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**Agrochemical Use, Environmental and Health Hazards  
in Bangladesh**

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**Abstract**

*The research work is an explanatory type of basic study mainly focuses the adverse impact of agrochemicals using in farmlands in Bangladesh. Presently the indiscriminate use of chemical fertilizers and pesticides has been a dangerous issue to agricultural production, soil and health. Bangladeshi poor and untrained farmers apply the agrochemicals massively for getting rapid and huge returns from their shared lands causing incurable risks for the ecosystem and human health. Policy and governance setbacks expedite the problems manifolds as both the central policy makers and field administration is concerned hardly with the problems, but they are greatly busy with showing the agricultural growth. The paper is made in qualitative approach which has been conducted by the secondary data. The data sources include academic books, journal articles, organizational records, encyclopedia; media reports, national archives, etc. Bangladesh like developing countries is induced by the indiscriminate use of agrochemicals. There are a good number of international and national laws but they are actually inactive due to the interests of economic (agricultural) growth. Hence poor governance, poverty, illiteracy, corruption and unawareness are the root causes of excessive use of chemical fertilizers and pesticides. It is suggested that international and local governance process has to be efficient through establishing the policy implementation for global sustainable development.*

***Keywords: Indiscriminate use, Chemical fertilizers, Pesticides, Poor farmers, Environmental risks, Diseases.***

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**Introduction:** Bangladesh is densely a populated and agricultural country. Nearly 90 percent of its lands are arable and 55 percent of the people are employed in agriculture. Agriculture plays a vital role in Bangladesh economy which accounts for about 21 percent contribution in national GDP. But agriculture is being conducted presently in unplanned, unsystematic and non-sustainable ways. Bangladesh lands are loosing their productivity and soil- water environments are getting vulnerability as agrochemicals (pesticides and fertilizers) are applied at excessive and indiscriminately in all types of arable lands. Presently the use of agrochemicals increases about 150-300 percent compared to the times of 1950s that has been a great threat to environment and human health. There are a good number of conventions and legal structures to stop or reduce the toxic and indiscriminate use of agrochemicals so that they can preserve the environment (soil and water) and

health. But it is regretted that untrained and poor farmers apply toxic agrochemicals at huge amount that is ruining the soil and water quality.

**Objectives of the Study:** The study mainly aims to explain the adverse impacts of excessive and contaminated agrochemical use on ecology and human health in Bangladesh. Moreover, there are several numbers of specific objectives. These are:

- (i) To describe the current status of agrochemical use in Bangladesh.
- (ii) To state the effects of agrochemical use on environment and health.
- (iii) To show the governance setbacks to control the excessive use of agrochemicals.

**Methods:** This is an explanatory type of research work which has been conducted in qualitative approach. Mainly secondary sources have been used for data collection that is called content analysis. Data materials are collected through library work and online resource. The sources include academic books, journal articles, media report, organizational records, encyclopedia, workshop paper, etc. Moreover, some data have been gathered from empirical observation as all the people of Bangladesh are directly or indirectly involved in agriculture.

**Application Status of Agrochemicals in Bangladesh:** Chemical fertilizers and pesticides have been gotten acute importance in Bangladesh agriculture. Bangladesh started agrochemical use mainly in 1960s as food security for a vast number of populations. The then use of those chemical inputs was in normal stage – farmers used to follow the global guidelines in application process. Productivity was increased along with maintaining and preserving the land soil and adjacent water. But when food demand was going to be risen, agrochemical use started to rise geometrically. People viewed in the Third World that chemical fertilizer and pesticides function like magic in high yielding agro production. It is viewed that agrochemical use rises sharply in early 1980s and going to be continued till present time in Bangladesh like less developed nations. Bio-manure and natural pesticide method are gradually removed from the farming system though some initiatives are taken in favor of biological techniques in farming process. Untrained or undertrained farmers don't know the effects of excessive agrochemical use on human health and environment and moreover, field level agriculture administration doesn't take any action against the harmful and illegal chemical application.

Actually USA firstly started to use the chemical manure and pesticide in the early stage in last century. But just after Second World War the whole world began to use agrochemicals massively. Because war-ravaged world demanded additional amount of food and thus various global authorities emphasize the growth of agro production using chemical inputs. The first important synthetic organic pesticide was a chlorinated hydrocarbon such as DDT. DDT was discovered in 1939 by Swiss chemist Paul Muller.<sup>1</sup> It was so effective at killing pests and thus boosting crop yield and was so inexpensive to make that its use quickly spread over the globe. But it is viewed that it is dangerously toxic to kill pests and non-target organisms. Public outcry began and the US Environmental Protection Agency (EPA) cancelled the registration of DDT in the US in 1972. Presently DDT is banned across the globe except in some 36 nations. Though officially it is banned in many countries there have been used in different illegal ways in the developing countries. Some other toxic pesticides are prohibited due to their severe toxicity to health and the numbers of these may be above 12.

