Revisiting the use of chemical pesticides in agriculture

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The application of pesticide becomes an invincible part to crop cultivation. It remains unclear whether the use of chemical pesticides should be stopped or not. Environmentalists, soil scientists, hydrologists, physicians, and experts of other line departments opined to phase off chemical pesticides gradually and introduce bio-pesticides; whereas, a majority of agriculturists, food experts and agro companies argued not to stop the use of chemical pesticides, rather to train up agricultural workers on the application (how and when) of pesticides. They argued that if chemical pesticides are not used, it will reduce 30-40% crops per year, which will eventually create food scarcity. Chemical pesticides may not harmful for human health if farmers know the residual time of a pesticide after they use. According to Bangladesh Crop Protection Association (BCPA), less than 1% farmers have the skills of pesticides application and crop harvest. In Japan, agricultural workers use seven times more chemical pesticides compared to Bangladesh. However, Japanese people take safe food. This is because Japaneses farmers know when to harvest crops after using pesticides. But in developing countries like Bangladesh, educating farmers is a troublesome task. Farmers have to wait 30-50 days for harvesting a crop if they spray pesticides of organochlorin group whereas, the waiting time of crop harvest is 4-7 days if they use pesticides of synthetic pyrethroid group. Bangladeshi farmers spray at morning and harvest at afternoon which is extremely risky for consumers, due to lack of knowledge of pesticide's residual period. Chemical pesticides have proven evidence that it creates environmental hazards such as soil and air pollution and water contamination following the death of aquatic animals and many other negative externalities. Therefore, introducing bio-pesticides, other natural means of pest control, and the methods of organic agriculture would be attention grabbing in future to avoid environmental deterioration and reduce human health risks.

It is commonly agreed that chemical pesticides in agriculture has created serious health and environmental effects, however, the information remains largely anecdotal. It is estimated that one to five million agricultural workers are affected by pesticide poisoning per year and the World Health Organization reports that at least 3000 workers die from exposure of pesticides every year. The uses of toxic chemical pesticides in agriculture not only create different diseases in human health (over 200 diseases reported by WHO) such as, cancer, hypertension, kidney diseases, skin diseases, affect nervous system, irritate eye, etc. but also polute soil and air, contaminate water through surface run off and jeopardize food chains.

According to BCPA, an organization of pesticide companies, 200 companies are the registered market players as members of the BCPA, however, there are other 200 companies who are not member of BCPA or even not registered with the Department of Agriculture Extension's Plant Protection Wing (regulates the pesticides business). These 400 companies import and market about 40000 tons of pesticides annually. The annual import cost stands nearly at 200 million USD. Among these 400 companies only 11 companies are supplying bio-pesticides.

Government has pesticide testing advisory committee who conduct laboratory and field tests prior to approve import and marketing of any pesticides. Every month the Plant Protection Wing randomly tests pesticide to make sure that pesticides are not adulterated, however, it found to be tampered, pesticides of the batch are cancelled. For instance, in 2013-14, twelve types of pesticides were banned for their adulteration.

A study of Bangladesh Agricultural Research Institute (BARI) revealed that one-third of the pesticides used in producing vegetables and fruits in Bangladesh are substandard. These substandard pesticides are strengthening the resistance power of the pests. That's why, farmers have to apply excessive doses of pesticides (10-15 times the prescribed amount for producing fruits and 8-10 times for growing vegetables) which increases the farmers' production cost, deteriorates the environment manifold, and the crop may retain toxicity even after harvest and poses high risk to human health in long run. Exposure to or consumption of these crops may even lead to death. A decade ago, crop cultivators used to apply pesticides maximum two times a month, but now they are applying at least twice a week. Apart from vegetables and crops, pesticides are also being used in fruits. A study (in 2015) of Poribesh Bachao Andolon found that 40% of the tested fruits contain 3-20 times greater toxic substances (i.e. pesticides) than the tolerable limit of human body prescribed by WHO.

Application of Integrated Pest Management (IPM), bio-pesticides/herbal pesticides, and vermi-compost, etc. is environment friendly and has proven evidence to reduce

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pest infestation and control the outbreak of diseases in crops. IPM is a kind of cultivation techniques which includes intercropping, multiple cropping, planting repellent crop in the periphery of the bed, placing biological pest control agent (e.g. pheromone trap) etc. Bio-pesticides/herbal pesticides are derived from plants, animals, bacteria etc., have similar qualities and effectiveness compared to chemical pesticides. Pheromone traps is a kind of device from where insect sex pheromone emits and allures the opposite sex to mate. Insects eventually trapped into the device where no reproduction of the pest occurs. Knowing its positive impacts and proven scientific evidence, IPM in agriculture had been introduced by the government of Bangladesh 3 decades ago. However, the Pesticide Act, 1985 did not mention the wording "bio/herbal", and that's why, agro companies did not produce IPM or bio pesticides. During last couple of years, IPM, bio-pesticides, etc. got a momentum (though in small scale). That's why, the use of chemical pesticides has declined which means the use of IPM and bio-pesticides increased. The use of chemical pesticides increased dramatically from 1997 to 2008 and then falls gradually. For instance, the use of chemical pesticides in 1997 was nearly 8000 tons, the use was 16000 tons in 2000, 20,000 tons in 2005-06, 48000 tons in 2008, which declined to 41600 tons in 2013 followed by 39250 tons in 2014. As government has formulated safe food act 2013, more and more pesticides companies are investing for switching from chemical pesticides to biological pesticides, which is a good move to implement the safe food act. For instance, Future Agro, Ispahani Agro Ltd, GME Agro, ACI Agrochemicals, Russell IPM and SNS Agro Tech have already invested in bio-pesticides and supplying to the farmers end.

