30% as compared to no gypsum fertilizer application. • Furrow transplanting in Boro rice along with gypsum fertilizer application has been appeared as a very promising technology for increasing the grain yield more than 1.5 t ha^{1}.
122	659	Assessment of the impact of climate change on arthropod vectors those transmitting vector borne diseases in Bangladesh	• A total of 4789 ticks, 2096 lice, 936 flies, 17 fleas and 10997 mosquitoes have been collected from seven topographic zones of Bangladesh. • Five (5) species of ticks, 4 species of lice, 4 species of flies, 1 species of fleas and 13 species of mosquitoes have been identified. • Dominant species of arthropods in Bangladesh have been confirmed by PCR. • Seasonal prevalence of arthropods has been determined. • Number of arthropods has been correlated with meteorological data.
123	661	Development of low-cost technology for making processed cheese	• Compositional analysis of 103 batches of processed cheese has been done with 40% average moisture and 50% fat in solids. • The percentage of microbial rennet has been standardized to be 0.05 g per liter of milk • Organoleptic evaluation revealed that the treatment T2BX (25% Short + 50% Medium + 25% Long + 3% ES + 2% salt) produced chees has better flavor, body & consistency, and color & appearance. • The treatment T3CX (25% Short + 25% Medium + 50% Long + 4% ES + 2% salt) has been found to be the most cost effective (Tk 535/kg).
124	666	Updating of Fertilizer Recommendation through Interpretation of Research Results Generated by the NARS Institutes	• Fertilization Recommendation Guide (FRG) -2018 has been published in English, Bengali, as Mobile apps and On-line.
125	668	Development of Protective Cultivation Techniques of Gladiolus and Gerbera in	• The variety BARI Gladiolus-4 has performed better with regard to attractive flower colour, vegetative growth, flower and corm characteristics, yield and quality. • Corm treated with GA_3 @ 200 ppm has been produced the best

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		Bangladesh	result in respect of plant growth, flowering and yield characteristics of gladiolus in Off-season under poly tunnel condition. • The promising line GJ-023 has performed better with regard to vegetative growth, flower characteristics, yield and quality under poly house condition. • GA_3 @ 100 ppm has accelerated vegetative, flowering, yield and quality characteristics of gerbera. • Gerbera varieties have been successfully grown through hydroponic culture. • Perlite + cocodust (1:1 ratio) has been observed the suitable potting substrate followed by cocodust (100%) for gerbera cultivation in pot.
126	670	Identification of Major Insect and Mite Pests of Major Vegetables in Bangladesh and their Eco-friendly Management	• Eight insect species of vegetables have been collected and identified. • Eco-friendly management of tomato fruit borer, okra shoot and fruit borer, cucurbit (bitter gourd, sweet gourd) fruit fly by using marigold intercropping, black seed oil, neem seed oil, garlic oil, detergent with savlon, netting at seedling stage and seed treatment have been developed.
127	672	Productivity Enhancement through Adaptation of Improved Crop Production Technologies in Previous Enclaves of Northern Region of Bangladesh	• Farmers of the previous enclaves have been found mostly engaged only in subsistence farming with low agricultural productivity. • The soils of previous enclaves have been observed as slightly acidic to strongly acid, low to medium in organic matter content, very high content of P except Dasiarchhara and low to very low content of other nutrients. • BARI Sarisha-14 has been found more suitable and profitable across the locations. • BARI Alu-46 has been found high yielder but BARI Alu-53 (red skin) has been found more profitable and preferable across the locations. • Alternative cropping pattern, Mustard (BARI Sarisha-14)-Boro (BRRI dhan58)-T.aman (BRRI dhan49) with STB based IPNS have resulted 109, 103 & 95% higher REY and 164, 153 & 133% higher GM than existing pattern Fallow-Boro (BRRI dhan28)-T.aman (Swarna) with FP at Dasiarchhara, Dahalakhagrabari & Banskata, respectively. • Improved cropping pattern, Potato (BARI Alu-46)-Jute (O-795)-T.aman (Binadhan-17) with STB based IPNS has produced 74% higher REY and 134% higher GM than existing pattern Potato (Lal Pakri)-Jute (Maharastro)-T.aman (Swarna) with FP at Dasiarchhara. • Alternative cropping pattern, Potato (BARI Alu-46)-Maize (BHM-9)-T.aman (BRRI dhan49) with STB based IPNS has produced 72 & 70% higher REY and 74 & 72% higher GM than existing pattern Potato (Lal Pakri)-Boro (BRRI dhan28)-T.aman (Swarna) with FP at Dahalakhagrabari & Banskata respectively.