Mainly there have been using several numbers of chemical fertilizer in Bangladesh such as Urea, Single Super Phosphate (SSP), Triple Super Phosphate (TSP), Muriate of Potash (MP), DAP, HPS and others. The nutrients of Urea and SSP are respectively Nitrogen and Phosphorus Pentaoxide and TSP also contains Phosphorus Pentaoxide. On the other hand, MP and DAP bear the nutrients of Potassium Oxide and Gypsum. The chemical fertilizers mentioned above are made of some toxins

and that are seriously dangerous for ecology and health. The main toxin elements of these fertilizers are basically cadmium, chromium, lead, nitrate, arsenic, nickel, manganese, fluoride, etc. Presently the farmers of Bangladesh use Urea, SSP, DAP more than that of other category of fertilizers. Actually these are mostly inexpensive and available everywhere in Bangladesh. They all are threatening to soil and biosphere and ultimately the waters. The use of chemical fertilizers has increased about many- folds from 1977/78 to 1997/98; while the application of pesticides has risen 9 folds from 1989 to 1998.<sup>2</sup> The most dangerous news is that legally or illegally contaminated fertilizers such as zinc-oxy sulphate as contaminated by cadmium, and lead hazardous, non-degradable and sub-standard pesticides as DDT, which have been banned in developed countries, are being imported into the country.<sup>3</sup> Bangladesh agriculture policy is implementing the Integrated Pest Management (IPM) that strongly suggests organic fertilizer and pesticides. Huge amount of funds have been spent for the project but use of organic manure decreases day by day and chemical fertilizer use is being raised alarmingly. As most of Bangladesh farmers are landless or marginal, they cultivate the leased-out lands and they try to get return at two or three folds scale within a short time. At this situation, they use fertilizer and pesticides massively. Pesticide is another type of threatening compounds which creates the environment and health vulnerable. The use of toxic pesticides by Bangladeshi farmers increased by 328 percent during the past 10 years, posing a serious hazards on human health due to its long-term residual effect.<sup>4</sup>

The insecticides are a dominant item which account for 76 percent of total pesticides and its use has been increased about 598 percent. Annually it costs for imports 171.43 million USD. The dominating pesticides group includes insecticides, fungicides and herbicides that contain the chemical group such as organophosphates, synthetic Pyrethroids and Carbamates. The brand names of the major using pesticides are Basudin, Fyfanon, Darsban, Nitro, Karate, Sumesidin, Cypermethrin, Marshal, Endofil, Baristin. Most of the pesticides are being used in Bangladesh croplands at liquid mode. Besides, granular and powder pesticides are using in crop vegetable fields. When liquid pesticides directly are used over the vegetable garden, are mostly affecting to human health. Actually, pesticide use is six times higher for vegetables than for the rice. Bangladesh has about 400 companies which import and market nearly 37,000 tones of pesticides annually, but only some 200 are the members of Bangladesh Crop Protection Association (BCPA). Most of the pesticides used in Bangladesh are severely toxic. Aldrin, dieldrin, chlordane, endrin, aldicares, fenthion, dioxins, kepone, etc. are acutely toxic and many of them are banned all over the world but they are still being used in Bangladesh like countries where monitoring and legal system is not working so properly. All these compounds are also persistent and that is why, the organic and basic ingredients of soil and water get lost or contaminated. The toxins ultimately are transmitted into human body through water and crop that seriously hazardous to human and animal health.

**Environmental Damages:** Excessive and indiscriminate use of toxic agrochemicals generates different kinds of risks and troubles in water, soil and air environment. Soil gets a severe change in the values of P<sup>H</sup> and acidity – it is found that soil P<sup>H</sup> value declines and acidic value increases gradually. Besides the organic nutrients and water conservation of soil day-by-day may be reduced causing a great threat to productivity and fertility. Manmade threats to our soil quality include improper cultivation, inadequate organic fertilizers, accelerated erosion particularly in the hilly and terrace soils accumulation of salinity in the coastal soil.<sup>5</sup> If the fertilizer uses continue at the present scale, once the arable land may get completely desertification as the organic nutrients and water of the surface soil will gradually be going to acute scarcity. All the water sheds of Bangladesh (river, canal, ponds, and streams) have already been more or less contaminated due to the toxin discharges occurred from industry, urban area, agrochemicals of crop fields. Rain water carries the toxin

compounds from corn fields. Nitrate, phosphate, potassium, aldrin, dieldrin, chlordane, indrin, cadmium, and arsenic are the major toxins. Chromium is a major toxin of agrochemicals that are frequently dumped into waters. Aquatic organisms or creatures are on seriously threats – many useful organisms are to be getting killed, extinct or endangered. Especially fishing culture has been greatly endangered since 1990s in Bangladesh. Biosphere is also a threatened aspect due to agrochemicals – lead, phosphorus, oxide etc. create the air polluted as they are persistent in soil, water and air. Nitrogen containing fertilizers are converted to ammonium. As nitrates and phosphorus are transported to water, that alters aquatic ecosystem by depleting oxygen.<sup>6</sup> Fertilizer and pesticide application increases the emissions of toxic gas such as carbon dioxide, nitrous oxide and methane. Nitrous oxide has been raised about 25 percent over the previous century and one-third of this increase is caused due to agrochemicals. The methane emission is being done mostly due to urea fertilizer.

