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Increasing Use of Pesticides in Food Products in India: Causes and Effects

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ABSTRACT: The Green Revolution revolutionised Indian food production but also introduced multiple new challenges, including deteriorating land quality, chemical infested food, and lower productivity of land. In 2018, the Food and Agriculture Organization (FAO) published an alarming report titled The State of the World's Biodiversity for Food and Agriculture which said that the loss of biodiversity is driving the global food system. Across the world, it said, large areas of monoculture—growing a single crop—are replacing biodiverse agricultural landscapes. It also said that just nine plant species form two-thirds of total crop production. The Green Revolution that radically changed Indian food production and helped maintain food security by introducing High Yield Variety (HYV) seeds, tractors and fertilisers, also introduced multiple new challenges, including deteriorating land quality, chemical infested food, and lower productivity of the land. Experts believe it is because of the “cheaper food paradigm”, the production of more and more food at cheaper rates, which countries across the world including India followed. The “intensified agricultural production”—with heavy reliance on fertiliser, pesticides, energy and water—degraded soil fertility and ecosystems, and also reduced production capacity, which, in turn, brought farmers under debt.

KEYWORDS: pesticides, agriculture, India, chemical, productivity, farmers, effects, causes

I. INTRODUCTION

Devinder Sharma, an expert on Indian agriculture, says, “We are producing surplus food. The greatest challenge is now, how to stop wastage. So, we don't have to focus much on how much we produce. Instead, we should be focusing on producing healthy food—free of harmful pesticides and insecticides. The idea that we should have organic food, and avoid pesticide infested food and that should drive the production and demand.” But is it easy? There are over 300 pesticides in use in India, as per official data. And the government is planning to ban 27 harmful pesticides as part of phasing out 66 contentious pesticides. Still, there are over 24 pesticides in use, classified as harmful, including Sulphur (fungicide), Endosulfan (insecticide), Mancozeb (fungicide), Phorate (insecticide). These are, in fact, among the most used pesticides in India. Besides, banning pesticides has its own set of challenges. First is the overdependence of farmers on pesticides to increase productivity, as land fertility is consistently deteriorating. And second, resistance from industries. Due to erratic monsoon and rising temperature due to climate change, pest attacks are rising. The locust attack last year was the biggest example of how pests are growing, which in turn is forcing farmers to control pests by using harmful pesticides. A senior scientist at the Division of Entomology, Indian Agriculture Research Institute (IARI), says, “Insects are cold-blooded organisms, and they love rain-less humid days.”

Current agricultural practices are creating a vicious cycle, as the agriculture sector is the second-largest greenhouse gas emitter, which is happening due to unsustainable agricultural practices—increasing use of pesticides and insecticides causing soil disturbance. This affects crop yield and forces farmers to use more and more pesticides. India has a huge domestic market for pesticides and insecticides. As per the 2018 CropLife India, a conglomeration of 15 companies engaged in crop protection, the domestic market size of crop protection products in India is estimated at Rs 232.2 billion by sales. In 2018, when a draft notification to ban 27 pesticides was released, many industrialists showed concern. Pradip Dave, the President of Pesticides Manufacturers & Formulators Association of India (PMFAI) told media that the decision would affect the Atma Nirbhar Bharat campaign and reduce India's export by 50 per cent. But

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civil societies have been demanding a ban on harmful pesticides for the last few years. Therefore, in 2013, the government appointed a committee to review 66 harmful pesticides under Anupam Verma, a retired professor from the Indian Agriculture Research Institute (IARI). Its recommendation included ban on 19 pesticides in a phased manner in 2015, and reviewing 27 other pesticides—which are now being considered for the ban. The government later banned 18 pesticides, including seven Class-I pesticides (extremely hazardous to use). These are good decisions. Our food should be pesticide-free. Consumers are also being aware of the harmful effects of pesticide infested food, this will bring change,” Devinder Sharma says. However, the biggest challenge is to create awareness and also the infrastructure for farmers to adapt themselves to the challenges of climate change and also produce organic food. Punjab and Haryana, known as torch-bearers of the Green Revolution in India, offered only a few solutions to ensure food security in India. Several banned pesticides are still in use in both states. The domestic market for pesticides has boomed. It is resulting in harmful effects, including rising cases of cancer. Several studies confirm that class 1 pesticides are carcinogenic. Various studies are suggesting that monoculture is also harming food production, as many traditional varieties of plants, including pulses rich in nutrients, are increasingly diminishing. In 2015, over 811 cultivated plants and 902 of their wild relatives were documented. But they are increasingly under threat of extinction.

India is the second-largest producer of wheat and rice and groundnuts and first in Jute, which is good but, More than 85% smallholders mostly produce rice, wheat, pulses, spices, vegetables and other cereals through monocropping. Which made farmers more vulnerable to challenges related to climate change. Many practitioners and experts believe that there is a need to make farming climate change-adaptive. Kumar Neeraj, the co-founder of 'Khetee'—a Bihar-based non-profit promoting benefits of agroforestry, says, “We have to provide bio-nutrients to the land instead of chemicals.” Neeraj finds that there is a huge challenge in creating awareness among farmers. “Farmers are resistant to new changes as agriculture is risky. Therefore, we need to create various models of sustainable farming practices that farmers can easily learn, like agro-forestry.”

II. DISCUSSION

Ready for dinner. Serve yourself two chappatis and a handful of rice. Choose your pick of dals. And your favourite vegetables. Mustn't forget the salad: tomatoes embellished with carrots and cucumber. A bowl of curd, maybe, And for a fruity dessert: a banana or an orange. Food faddists will tell you that this meal is a perfectly balanced diet. A similar lunch and a light breakfast would add up to that ideal figure of 2,200 calories daily. Just right to keep you trim and healthy.