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128	674	Production and Productivity Improvement of Haor Floodplain Fisheries for Upliftment of Fishers' Livelihood	• The production performance of monosex tilapia (Oreochromis niloticus) under cage culture has been found to satisfactory level in haor floodplain. The fish yield has been recorded 160.31-164.50 kg $cage^{-1}$ for 3 months culture period in 27 m^3 size cage. • The stocked fish production of pen culture has been recorded 1953.90 kg ha^{-1} 135$days^{-1}$ where non-stocked small fish production has been recorded 446 kg ha^{-1}. • The number of non-stocked fish species has been increased 25% over the initial baseline population under sanctuary establishment in haor floodplain. • After technological intervention, the fish yield of selected haor floodplain has been recorded 461 kg ha^{-1} yr^{-1} from the baseline production of 256 kg ha^{-1} yr^{-1}. • The overall fish production in haor floodplain has been increased against the baseline production with subsequent improvement for employment of fishers, income and household fish consumption.
129	688	Improved Crops Productivity of Beel Areas of Bangladesh	• BARI sarisha-14 and BARI sarisha-15 were found suitable before boro rice in upper land of Chalan Beel area producing higher seed yield (1600-1667 kg/ha) and BCR (1.59-1.65). • Nutrient dose of 140-44-70-30-1.8-1 kg/ha of N-P-K-S-Zn-B (125% RN) + Weeding at 15 DAE was found suitable for higher seed yield (1754 kg/ha) of mustard and higher BCR of 1.69. • BARI Gom-30 was found superior in upper land of ChalanBeel area in respect higher yield (5.02 t/ha) and BCR of 1.78. • Nutrient dose of 125-45-31-25-2-1 kg/ha of N-P-K-S-Zn-B (125% RN) + Weeding at 20 DAE was found suitable for better yield (5.52 t/ha) and economic return (BCR of 1.81) for wheat at ChalanBeel area. • Maize varieties named NK-40, 900 M Gold and Miracle produced higher grain yield (10.02-10.64 t/ha) with higher BCR (1.88-2.00) in ChalanBeel area. • Nutrient dose, 325-90-185-60-5-2.5 kg/ha of N-P-K-S-Zn-B (125% RN) + Weeding 20 DAE was found suitable for higher grain yield (12.98 t/ha) and BCR of 2.24 for maize cultivation in ChalanBeel area. • BARI Piaj-4 and local variety of onion gave better bulb yield (19.61-20.02 t/ha) and higher economic returns (Gross return of Tk. 830400-862000/ha and BCR of 2.00-2.08) in Monglarbeel area. • Nutrient dose, 150-75-200-50-5.60-2.5 kg/ha of N-P-K-S-Zn-B (125% RN) + Weeding at 30 DAE produced the highest bulb yield (19.96 t/ha) of onion with higher economic returns (BCR of 2.01) in Monglarbeel area. • Nutrient dose, 26-11-11-5-0.8-0.8 kg/ha of N-P-K-S-Zn-B + hand weeding at 20 DAE and 50-60 DAE was found suitable for higher yield (1.59-1.61 t/ha) and better economic return (gross return of Tk. 35475-41976/ha and BCR of 1.91-2.11) for B. aman in beel areas. • Nutrient level like 40-20-10-5-0.8-0.5 kg/ha of N-P-K-S-Zn-B + one hand weeding at 5-7 days after harvest of main rice was

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			found suitable for higher yield (2.10 t/ha) and better economic return (gross return of Tk. 46200 /ha and BCR of 3.82) for ratoon rice in chalanbeel area.
130	690	Assessing and mitigating the contamination of vegetable crops and soil under irrigation with urban wastewater	• Waste water irrigation has been found positively affected the growth and yield of all studied crops (spinach, Indian spinach and potato) while methods of irrigation has little effect on it. • The difference in yield has been found between 80% and 100% RFD with waste water irrigation, and the nutrient added by wastewater has been revealed that about 20-25% of RFD could be reduced for cultivation of these crops with waste water. • Crops irrigated with waste water has exhibited an increase in the concentration of macro (NPKS) and micro elements (Zn, B) in both the crops and the soils. But no consistence changes have been observed in case of heavy metals accumulation in soil. • Though crop cultivation with waste water using proper irrigation techniques (BBFI for leafy vegetables, AFI for potato and drip irrigation for tomato) could minimize the bacterial (FC,TC, TABC, F.streptococci and E. coli) contamination of crops but the degree of contamination has been found still higher for its safe use.
131	694	Assessment of effectiveness of avian influenza vaccination in commercial layer birds in Bangladesh	• None of the two AI vaccines, Re-6 and HVT-AIV produced consistent protective antibody and conferred flock immunity. • Percent of birds with protective humoral Ab titre against AIV type A has been found higher in Re-6 vaccinated birds in Gazipur. • HVT-AIV vaccine has been failed to produce protective humoral Ab titre agaist AIV type A- cellular immunity. • Positive H9 has been found in 21% vaccinated birds.
132	695	Quantitative analysis for the toxic chemical residues in fruits and vegetables using chromatographic techniques of selected markets in Bangladesh	• About 76% pesticides have been found at standard level based on purity test among the available pesticides in selected markets. • A total of 6 pesticide residues have been detected in brinjal samples while 3 have been detected in bean and cauliflower samples and the quantities have been found more than MRL. • Cypermethrin and Chlorpyrifos have been found as the common residues in brinjal, bean and cauliflower. • The Pre Harvest Interval (PHI) of spraying Cypermethrin and Chlorpyrifos in brinjal and bean have been found 15 and 30 days respectively. • Multiple pesticide residues has also been detected in few vegetable and fruit samples.
133	696	Improvement of Water Productivity for enhancing crop production in water scare area of North-West Bangladesh	• Monitoring data of ground water has been indicated that the aquifer of North-West Bangladesh is unconfined. • Storage coefficient, transmissivity, hydraulic conductivity of aquifer should be studied for further planning of crop cultivation as ground water has been the only source of irrigation in the North-West of Bangladesh. • HYV submergence tolerance variety BRRi dhan 51 and BRRI dhan 52 have been accepted by the farmers during aman season with local cultivar Zonakra. • The main cash crops onion, garlic, onion seed and wheat have not been suffered by BRRI dhan 51 and BRRI dhan 52. • Farmers have been interested to cultivate BRRI dhan 48 after non-rice crops.
134	697	Intensification of Conservation Farming in North West Bangladesh	• Transplanting of rice by rice transplanter and direct seeding of wheat and mungbean by bed planter under rice-wheat-mungbnean