**Health Hazards:** Non-communicable diseases have been a great hazardous aspect across the world including Bangladesh. For example, heart disease, kidney complicity, hypertension, eye irritation, acidity, diabetes, liver cancer, etc. have been gotten alarming threats especially in the Third World due to the different kinds of toxicity. Contaminated and excessive use of agrochemicals (pesticides and fertilizers) expedites such type of complicated health risks. The use of some pesticides is also risky for human health. About one million pesticide poisonings occur globally every year, resulting in 2000 fatalities. About one-half of the human poisonings occur in poorer, less-developed countries, even though these places account for only 20% of the world's use of pesticides. This proportionate risk is due to greater rates of illiteracy in poor countries, and to tax enforcement of regulations concerning the use of pesticides.<sup>7</sup> When fertilizers and pesticides are used in farmlands, they are transmitted directly or indirectly into the corns and vegetable that affect the human health. Moreover, as pesticides are applied over the vegetable which are directly entered into human or livestock bodies. Excessive use of fertilizers may pollute the underground water with nitrate and it is so much hazardous to humans or livestock. Nitrate concentrated water can immobilize some of hemoglobin in blood. Organophosphate pesticides have increased in application, because they are both less persistent and harmful for environment than organochlorin pesticides. But, they are associated with acute health problems, such as abdominal pain, dizziness, headaches, nausea, vomiting, as well as skin and eye problems. There have been many studies intending to establish cancer – pesticides association.

Organophosphate pesticides used in the vegetables gradually gets deposit into human body and has a link with cancer.<sup>8</sup> Nowadays, sexual and urinary diseases have spread across the world due to availability of various chemicals and pesticides in the environment. For example, status of sperm in Europe has reduced by about 50 percent and pesticides uses in Bangladesh have been causing low level of testosterone. Chemicals may cause chronic health problems that include cancers, reproductive and endocrine disruption, neurological damage and dysfunction of immune system.

**Governance Setbacks:** Massive use of agrochemicals is seriously damaging to both environments and our health. Both local and international governance become alert to control the excessive application of fertilizers and pesticides. Stockholm Convention on Persistent Organic Pollutants in 2009 is a pioneering legal architecture to standardize the agrochemicals. As of 2011, 176 nations were parties to this convention, which went into enforcement in 2014. Then after 'Integrated International Safety Guidelines for Pesticide Formulation in Developing Countries' is another international regulation for poor nations so that they can preserve the environment standardizing the use of pesticides. But it is regrettable that in the Third World use of agrochemicals is increasing sharply resulting in environmental and health hazards. Agricultural pesticides have been primarily in

use since early sixties. However, Pesticide Ordinance was promulgated in 1971 in Bangladesh to regulate import, manufacture, formulation & distribution and use of pesticides. The ordinance was amended in 1980 mainly to accommodate the provision for licensing and the trade was handed over to the private sector. Pesticide rules were framed in 1985 for carrying out the provision of the ordinance.<sup>9</sup> Moreover, the Pesticides Act (Amendment) 2010 provides for up to two years' imprisonment and cancellation of licenses for adulteration of pesticides. Even 12 types of pesticides were banned in 2013-14 for adulteration. However, pesticide uses day-by-day is increasing alarmingly in Bangladesh due to the lacks of implementation of rules and laws.

There is an order titled 'Fertilizer (control) Order 1999' which places a good number of guidelines, directives to control the massive application of chemical fertilizer. It has formed the National Fertilizer Standardization Committee over the country. Following the order 15 laboratories, two soil testing institutes and non-government laboratories are working for fertilizer standardization. But fertilizer use not being standardized and controlled due to the irresponsible duties of field level agriculture administration. It is viewed that Upazilla Agriculture Officer, Sub-Assistant Agriculture Officers are working in all upazilla, union and ward levels, but they are not so responsible and promising to control the fertilizers and pesticides. In these situations, agriculture court is required to establish in all district levels.

**Conclusion:** Finally it is found that over-use of chemicals in farm land has already been a serious problem in Bangladesh. Chemical fertilizers play a great role in agricultural growth; but indiscriminate application of them harms the quality of soil, water and air. As a result, ecological balance is getting lost gradually causing hazardous situation to the animal planet. Non-target organisms have been extinct day-by-day. Various kinds of complicated diseases are exposed to the human society. They include cancer, heart disease, diabetes, kidney problem, eye, and skin diseases. Moreover, neurological, urinary and reproductive health is presently on great risks. To minimize these problems policy makers have to formulate new laws and regulations. Moreover, implementation of legal frameworks has to be emphasized and field level agricultural administration has to be committed and accountable so that they can control agrochemical use. Besides, it is suggested that agricultural court in each district is to be established so that they can execute the agricultural laws. Good governance in each level of agricultural administration has to be ensured.

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