Now gird yourself for the bad news. Along with those wholesome meals, you daily take half a milligram of two of the most widely used toxic pesticides in the country: Dichloro Diphenyl Trichloroethane (DDT) and Benzene Hexachloride (BHC). Not to mention a dash of malathion and endosulfan. In all, that quantity is less than a pinpoint. But that's 40 times more than what average Americans or English ingest with their food. And equals the World Health Organisation danger level for daily intake of these pesticides. It's hard to stomach, but true. It's not just drinking water that you have to worry about. But practically everything you eat. The chappatis and rice, dals and vegetables, meats and fruits and even milk, now pose a new threat not just to us but to our babies too. Repeated surveys have shown that Indians are daily eating food laced with some of the highest amounts of toxic pesticide residues found in the world. In the process, they are exposed to the risk of heart disease, brain, kidney and liver damage and even cancer. Even more frightening, studies indicate that right from the day our babies begin to suckle they are taking in pesticides deposited in breast milk. And some ready-made baby foods too are similarly contaminated. “We are not only slowly poisoning ourselves but jeopardising our future generations too,” says toxicologist Dr K.N. Mehrotra, president, Society of Pesticide Science, India in New Delhi. An increase in pesticide consumption will increase the burden on farmers and damage the environment. With the increased use of toxic pesticides, snakes, snails, earthworms, etc., are fast vanishing from the farms, all of which are essential part of the farming ecosystem. While every effort is needed to control the consumption of pesticides without harming productivity, concerted efforts are needed to increase the area under organic farming and zero-budget farming, both of which do not require pesticides. By reducing the area under paddy and cotton, the consumption of pesticides can also be reduced considerably as these two crops together consume about 65 per cent of

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pesticides in India. Attractive advertisements on pesticides influencing the farmers to increase their use should be banned. Given the changing environment, the pesticide manufacturers should also change their production system from toxic to environment-friendly pesticides.

III. RESULTS

According to data from 2017, the [most commonly used](#) pesticides:-

- glyphosate, which is an herbicide that people use to kill weeds and grasses
- atrazine, which is an herbicide that people use to kill grassy and broadleaf weeds
- metolachlor-S, which is an herbicide effective against grasses
- dichloropropene, which treats the soil before planting to kill roundworms
- 2,4-D, which is an herbicide that people use to kill broadleaf weeds

Pesticides can be toxic to humans, but the function of the pesticide determines how harmful they are. The effect may also depend on the amount and concentration of the pesticide. It can also have different effects depending on whether a person gets it on their skin, swallows it, or inhales it. There is not much research regarding the possible long-term health risks of pesticide exposure. However, the World Health Organization (WHO) Trusted Source suggest that coming into contact with large amounts of pesticides could affect reproduction and potentially be a cause of cancer.

According to the WHO, insecticides are typically more toxic to humans than herbicides. Exposure to large quantities of a pesticide may cause poisoning. Symptoms of poisoning may appear immediately or after a few hours. Some symptoms of mild poisoning may include:

- headaches
- dizziness
- nausea
- diarrhea
- insomnia
- irritation of the throat, eyes, skin, or nose

Some symptoms of moderate poisoning may include:

- blurred vision
- confusion
- vomiting
- constriction of the throat
- rapid pulse

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Some symptoms of severe poisoning may include:

- chemical burns
- unconsciousness
- an inability to breathe
- excessive phlegm in the airways

There is pesticide residue in food and water. Pesticides can run off fields or soak through the ground to enter watercourses. Spraying crops with pesticides, or using pesticides in the soil, can leave some residue on produce. Exposure to pesticides is also common in some workplaces and outdoors during crop spraying. Although people may consume pesticide residue, the [Environmental Protection Agency \(EPA\)](#) set a benchmark for safe levels of pesticides in food. If a food product has an unsafe level of pesticides, the EPA can remove it from sale. The [Food Quality Protection Act](#) regulates the use of pesticides in the U.S. This law enforces safety tests for new and current pesticides. Produce checks make sure that pesticide residue is at a level that will not harm infants, children, or adults. People who work on farms are most at risk of exposure to pesticides. Employers should provide personal protective equipment to workers who have direct contact with pesticides. This includes clothing that prevents pesticides from coming into contact with the skin or being breathed in.

Those who work with pesticides should get regular checkups with a healthcare professional. Before working with pesticides, women who are pregnant or breastfeeding should talk to a doctor. Some pesticides may be harmful to babies.

IV. CONCLUSIONS

It may not be possible to completely avoid pesticides in food, as their use is so widespread. That being said, a person can choose to buy and consume organic produce. Farmers grow and produce organic food in line with government guidelines. These guidelines mean that organic farmers must:

- avoid using pesticides and synthetic fertilizers
- protect or improve soil and water quality
- promote animal welfare
- conserve wildlife
- not use genetically modified organisms

Spraying fruits, vegetables, and crops with pesticides protects them from damage due to insects, weeds, and fungi. Coming into contact with large amounts of pesticides can be harmful. Although most produce contains some level of pesticide residue, food testing ensures that the levels of pesticides are low enough to not pose a risk to human health. Strong laws regulate the sale and use of pesticides. Organic food does not contain pesticide residue, but it can be more expensive. People should wash their fruits and vegetables under running water to prevent consuming contaminated produce. *Listeria*, *E. coli*, and *Salmonella* can be present on produce. In recent years, people have developed foodborne illnesses from fruits and vegetables. Cooking produce before consumption is the safest way to eat

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fruits and vegetables, but people should still wash them beforehand. Many farmers use pesticides on their produce. If people want to avoid consuming pesticides, they can choose organic produce or avoid produce that contains higher levels of pesticides, such as kale, cranberries, and asparagus.

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