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			cropping system have saved about Tk. 15000-20000/ha. • Compare with conventional, the yield of direct seeded rice in bed planting/strip tillage system has remained lower while the rice-maize-mungban system yield has been found higher in bed/strip planting system. Therefore, bed/strip planting system has saved Tk. 25000/ha compared with conventional. • Jute +relay BRRI dhan39-bed/strip planted wheat system has been produced similar yield with higher gross margin compared with farmers practice while jute +relay BRRI dhan71-bed/strip wheat has been produced higher yield and higher profit margin compared with jute +relay BRRI dhan39 and farmers practice.
135	698	Identification of climatic factors responsible for disease and insect outbreak and their appropriate management in southern region of Barisal	• Temperature at 28-30^{0}C, humidity at 80-90%, rainfall along with rice variety BRRI dhan52 has increased Gall midge infestation; closer spacing, shade, higher humidity and lower temperature have been observed conducive for leaf folder multiplication • Bacterial leaf blight has been observed the major disease followed by brown spot, blast and sheath blight. These diseases have been found higher in local varieties compared to HYV rice. Optimum time of transplanting and dose of urea has been found to decrease the False Smut incidence. • Perching, sweeping, light trapping, optimum use of urea and spraying of appropriate insecticide has been reduced the infestation of insects. • Gall midge and leaf miner have been found higher in Dasmina , Patuakhali and Shankar Pasha, Pirojpur.
136	700	Value Chain Analysis of Rice and its Byproducts in Bangladesh	• The average recovery ratio for head rice, dead rice, broken rice, rice bran and husk have been found 61.00%, 3.51%, 6.49%,8.50% and20.50% respectively from the automatic rice millers. • Total production capacity of ten surveyed oil mills has been found 197000 ton/year where as these mills have been utilized 64% of the capacity which has produced 125500 ton/year of rice bran oil. • Production cost of rice bran oil (RBO) has been found BDT 87000 per ton. • Two dominant supply chains of rice bran oil (RBO) have been observed: ▪ Miller > Dealer > Retailer> Consumer and ▪ Rice Bran Oil Miller > Company (Pran, Pusti, ACI, Aristrcate) > Dealer > Retailer > Consumer. • The key problems of RBO have been identified as unavailability of adequate rice bran and lack of promotional activities at consumer level.
137	701	Characterization of Important Rice Germplasm of Bangladesh	• Morphological and molecular characterization of 96 germplasm (48 T. Aman and 48 Boro rice) have been completed. • Among the T. Aman rice, 05 accessions have been observed short growth duration (<120 days), 09 germplasm have been found having long slender grain and 02 germplasm (Chapail and Laitasail) has high TGW (>30 g). The highest grain length breadth ratio (4.56) has been observed in Beruin (acc. 7357) and has been considered as long slender type. • Among the Boro germplasm, 01 accession number 3447(Gobirsail) has short growth duration (<135 days), 01 accession number 1648 (Elachi Boro) has higher filled grains per

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			panicle (250) and 01 landrace namely Jagi (Acc. 545) has been found the highest yielder. • In T. Aman season, 48 germplasm have been characterized with 90 primers of which 69 have been polymorphic. Similarly, 48 Boro germplasm using 90 primers has revealed 65 as polymorphic. • A total of 41 and 14 unique alleles have been found in T. aman and Boro rice germplasm respectively for specific landrace identification, for instance, the popular rice germplasm "Rajasail" has been uniquely identified using RM16, "Jotagainja" with RM455 and "Jagli" with RM447. • 48 T. aman and 48 Boro rice germplasm have been grouped into two & three clusters using structure analysis. • From the molecular characterization, it has been observed that RM206 (0.87) has been supposed to be the best marker for characterizing the 48 T.aman rice germplasm for higher PIC value and also RM302 for Boro rice germplasm.
138	705	Improvement and validation of BRRI developed head feed mini combine harvester	• Prototype of BRRI developed head mini combine harvester has been finalized and fabricated. • Capacity of two local manufacturing workshops has been enhanced. • A total of four awareness program with 60 end users have been conducted. • Two validation program has been conducted.
139	706	Delineating rice yield limiting soil factors for some selected paddy soils of Bangladesh	• OM, N, K and S content have been found the main yield limiting soil factors of Rangpur and Gazipur. • Significant differences of agronomic attributes have been observed in Habiganj and Bhanga soils over Rangpur and Gazipur. • Rangpur and Gazipur soils have been partially made as like as Habiganj and Bhanga soils through proper fertilization.
140	707	Up-scaling of bio-fertilizer for improvement of soil health and rice yield in Bangladesh	• A number of 7 potential Plant Growth Promoting Bacteria (PGPB) have been identified from Gazipur (Paenibacillus polymyxa, Bacillus sp.), Komolgonj (B. subtilis), Lalmonirhat (B. mycoides, Proteus sp, B. cereus) and Patuakhali (B. pumilus). • The efficacy of prepared bio-fertilizer has been determined by field application at Rajshshi, Barishal, Patuakhali, Kishoregonj and Gazipur soil. • About 25-30% N and 100% TSP could be saved at T. aman and Boro season by applying preparted bio-fertilizer. • The developed bio-fertilizer has been named as " BRRI-Bio-organic fertilizer". • The bio-fertilizer improved with these bacteria, kitchen waste, rice husk bio-char and rock phosphate. • Application of this improved bio-fertilizer saved 30% use of urea, 100% TSP fertilizer as well as improved rice yield and improved soil biology
141	708	Combating seedling blight and raising healthy seedling of rice in cold	• Two causal pathogens (Fusarium semitectum and Curvularia) have been detected morphologically. • Five effective fungicides have been identified to control the

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		environment	seedling blight disease. • Cultural management system has been suggested for the control of seedling blight and good seedling growth. • Nutrient management system has been developed for good growth of seedling.Standardization of nutrient spray of NPKSZn has been confirmed. • Auto controlled seed germination device (Ankuri) has been developed.
142	712	Identify and formulate bio-pesticides to control bakanae pathogen	• Forty (40) bio-controlling bacterial isolates have been isolated using morphological identification and preserved for further work .Duel culture technique has been used in Lab. condition for determining inhibition zone between bio-controlling agent and virulent isolate causing bakanae disease. • Six (6) Trichoderma spp. have been isolated and preserved for further work. Duel culture technique has been used in Lab. condition for determining inhibition zone between bio-controlling agent and virulent isolate causing bakanae disease. • Three plant products (neem leaves, Dodder plant and Mehogoni seed extraction in ethanol) have also found promising to control the pathogen in vitro.
143	714	Introgression of heat tolerant QTL (qHTSF4.1) into Bangladeshi mega rice varieties through marker-assisted breeding	• Hybridization for introgression of qHTSF4.1 QTL into BRRI dhan48 and BRRI dhan58 have been done successfully and 75 F_1 seed has produced. • Genotyping of F_1's has been completed through marker and 28 F_1 has been confirmed. • First backcrossing has been carried out in the confirmed progenies of BRRI dhan48 and BRRI dhan58 successfully and 1534 BC_1F_1 seeds have been produced. • 88 lines having fixed QTL loci (qHTSF4.1) of BRRI dhan28 and BRRI dhan29 have been selected phenotypically and advanced to BC_2F_6 and QTL have been reconfirmed by marker.
144	715	Enhancing Agricultural Technology through ICT Innovation: Mobile Application and Rice Database Development	• Mobile app has been designed & developed. • Database has been prepared & developed. • Collected data are being processed for preparing rice database & mobile app. • Mobile app hosting for Google play store & database hosting at BCC (Bangladesh Computer Council) server are being processed.
145	716	Up Scaling of BRRI Released New Promising Rice Varieties through Quality Seed Production at Farmers' Level	• During T. Aman 2017 a total of 31.5 tons paddy grains of BRRI dhan70, 71, 75, 76 and 77 have been produced through block demonstrations in 4 districts from which a total of 15.5 tons have been retained as seeds by the farmers. • A total of about 1300 farmers have gained awareness and knowledge about the new varieties of aman and out of them 80% farmers have preferred BRRI dhan 71, 75 and 76. • During Boro 2018 a total of 42.3 tons paddy grains of BRRI dhan58, 60 and 63 have been produced in Mymensing, Comilla, Netrokana and Kishoreganj from which a total of 127.20 tons have been retained as seeds by the farmers. • A total of about 1285 farmers have gained awareness and

