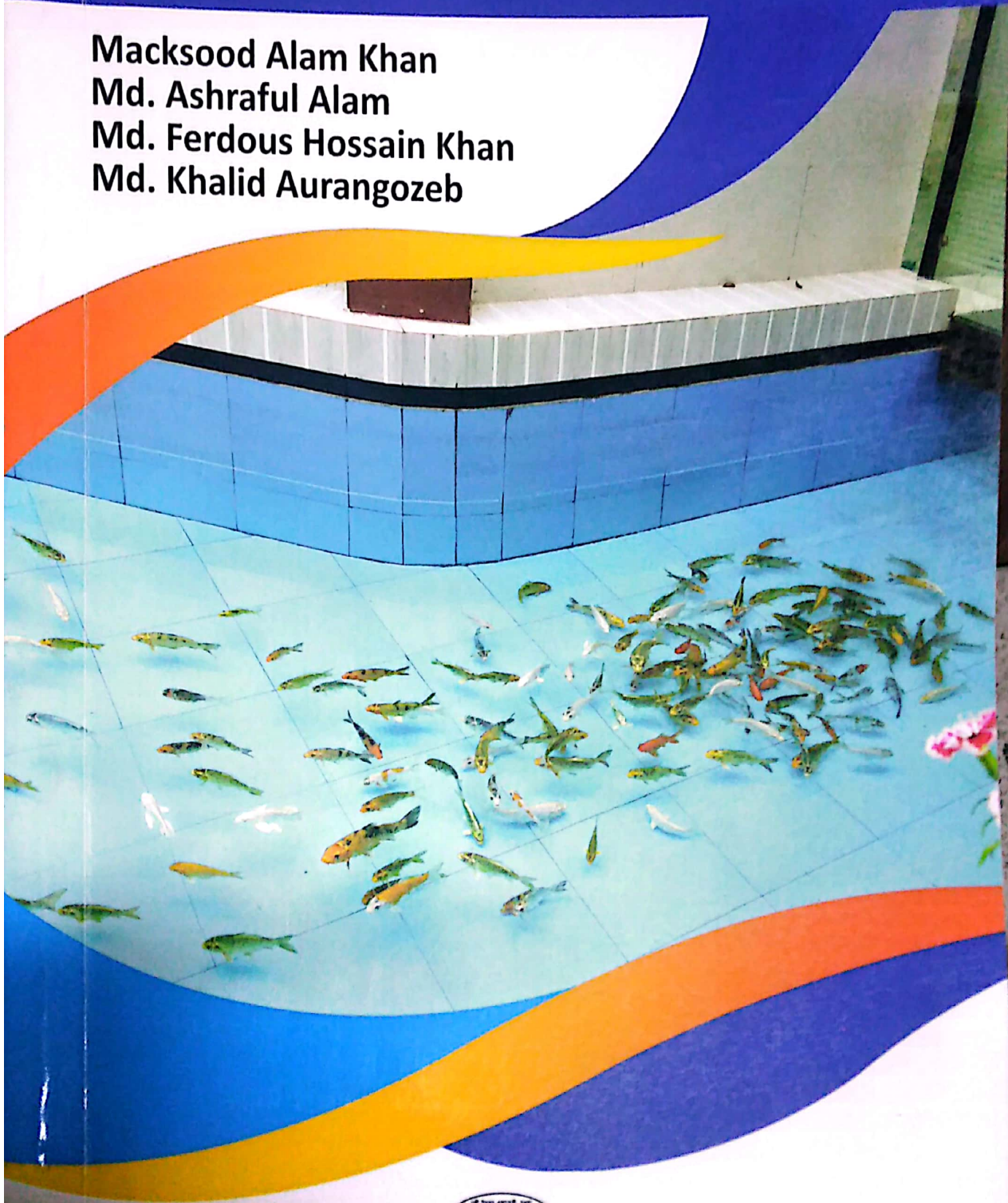


Fish and Vegetable Production through Aquaponics System

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At present, **Mr. Macksood Alam Khan** is serving as the Director (In-charge) of Project Planning and Monitoring Division of Rural Development Academy (RDA), Bogura. He has completed B.Sc. Fisheries (Hons.) and M.S. in Fisheries Management from Bangladesh Agricultural University, Mymensingh. Later on, he did second Masters's Degree from the University of Kent, UK on Conservation and Rural Development. He is also a PhD Research Fellow in Department of Fisheries Management under Bangladesh Agricultural University (BAU), Mymensingh. Title of the PhD research is - Reproductive biology of endangered mud eel *Monopterus albus* (Final dissertation accepted by CSAR, awaiting for approval of BAU Syndicate). At RDA, he is involved in planning, designing, and organizing training courses and conducting research and piloting projects, especially on fisheries and the rural development sector. Besides, he looks after the Fisheries Unit of the RDA Demonstration farm and supervises aquaculture, breeding, and spawn production of commercial fish species of carps, catfishes All Male (Mono-sex) Tilapia. He has also initiated several activities towards conserving the natural environment and launched Ecotourism program at RDA with the slogan 'Green RDA, Clean RDA'. So far, he has ten research publications, of which four are Journal articles, and the rest are research reports. He was born in Bogura district.