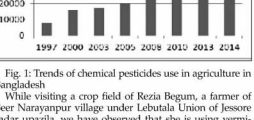

Fig. 1: Trends of chemical pesticides use in agriculture in Bangladesh

While visiting a crop field of Rezia Begum, a farmer of Beer Narayanpur village under Lebutala Union of Jessore sadar upazila, we have observed that she is using vermi-compost and herbal pesticides namely; extract (oil and oil cake) of mehagoni seed, extract of neem, and several other Malainasok (herbal pesticides) to produce bean, brinjal, cauliflower, cabbage, tomato and other traditional vegetables. "After receiving training from a local NGO (Ulashi Sreejony Sangha), we the 120 farmers in our village are now cultivating safe vegetables using bio-pesticides, IPM and vermi-compost", Rezia added. Many advanced farmers of Beer Narayanpur, Kodalia, Khajura villages of Lebutala union of Jessore districts are using seed extract of mahogany & neem, vermicompost, smoking by burning tyre and piercing as substitute of chemical pesticides. Abdul Matin, Managing Director of Future Agro, who poses patent of mahagoni oil (herbal pesticide), said herbal pesticide has no side effects on human health and on our environment, whereas, chemical pesticides can affect the nervous system and cause cancer as well as kills crops friendly insects and deteriorate our environment. Ulashi Sreejony Sangha's Executive Director Khondoker Azizul Haque Moni raised that government should provide subsidy to the producers of bio-pesticides and organic fertilizer (vermicompost) so that farmers can purchase these agro inputs with an affordable price.

While pesticides affect everyone, it is the poor people that are disproportionately affected. As a part of a strategy to build the nation providing quality education to student and equip the communities with the knowledge and means to protect themselves against harmful effects of pesticides, German University Bangladesh has been educating the students through its several BSc programmes namely, Food Science & Engineering, Environment Protection Technology, and Biotechnology etc. that help the students to do research in such fields. Education and research in these fields are now a priority within the government's plans to promote safe food production and protect the environment and reduce the health hazards. German University Bangladesh is implementing a research project titled "Response of Organic Fertilizer and Herbal Pesticides to Yield of Vegetables" at the experimental field of its permanent campus in Gupbirdabari, Sagordighi, Chandi, Tangail. This university has well equipped laboratory and scientists namely; Prof. Dr. Saifullah Khandker, who has over 37 years of experience in the field of bio-pesticides, residue analysis, chororganic micro-contaminants with several departments, universities and organizations in Germany. So, the university is willing to conduct any physical, chemical and biological analysis related to pesticides and environmental forensics. Whatever, university is doing is just a beginning (going to establish analytic method). Once the method is established, university will go for field application.

The government has endorsed the Balai Nashak (Pesticide) Act, 2017 suggesting tougher punitive actions against marketing, sale, packaging, storage and advertisement of adulterated pesticides. Under this Act, the company could be fined as high as Tk one lac and one year jail for first time offence and two lac and two years jail for repeating the identical offence. As per current Pesticide Act (Amendment) 2010, if a company found adulteration of pesticides, there will be two year imprisonment and cancellation of company's licence. Though Bangladesh has already passed national Food Safety Act 2013 and National Food Safety Policy is in the pipeline. If all these acts and policies implement properly, there will be a paradigm shift towards safe food production, marketing and consumption. Since its set up in 2015, Bangladesh Food Safety Authority has been working to establish a modern and technological food safety system in Bangladesh.

Food safety and pesticides have become serious human health concern and synthetic pesticides are an environmental contaminant. Despite the harmful effects of synthetic pesticides to human health, environment and other living beings, we cannot replace the chemical pesticides by bio-pesticides, IPM and organic agriculture over night. Farmer's skill development training on the judicious use of pesticides and crop harvest time after spray of pesticides are one option to reduce health risks from harmful pesticides. Another option could be to introduce inter cropping and multiple cropping with pest repellent crop in the periphery of the crop field. Application of vermi-compost, bio-pesticides, herbal pesticides and indigenous techniques could be a good move from chemical pesticides. IPM is getting popularity among the farmers as they observed that IPM has a significant impact in controlling pest attack. Further research is required to explore the pest resistant crop varieties. Awareness raising activities need to be strengthened among the farmers, vendors and consumers.

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