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			knowledge about the new varieties of Boro and out of them 55% farmers have preferred BRRI dhan 58 and 60. • A total of 40 plastic drums (each capacity of about 75-80 kg paddy) have been distributed among the innovative farmers of the demonstration areas for storing seeds. • A total of 90 farmers have been trained in 3 batches in 2 upazillas of Mymensingh and 1 upazilla of Netrakona districts.
146	718	Study of the climate change impact on fisheries resources and fishers' especially women and children in selected climate hotspot zone of Bangladesh	• Climate change has the negative impact on fishers and fisheries resources in Bangladesh. • Physico- chemical parameters (temperatures, dissolved oxygen, pH and salinity) has been changed due to climate change. • Shape of fish organs have been found to remain in normal. • Gonadal maturation cycle has been changed due to climate change.
147	719	Production of low cholesterol healthy mutton by using natural herbs	• Herbal supplementation (Plantain, garlic leaves etc.) has been boosted up the growth performance of native sheep. • Feeding TMR diet (Road side grass, rice straw, wheat bran, mustard oil cake, molasses and common salt based) with herbal supplementation has been boosted up serum antioxidant status in native sheep. • Herbal supplementation has been found to reduce blood and mutton cholesterol content.
148	722	A field study on survivability of vitrified embryos in Bangladeshi native sheep	• Multiple Ovulation and Embryo Transfer (MOET) in indigenous sheep has been established. • Development of embryo vitrification protocol has been optimized. • Direct transfer protocol of vitrified embryos in the field recipient ewes has been developed. • The pregnancy rate has been found 58% in the field ewe recipients following direct transfer. • The born of lamb by direct transfer of vitrified embryos in the field recipient ewes (66.6%) has been recorded first time in Bangladesh..
149	728	Development of shelf stable value added products from onion, garlic and ginger	• The traditional storage practices of onion, garlic and ginger has not been found good enough to minimize the postharvest losses. • High quality shelf-stable onion, garlic and ginger products have been developed by utilizing available low cost dehydration processes and post-harvest losses of these spices have been reduced to an acceptable level. • The storage stability and organoleptic acceptability of these developed products have been found satisfactory. • Farmers have been interested to use these processed spices in curry.
150	729	Integrated rodent management in wheat and rice through ecofriendly control techniques	• Highest numbers of burrows have been recorded at grain filling stage (14.25/ha) and ripening stage (16.75/ha) of rice. In wheat field, similar numbers of burrow opening have been observed in grain filling to ripening stage. The wheat field of Dinajpur has been highly affected than the field of Rajshahi. About 13% rat

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			damage has been observed in wheat whereas about 7% in rice field. • Trapping followed by acute and chronic poison has showed the best result (up to 93.33 % success) for controlling rodent in rice field. Trapping followed by acute poison only has showed up to 78% success for rodent control. About 35% success has been found in case of using live trap whereas kill trap has showed only 24% success. About 70% captured animals have been found Bandicota bengalensis. • Similarly in wheat field, trapping followed by acute and chronic poison has showed the highest success (up to 96.67 % reduction over control) for controlling rodent. Trapping followed by acute poison only has showed up to 82.06% success for rodent control. About 50% success has been found in case of using only live trap and kill trap. Majority (85.83%) of captured animal have been found Bandicota bengalensis whereas a few numbers (14.17%) of Rattua rattus have also been trapped.
151	730	**Development of propagation and processing technology for Bay leaf andCinnamon**	• Air layering of Cinnamon (31%) and Bay leaf (48%) in April-May with 3000-4000ppm IBA has been found better for successful rooting and establishment. Cinnamon took longer time than Bay leaf. Cutting of Bay leaf and Cinnamon is not suitable as no rooting has been observed in any month or any level of IBA or NAA treatment. • Cleft grafting has showed 56.3% success in Cinnamon but only 6.7% in Bay leaf in March grafting. Success on Contact grafting has been found better in Bay leaf (73%) and cinnamon (88%). • Drying of Cinnamon at 40ºC temperature in the oven without pre-treatment has been found better. • Fresh Bay leaf dried at 40ºC temperature or sun drying without pretreatment has been found better.
152	732	Validation of Integrated Pest Management (IPM) technologies in the farmers fields against major insect pests of soybean at Noakhali region	• Thirty species of insect pests have been identified to infest soybean in Noakhali regions. Of these, only 6 species namely, hairy caterpillar, leaf roller, common cutworm, pod borer, stem fly & white fly have been considered as the major pests for extent of crop damage. • Most of the major insects have been appeared and infested in the crop (about 100%) during vegetative to reproductive stages (30-50 DAS) of the crop causing about 30% yield loss in 2018. • The most effective IPM technolog has been found Hand picking+Perching+Sex pheromone trap +Bio-control agent reduced the highest insect population and their infestation (80-90%) and has produced the highest seed yield (2.25 t/ha) compared to farmers practice and has reduced production cost (30%).
153	735	Production of compost,	• About 80% (weight basis) of household solid waste has been observed as organic in nature which could be converted to