Mr. Md. Ashraf Alam has been working as Assistant Director in Rural Development Academy (RDA) since October 2017. He has completed his B.Sc. Fisheries (Hons.) from Hajee Mohammad Danesh Science and Technology University, Dinajpur, and M.S. from the Department of Fisheries Biology and Genetics, the same university. Mr. Alam was awarded the "Prime Minister Gold Medal" by honorable Prime minister Sheikh Hasina, the Peoples Republic of Bangladesh, in 2016 for his Excellencies in the academic result. He received the International Union Conservation of Nature (IUCN) Bangladesh award to conserve indigenous threatened fishes in Northwest Bangladesh in 2014 from his research team. Besides other activities, Mr. Alam is also working as the unit in-charge of the Fisheries Unit. As a fisheries unit in-charge in RDA, he looks after the induced breeding, nursing, and culture of indigenous and demandable exotic fishes. He has conducted different types of research related to fisheries and rural development. The first time he was able to successfully nursing of carp in biofloc. Besides, he arranged a lot of training programs, including improved fish culture technology that was helpful to enhance the skill of fish farmers. His interests include aquaculture, hatchery management, fish breeding, nursery management, fish biodiversity, biofloc technology, etc. Currently, he has thirteen publications in national and international journals.



Engr. Md. Ferdous Hossain Khan is one of the Directors of Rural Development Academy (RDA), Bogura, Bangladesh. He started his professional carrier at RDA as Assistant Director in 2004 and currently, he is serving as Director (training). RDA has a renowned center named Center for Irrigation and Water Management (CIWM) and he is also acting as the Director of CIWM. Mr. Khan is an Agriculture Engineer, graduated from Bangladesh Agricultural University, Mymensingh. He completed his Master of Science (MS) degree in Farm, Power and Machinery Discipline from the same university. He is a rural development practitioner with well reputation in the field agricultural mechanization, irrigation and water resources management. RDA has unique contribution in bore-hole technology, solar-irrigation, water treatment, waste/sewage water management, rainwater harvesting, and recycling of waste water issues, which are presently led by Mr. Khan. He enjoys photography, reading novel and playing badminton in his spare time.



Mr. Md. Khalid Aurangozeb has been serving at the Rural Development Academy (RDA), Bogura from 2004 to date. His present position in RDA is Joint Director. His tenure of service he has proved himself worthy and innovative in design and implementation of action research related to seed production, processing, and storage by farmer's participatory approach. Further, the track record during his service period in the academy proved that he has sufficient skill and expertise in conducting training programs on farm management, nursery development, and soil health management for the different levels of participants. He is also involved in action research activities in the field of plant health (Rural plant clinic), Community biogas, women in seed enterprise (WISE) and Fostering Women Voices through Videos in Bangladesh. His educational background is B.Sc (Hons) in Agriculture and M. Sc in Agricultural Extension Education from Bangladesh Agricultural University (BAU), Mymensingh. He did his second Master degree from Khon Kane University, Thailand in Rural Development Management (MRDM). He has also received training in the field of soil and water management from (EICA) Egypt. Rice breeding course from International rice research institute (IRRI), Philippine. He has a lot of publications related to agriculture and rural development.

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The authors

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EXECUTIVE SUMMARY

The study was carried out to simultaneously produce the fish and vegetables in the aquaponics system at Rural Development Academy (RDA), Bogura. Three selected ornamental fishes (Koi carp, comet goldfish and goldfish) are reared in the fish tank for gonadal maturation. A breeding trial was performed using the synthetic hormone ovaprin with different doses of 0.5-1.1ml/kg body weight. Four types of different vegetables were produced using three different media-based (TM-1: Gravels; TM-2: Bricks; TM-3: Coco-dust mixed gravels) treatments. Water quality parameters of the fish tank were monitored regularly. All the water quality parameters in three treatments were in the optimum range, indicating the nutrient cycles functioned effectively. Using doses of ovaprin 0.5 ml/kg, 0.8 ml/kg and 1.1 ml/kg the fertilization rate were 43.22%, 47.95%, 61.22% for Koi carp; 49.86%, 42.4%, 39.6% for comet goldfish; 44.74%, 39.54%, 38.4% for goldfish, respectively. The fertilization rate of the selected ornamental fishes varied significantly ($P < 0.05$) among the three treatments. The hatching rate of the following hormone doses were 43.22%, 47.95%, 61.22% for koi carp; 49.86%, 42.4%, 39.6% for comet goldfish and 44.74%, 39.54%, 38.4% for goldfish, respectively. There was a significant difference ($P < 0.05$) in hatching rate between koi carp and comet goldfish, but no difference ($P > 0.05$) between goldfish. Highest vegetable production was observed in lettuce. Peak harvest was observed in coriander at TM-1, brinjal and tomatoes at TM-3. Maximum production of coriander, brinjal, lettuce and tomatoes were 4.86 ± 0.21 kg, 4.02 ± 0.15 kg, 8.94 ± 0.47 kg, and 3.81 ± 0.14 kg, respectively. On the other hand, the minimum production of coriander, brinjal, lettuce and tomatoes were 3.22 ± 0.34 kg, 2.45 ± 0.15 kg, and 7.35 ± 0.37 kg and 2.23 ± 0.13 kg, respectively in TM-2. Along with ornamental fish and vegetable production, aquaponics creates an aesthetic value in RDA. Thus, the result of the present study suggested a high dose of inducing agent should be used for koi carp breeding and a low dose for comet goldfish and goldfish to get high fertilization and hatching rates. In the case of vegetable production, leafy plants showed better results than fruit vegetables.