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		vermicompost and tricho-compost from household solid waste and their utilization on tomato and cabbage production	compost, vermicompost and trichocompost. • Eisenia fetida, Eudrilus eugeniae and Perionyx excavatus have been found efficient in decomposing agricultural waste. • Best vermicompost has been produced from 75% cow dung with 25% cabbage leave. • 1.5 t vermicompost/ha with 100% recommended chemical fertilizer has been produced the highest yield of cabbage and tomato.
154	744	Production and Field Release of Parasitoids and Predators for Management of Major Insect Pest of Sugar crop	• To control Sugar beet caterpillar, 50.37% larval population has been decreased over control at Pabna location and 55.64% larval population has been decreased over control at Natore location. • To control sugarcane stem borer by releasing Earwig, 46.79% and 42.72% infestation have been decreased over control at Pabna and Natore location respectively. • For controlling Top shoot borer, 38.85% and 34.58% infestation has been decreased over control at Pabna and Natore location respectively. • For controlling Rootstock borer, 32.99%% and 41.27% infestation has been decreased over control at Pabna and Natore location respectively. • In Trichogramma chilonis release technique strip method has been performed better (55.91%). • 1101ml egg of Corcyra cephalonica has been collected during June'17-May'18 • Total number of Corcyra adult has been observed 1,48,372 during this time. 54 trip has been prepared for parasitization of Trichogramma.
155	746	Screening of sugarcane clones based on adaptive mechanisms under drought and salinity stress due to climatic change	• Among 5 clones of sugarcane under ZYT-111, I 85-10 and I 103-10 have been performed better than others in drought stress. • Among 6 clones of sugarcane under ZYT-11, I 198-11and I 7-11 have been performed better than others in drought stress. • Among 5 clones of sugarcane under ZYT-111, I 1227-09, I 103-09 and I 103-09 have been performed better than others in salinity stress. • Among 6 clones of sugarcane under ZYT-11, I 7-11, I 198-11, 230-11 and I 131-10 have been performed better than others in salinity stress.
156	748	Design and Development of Efficient and Low Cost Sugarcane Power Crusher for Goor Production	• Four types of sugarcane power crusher have been designed and fabricated. • Juice extraction capacity of developed BSRI sugarcane power crusher has been observed 50 to 60% of cane weight. • Crushing capacity of BSRI sugarcane power crushers have been found 250 kg to 500 kg per hour. • Power requirement of BSRI sugarcane power crusher has been observed lesser than conventional crusher.
157	750	Cost and Return Analysis of Sugarcane Production with Intercrops in Bangladesh	• Per hectare yield of sugarcane has been observed 77.43 t and total cost, total return and BCR of sugarcane production in mill zone area have been found BDT 154895, 228425 & 1.51 respectively. • Benefit cost ratio (BCR) of sugarcane + potato, sugarcane + lentil, sugarcane + coriander and sugarcane + maize in mill zone have been found 1.74, 1.76, 1.70 and 1.73 respectively. • In efficiency model of sugarcane sett, human labour, organic

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			manure, furadan, other pesticides and irrigation costs have the positive and significant impact on sugarcane yield. • In efficiency model education, experience, farmers training on sugarcane production and regular field visit by the extension workers have the negative and significant impact on sugarcane yield. • Average technical efficiency of sugarcane production in mill zonxce area has been found 77%.
158	753	Induction of somaclonal variation in non-flowering germplasm of sugarcane through in vitro culture	• From the germplasm bank of BSRI, non-flowering 20 sugarcane germplasm have been selected for development of somatic variants. Callus has been developed from the selected germplasm through in vitro cultre. • A total of 1677 number of somatic variants have been developed in vitro and acclimatized to soil at natural environment under transparent covered condition. • After hardening of in vitro plantlets, field experiment has been set up at BSRI farm following augmented design. a field experiment was set up at BSRI farm following augmented design. • Survivability of variants in the field and number of tiller per plant has been recorded after 30 and 140 days of plantation. • Out of 1677 variants, 1223 have been survived in field and the highest 4.64 number of tiller pet plant has been recorded by the variant of Isd 34 followed by Isd 37 (4.33) and CP 48-103 (3.62).
159	754	Innovation of dyed jute knitted fabric in textile technical sectors	• Different types of value added and attractive garments items like ladies gown, sweater, cardigan and ladies suits have been produced by using jute knitted fabric. • Value added and attractive garments have been produced by using Flat Bed Knitting Machine, Circular Knitting Machine and other Knitting Machine.
160	755	Enhancement of Productivity of Kenaf in Char Areas	• Yield performance of BJRI and local varieties of Kenaf the average highest fibre yield (3.90 tons ha^{-1}) has been found in BJRI Kenaf 3 at Ulipur and Sundarganj sites. • Developed cropping pattern Potato-Kenaf-T.Aman has been found suitable over existing cropping pattern Potato-Jute-T.Aman in Char areas. Gross return and gross margin have been found higher in improved cropping pattern over existing cropping pattern. • In late season, the average highest seed yield (1036.17 k gha^{-1})of Kenaf has been recorded in BJRI Kenaf 3 at both the locations. • The highest kenaf seed has been obtained from mechanical method of threshing in all the drying period and minimum requirement of time. Seed threshing through mechanical method has been found more profitable than traditional method.
161	765	Selection of super high-yielding rice genotypes	• Genotypes BR10238-5-1, BR9292-6-2-1B and BR9396-2-6-2B with higher yield and shorter growth duration have been selected. • Promising morpho-physiological traits (thick, erect and long flag leaves, deep green leaves and stems, strong stems, vigorous root systems) correlated with higher yield have been identified in BRH11-9-11-4-5B and BR10230-15-27-7B • Improved anatomical features in stem of BR10230-27-19-5-7 has been found for larger vascular bundle size, large longitudinal veins, radically arranged mesophyll cells compared with C_3 rice.

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			• BR10230-15-27-7B (score 2), BR10238-5-1(score 2) and BR7566-4-4-2 (score 2) have been selected as deep rooted genotypes for further evaluation. • Genotypes BRH11-9-11-4-5B, BR10238-5-1 and BR9292-6-2-1B with higher yield have been selected as super high yielding rice for boro season.
162	767	Screening of Shattering Tolerance of *Brassica napus*	• BEN-21 and BEN-19 are two Brassica napus lines which are tolerance to shattering. But their yield potentiality is poor. • Compensating yield and shattering tolerance; NAP-15020, NAP-16041 and NAP-0733-1 have been selected. They have been found moderately shattering tolerance as well as produced good yield.
163	768	Utilization of Fallow Land Using Underutilized Crops in Coastal Saline Area of Noakhali	• Among six (06) underutilized crops, four (04) crops namely – Proso millet, Safflower, Sorghum and Linseed have been found more suitable for cultivation in moderate to strong (6.1 to 12 dSm^{-1}) saline areas. Barley has been found suitable for moderate (6.1to 8 dSm^{-1}) saline areas whereas Foxtail millet has been found suitable for slightly (4 to 6 dSm^{-1}) saline areas. • Out of 28 intercropping systems, more than 10 systems have been found promising for coastal area for further up-scaling. • Three prototypes for post-harvest of underutilized crops have been developed and testing has been continuing in farmers conditions.
164	769	Development of mobile phone applications for phenotyping and assessment of nitrogen fertilizer requirement by digital image analysis in cereal crops	• Three softwares have been developed for digital phenotyping of rice, maize and wheat (RCC_BARI for rice, MCC_BARI for Maize and WCC_BARI for Wheat). • Algorithms have been developed for relationship between manual phenotyping and digital phenotyping • Algorithms have been developed for relationship between leaf nitrogen and digital field image. • Three mobile Apps have been developed for real time estimation of nitrogen fertilizer requirement for rice, maize and wheat.
165	774	Development of a low cost battery operated rotary type upland weeder	• Battery operated rotary type upland weeder has been fabricated by locally available materials. • Yield difference among the three weeding methods has not been found significant. • Number of labour requirement has been observed one fifth compare to other methods. • Cost of weeding has been observed almost oe foueth to hand weeding. • Area coverage of weeder has been found 17 decimal/ hour. • Mean value of weeding index has been found very close to hand weeding. • Plant damage has been observed very few at low height and low canopy crop. • Battery life has been found one year but need to chage monthly.
166	777	Improvement of dry direct seeded boro	• Dry direct seeded boro rice has been produced successfully after different rabi crops such as mustard, potato, field pea, french

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		rice based cropping pattern through climate smart technologies and its adoption in drought-prone areas	bean, tomato, lentil etc. • Organic amendment by tricho-compost, vermicompost or mustard oil cake does not have any significant effect on yield performance of dry direct seeded boro rice over the recommended rates of fertilizers • Boro rice cultivation with dry direct seeding technology has saved over 50% irrigation water compared to puddle transplanted one. Dry direct seeding by VMP has saved more than 75% labour cost for planting compared to manual transplanting. • Dry direct seeded boro rice based cropping pattern has increased cropping intensity and farm productivity.
167	778	Fine tuning of short cycle culture of shrimp Penaeus monodon in rotation with tilapia in the coastal ghers	• In short cycle (60 days), production of shrimp have been obtained 734-797 kg/ha and 705-724 kg/ha in on station and on farm station respectively. • Average body weight of shrimp has been found 17.3-18.2 g and 17.2-17.7 g in on station and on farm respectively. • Highest average yield in 90 days culture of tilapia has been obtained in on-station pond- 4755 kg/ha with a net benefit of BDT 65026.00/ha and BCR was 1.16 • Highest average yield in 120 days culture of tilapia has been obtained in on-station pond, 5997 kg/ha with a net benefit of BDT 107218.00/ha and BCR was 1.22
168	779	Improvement of live feed culture for Brackish water hatchery operation	• In indoor condition in 2 liter conical flask the highest average density has been observed 6.91×10^6 for Tetraselmis sp. while in 60 Liter white container in indoor condition highest average density 3.31×10^6 has been observed for Nannochloropsis sp. • In outdoor condition in 300 liter culture tank the highest average density 3.11×10^6 has been observed for Nannochlorum sp. while in 300 liter plastic tank in 20/ml inoculum density with different media the highest average density of rotifer (Brachionus plicatilis) 189 ind/ml has been observed for yeast+microalgae. • In 300 liter plastic tank in 300-400/ml inoculum density with different media in outdoor condition the highest average density of rotifer (Brachionus plicatilis) 721 ind/ml has been observed for microalgae+ fish oil media and no rotifer has been found in fish oil media.
169	780	Design and Development of Jute-Cotton Reinforced Polimer Composite for Rural Poultry Housing	• 60% jute and 40% cotton blended union fabrics has been found the most suitable for composites fabrication to diversify the uses of jute fibres. • Jute composites has been fabricated by varying the sample thickness (3 mm and 4 mm), MEKP (methyl ethyl keton peroxide) wt%, and nano-cellulose wt%. • The best weight proportion of methyl ethyl keton peroxide, nano-cellulose and the optimum thickness of the composites have been observed 1.5%, 6.0% and 3mm respectively.
170	781	Assessment of methane emission in dairy production systems based on existing feed resources through GLEAM model under different climatic zones of	• Actual amount of enteric methane emitted from dairy animal in different climatic zones of Bangladesh has been estimated through GLEAM model. • The suitable fodder which emit low quantity of methane has been identified.

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		Bangladesh and their mitigation options	
171	783	Collection, Conservation and Maintenance of Different Fruits Germplasm in the Hilly Region of Bangladesh	• Thirty two indigenous germplasm of 12 fruits have been collected from different location of CHT. • Nine mango (6 late and 3 early),1 jackfruit (year round), 3 burmese grape (regular bearer),2 guava (attractive colour & taste), 3 sweet orange (Juicy, sweet, large fruit size), 1 kaffir lime (Juicy, sweet), 2 mandarin (Juicy, sweet, large fruit size), 1 pomegranate (Large fruit size & taste),1 sweet lime (Small, thin & sweet skin), 1 olive (Large fruit size & taste), 1 bel (Large fruit size & bitter less) and 1Indian plum (medium fruit size & profuse bearing) germplasm have been collected. • Eight indigenous germplasm of 6 fruits have been identified from different locations of Khagrachari which will be collected in the next season.
172	785	Study on bionomics, species diversity/host range, management technique of mealy bug in kenaf and mesta	• The highest infestation of mealy bug (80.49%) has been found in BJRI Kenaf variety (HC-95) at Narayanganj Sub Station of BJRI and the most infested part of plant has been observed the twig. • Mealy bug infestation has also been found in jute plant especially in O-9897 and 0-795 variety in Faridpur and Comilla Regional Station of BJRI. • Among the kenaf and mesta varieties, BJRI Kenaf-3 (Bot kenaf) has been observed the most susceptible to mealy bug where the highest level of mealy bug infestation has been found 73.59% causing 34.36% fibre yield loss at Rangpur Station. • The life cycle of mealy bug has been observed 35-37 days. • Duration of first, second & third instars and adult have been observed 3-4, 6-9, 7-9 and 14-18 days respectively. • Phytoclean (Bio-pesticide) and Sevin 85 SP have been found the most effective for controlling mealy bug.
173	787	Offline Fertilizer Recommendation through Mobile Apps	• A mobile app has been developed that can provide agro-information on location wise specific fertilizer dose and application method for almost all crops described as Fertilizer Recommendation Guide-2012. • The farmers/users need not have any internet connection to operate this app as it has been devised to work in an offline mode. • To prepare this mobile apps accurately, all chemical data (soil test values) of all the upazila (460 volumes) have been classified and processed on the basis of land type, soil texture, soil group, and other characteristics of a union using soil έ land physiographic map to input to the main database for preparing this moble apps.
174	788	Development of cost effective complete pelleted feed and its utilization for commercial goat and sheep production	• A cost effective complete pellet feed has been developed by using rice straw as roughage and some other agro industrial by-products are as concentrate source for commercial goat and sheep production. • The body weight gain has been increased and FCR and feed cost has been reduced considerably by pellet feeding. • No clinical symptoms and other health hazards have been observed due to complete pellet feeding. • Developed complete pellet could be an alternative ready feed commercial goat and sheep production under stall feeding condition..

Sl No.	Project ID	Sub-Project Title	Major Preliminary Findings
175	790	Development of pro-biotic feed supplement for calves	• Four pro-biotic feed supplements have been formulated as potential to be used for calves. • Pro-biotic feed supplements based on rice polish and wheat bran have been recommended considering their quality and shelf life. • Wheat bran based pro-biotic feed upon feeding to milk-fed calves from 15-90 days after birth has been resulted improved fecal characteristics, lesser E. coli load, but higher pro-biotic microbes have shown shedding in feces, lower diarrhoeal incidence and improved metabolic profile. .
176	791	Effect of variety and fertilizer on cotton yield, fiber quality and seed oil content.	• The optimum NPK requirement for CB-14 and CB-15 has been found 175, 80 and 200 kg/ha respectively. • N has positive correlation with fibre length, strength and fineness for both CB-14 and cb-15. • P has positive correlation with fibre length but negative correlation with fibre strength and fineness for both CB-14 and Cb-15. • K has positive correlation with fibre length and strength but negative correlation with fineness for CB-14 while positive correlation with fibre length and fineness and negative correlation with SFI in case of CB-15.
177	798	Heavy Metal in the Industrial Polluted Area: Spatial Distribution, Risk Assessment and Bacterial Biogeography of Contaminated Soils	• Increasing trend of heavy metal (Zn, Cu, Pb, Cd, Ni, Fe) accumulation have been found in the agricultural soil due to the untreated industrial waste water discharges. • Spatial distribution of heavy metal has been observed through preparing GIS maps. • Bacterial population has been decreased dramatically in the contaminated soils as compared to the uncontaminated soils. • Community structure of soil bacteria has been changed due to the contamination of agricultural soil by untreated toxic industrial effluents.
178	801	Assessment of land degradation situation for improving soil quality and crop productivity using nuclear techniques	• Fallout Radio-nuclides (^{137}Cs, ^{210}Pb, ^{238}U, ^{40}K, $^{210}Pb_{ex}$ and ^{226}Ra) distribution has been observed in decreasing trend with increasing soil depths. • Soil has been eroded from summit position by 2.32 t $ha^{-1}yr^{-1}$, and deposited on middle slope position (2.29 t ha^{-1} yr^{-1}), lower slope position (7.59 t ha^{-1} yr^{-1}) and bottom position (11.12 t ha^{-1} yr^{-1}) respectively. • Soil has been eroded from the higher elevation and has been deposited on the lower elevation.
179	802	Studies on the performance of vermicompost and organic materials for improving soil fertility and crop productivity	• Abundance of earthworms has been observed highly dependent on soil condition. Maximum earthworms have been found in loam soil at BINA substation farm, Jamalpur (AEZ-9). • Mixtures of cow dung (CD), rice straw (RS), poultry manure (PM), giant mimosa residue (GMR) at the ratio of 2:2:1.33:1.33:1.33 with the red wigglers earthworms has been found more suitable for the production of nutrient rich vermicompost among the treatment combination. • Red wigglers earthworms (Eisenia fetida) have been observed more effective than mixture of local earthworms (Perionix excavates, Lumbricus rubellus, Eudrilus eugeniae etc.). • About 15-25% chemical fertilizer (NPKS) could be saved either with the application of 75% NPKS with 4 t ha^{-1} vermicompost or 85% NPKS with 2 t ha^{-1} vermicompost for mustard (Binasharisha-10) and Boro rice (Binadhan-14) cultivation.
180	804	Improvement of spices varieties	• Thirty three germplasm of spices have been collected.

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		cumin, sweet pepper, chilli, turmeric and black pepper through induced mutation	• LD50 / GR50 has been estimated for Chilli: 75 – 100Gy, Capsicum: 75-105 Gy ,Turmeric=:2-3 Gy ,Cumin: 3-5 Gy • M_1 populations of chilli, capsicum and turmeric have been harvested. • M_2 screening of turmeric has been conducted at Mymensingh, Magura and Khagrachori. Multi-location trials of promising mutants of chilli and turmeric would be conducted and evaluated for registration of variety.
181	809	Oxidative stress tolerance of wheat under drought and salinity: Mechanism and identification of stress inducible proteins	• After screening five promising wheat genotypes have been selected against salinity. • The best physiological, biochemical and yield data have been found in genotype BU-2008-4, which has indicated the tolerance against salinity.
182	811	**Development and Dissemination of Fertilizer Deep Placement Applicator for Increasing Fertilizer Use Efficiency and Farm Productivity**	• Single row filled urea applicator has been designed, tested and manufacturing has been under processing. • Injector type prill urea applicator has been developed. • Linkage has been developed in supplying packet USG to the local fertilizer businessmen. • Yield has been increased due to deep placement of urea at the project locations.
183	814	Development and Adaptation of Water Saving Irrigation Techniques for Upland Crops	• New emitter with low pressure (gravity) drip irrigation system has been developed for efficient application of water to individual plant. The hydraulic performance of the developed drip irrigation system has been found better at 1.5 to 2 m operating head with various slopes of 0% and 1%, and emitter discharge rate has been found from 3 to 5 liter/ hour. • Alternate / Fixed furrow irrigation techniques have saved seasonal water use of potato, maize, sunflower, brinjal from 24 to 32% and it has also improved water productivity from 28 to 40% while drip irrigation at 3-5 days interval has saved water use of brinjal, tomato, watermelon from 38 to 47% and has improved water productivity from 50 to 60% compared to traditional irrigation practices. • Water saving techniques has the potential to save water without any sacrifice in yield of crops. • Because of insufficiency of surface and ground water resources and raising salinity, these efficient irrigation techniques should be used in different rabi crops at drought and coastal salt affected areas of Bangladesh for sustainable food security.
184	815	Studies on gummosis of shade trees in tea plantation and its management	• The highest gummosis disease incidence (35.25%) has been recorded in A. procera at Uddalia tea garden, Fatikchari, Chittagong and the lowest (4.94%) has been recorded in Samanea saman at BTRI substation, Fatikchari, Chittagong. • The pathogenecity test has proved that gummosis has been caused by Lasiodiplodia crassispora and Botryodiplodia theobromae. • RH (90-95%), pH (6-8) and Temperature (25-30 °C) have been found favorable for CG (Conidial germination) and MG (Mycelial Growth) of Lasiodiplodia crassispora and Botryodiplodia theobromae. Concentration of 2-3% glucose and

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			sucrose has been observed the best for CG and MG, and sucrose has been found beStter than glucose. PDA (Potato dextrose agar) medium has been observed the best for mycelial growth of Lasiodiplodia crassispora and Botryodiplodia theobromae. • Chemical fungicides Autostin, ARBA, Knowing and Bordeaux mixture have been found effective to control gummosis disease of A. procera, A. lebek and Samanea saman. Trichoderma harzianum has also been observed effective as a biocontrol agent against gummosis disease of A. procera, A. lebek and Samanea saman.
185	817	Biochemical and molecular assay for Detection of Vibrio spp at Shrimp and Shrimp Farms in Bangladesh	• 509 samples of shrimp, water, and sediment have been collected from shrimp farms for microbiological analysis of Vibrio species. • Multiplex PCR method has been adopted to detect five major Vibrio species. • Antibiotic susceptibility of 150 Vibrio species has been isolated from shrimp farms.
186	820	DNA bar-coding of common native livestock & poultry and crossbreed animals in Bangladesh: potential uses in conservation for increasing production	• A total 985 biological specimens of cattle, sheep, goat, buffalo, chicken, duck and pigeon have been collected from different region of the of the country. • DNA extraction and PCR amplification have been completed. • Sequencing for DNA bar-coding has been completed. • Draft DNA barcode for has been prepared.
187	823	Residual Assessment of Hazardous Pesticides and Antibiotics in Shrimp/Prawn Farming Systems of South-West Bangladesh with its Traceability Identification and Risk Quantification on Human Health	• A total number of 492 retail shops from the local markets of the three districts (Khulna, Satkhira, and Bagerhat) have been surveyed and 153 different brands of pesticides and 33 different brands of aqua drugs have been found. • A total of 108 samples of shrimp, water, sediment have been collected from 36 farms of the districts of Khulna, Satkhira and Bagerhat. • Samples from 36 farms have been analyzed for hazardous antibiotics / chemicals and pesticide residues. • No hazardous Nitrofuran metabolites and chloramphenicol has been found in the samples. • Shrimp samples from 12 farms have been sent to FIQC, Dhaka Lab. to the presence of Nitro-furan metabolites and chloramphenicol but no hazardous Nitrofuran and chloramphenicol have been found. • Shrimp samples from 12 farms have been sent to BARI Pesticide Lab. to test the presence of pesticides but no pesticide residues have been found. • Some pesticides residues have been detected in the two samples of Bagerhat district that have been much lower than the

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			acceptable limit.
188	825	Adoption of Culture Technologies of Short Cycle Fish Species in the Semi-arid Zone of Bangladesh	• Polyculture of tengra (Mystus vittatus) and Polyculture of shing (Heteropneustes fossilis) in seasonal waters at the semi-arid zone has been found economically viable. • Considering growth and survival, Tengra and shing @ 500 nos dec^{-1} has been observed suitable stocking density in polyculture system. • Tengra polyculture has been found a bit better than the shing polyculture on the basis of economic aspects. • Shing polyculture has been found higher than the tengra polyculture on the basis of production.
189	827	Development of Mixed Culture Technology of High Valued Galda (Macrobrachium rosenbergii) with Two Native Catfish, Shing (Heteropneustes fossilis) and Magur (Clarias batrachus) in South-western Coastal Ghers of Bangladesh	• Highest growth performance of Shingh(47.0 g), Magur (112.0g) and Galda (77.0g) have been obtained from 400, 50 and 30 stocking density/decimal of Shing, Magur & Galda (T3) respectively after 06 months culture. • Highest survival rate have been exhibited for Magur (39.0%) followed by Galda (30.0%) and Shing (20 %). • Highest growth performance of Magur (33.0g), Shing (22.0 g) and Galda (28.0g) have been obtained from T3 after 5 months culture .
190	833	Production enhancement of carps and tilapia in creeks of Chittagong hill districts	• Fish production technology in the creeks has been adopted by the people of Chittagong Hill Districts. • Targeted beneficiaries have been involved with fish culture as their alternative means of income. • Growth and production performance of carps and tilapia have been found good. • Alternate livelihood opportunity has been created due to fish culture in the fishing ban period in Kaptai Lake