

Excessive Use of Agrichemicals : Emerging Hazards In West Bengal

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Introduction

Globalisation and new markets economy have had a significant impact on how fertilisers are used in agriculture. Fertilisers improve soil efficiency, which results in higher-quality agricultural products. The usage of fertiliser has skyrocketed globally in recent years, leading to major environmental issues. By increasing the cultivation of food and other agricultural commodities through the application of high-yielding seed varieties, altering farm equipment, and greatly increasing the use of fertilisers, developing countries like India made it possible for the Green Revolution to end the current food shortage.

The issue of residue of pesticides is highly prevalent in India, despite the country's average pesticide consumption being far lower than that of many other industrialised economies. Over the last three decades, the negligent use and handling of fertilisers in agriculture has led to serious health problems for people in many developing countries (Dasgupta *et al.* 2007).

Pollution of the environment by chemical fertilisers

Any substance that harms people or other organisms that live is referred to as pollution. Synthetic or natural materials known as fertilisers are put to soils to supply essential nutrients for plant development. Each year, a large number of chemicals are used in agriculture as fertilisers and pesticides, primarily heavy metals including mercury, cadmium, aluminium, lead, copper and Cu in the soil. Pollution of the air, water, and soil are among the environmental problems caused by the use of these fertiliser and pesticide use outside of the permitted range.

These pesticides are causing an increase in water contamination, and they seriously damage the ecosystem even at low quantities (Agrawal *et al.* 2010). Chemicals, especially nitrates found in chemical fertilisers, are the main source of water contamination. More nitrate has been accumulating in the soil in India's semi-arid and arid areas as a result of increased irrigation practices in recent years.

Fertilizer usage in west bengal

West Bengal's intensive farming methods and multi-cropping systems are the reason for its comparatively high fertiliser use compared to many other Indian states. In recent years, the state has consumed roughly 1.5 million metric tonnes of fertiliser annually. Urea, muriate of potash (MOP), di-ammonium phosphate (DAP), and complex fertilisers are the main fertilisers utilised.

Consumption of all three nutrients decreased in 2023–2024 as compared to 2022–2023. Compared to 2022–2023, the use of N (0.742 million MT), P₂O₅ (0.428 million MT), and K₂O (0.274 million MT) decreased by 12.8%, 10.6%, and 3.7%, respectively, in 2023–2024. In 2022–2023 the NPK use ratio was 3.0:1.7:1, whereas in 2023–2024 it was 2.7:1.6:1. During that time, the amount of fertiliser nutrients used per hectare decreased from 157.4 kg to 140.7 kg.

Weather and crop situation in West Bengal

Rainfall in the Sub-Himalayan West Bengal subdivision during the 2023 southwest

monsoon was typical with 2023 mm. The Gangetic West Bengal subdivision received 906 mm of rain, which was insufficient. During the season, 12 and 7 of the state's 19 districts, respectively, got normal and insufficient rainfall. In comparison to Kharif 2022, the area planted to rice and pulses grew by 180 and 10,000 hectares, respectively, during Kharif 2023. However, the area planted to sugarcane, jute and mesta, and coarse cereals decreased by 13,000, 15,000, and 15 thousand hectares, respectively.

The state received 201 mm of regular rains in the Sub-Himalayan West Bengal subdivision and 225 mm of excess rains in the Gangetic West Bengal subdivision during the post-monsoon season. During the season, four, ten, and five of the 19 districts had normal, excess to big excess, and insufficient rainfall, respectively. In comparison to Rabi 2022–2023, the area planted to wheat, rice, and coarse cereals grew by 14, 49, and 33 thousand hectares, respectively, during Rabi 2023–2024. Nonetheless, the area planted to oilseeds and pulses decreased by 55,000 and 7,000 hectares, respectively.

SEASON-WISE CONSUMPTION OF N, P₂O₅ & K₂O 2023-24 IN WEST BENGAL

| Nutrient (Mt) | Kharif | Rabi | Total |
|-------------------------------|--------|--------|----------|
| N | 347.55 | 394.37 | 741.91 |
| P ₂ O ₅ | 224.67 | 203.32 | 427.99 |
| K ₂ O | 136.46 | 137.33 | 273.80 |
| Total | 708.68 | 735.02 | 1,443.70 |

(Source: Annual Review of Fertilizer Production and Consumption 2023-24)

Regional variations for fertilizer consumption

The amount of fertiliser used varies greatly throughout West Bengal's districts. The districts with the largest fertiliser usage, especially for paddy farming, are Burdwan, Hooghly, and Nadia, which are renowned for their rich soil and sophisticated irrigation systems. Conversely, areas with arid climates and few irrigation resources, such as Purulia and Bankura, exhibit comparatively low usage. The moderate fertiliser use in coastal regions like South 24 Parganas reflects a balance between the development of horticulture crops and rice. Different fertiliser needs arise in the northern districts of the state, such as

Darjeeling and Jalpaiguri, because of their greater emphasis on tea and other plantation crops.

Human health and chemical fertilisers

In developing nations, the use of agrochemicals is regarded as a potent tool for increasing agricultural productivity (Bhandari, 2014). Continued use of chemicals as fertiliser causes pests to become resistant, making management more challenging. The components of artificial fertilisers, phosphate and nitrate, are released into nearby water bodies or runoff into agricultural fields, resulting in eutrophication. Human blood disorders caused by elevated nitrate levels in drinking

water result in an abnormal production of methaemoglobin, which impairs the body's ability to release oxygen. Testicular and stomach cancer can be brought on by elevated sodium nitrate levels in groundwater.

Other health issues caused by ammonium nitrate include burning sensations and irritation of the skin and eyes. Exposure to it through inhalation might cause additional health issues, such as lung, throat, and nose discomfort. Additionally, using this can cause headaches, nausea, vomiting, facial and neck flushing, anxiousness, uncontrollable muscular movements, fainting, and collapse. Methemoglobinemia is a disorder that affects infants when plants accumulate too much nitrogen.

In the end, cadmium enters human tissues and causes a variety of illnesses, including osteoporosis, pulmonary oedema, trachea-bronchitis, pneumonia, and renal failure.

Lung injury is only caused by high quantities of cobalt. Boron irritates the eyes, nose, throat, and sperm count. It is believed

that manganese harms the digestive, reproductive, and respiratory systems. Lindane functions as a nerve toxin and can induce breast cancer. It is referred to as a carcinogen and also impacts the reproductive system.

Conclusion

Overuse of chemical fertilizers can lead to soil degradation, water pollution through runoff, and air pollution due to greenhouse gas emissions like nitrous oxide. Additionally, exposure to certain fertilizers can cause health issues such as respiratory problems, skin irritation, and poisoning. To mitigate these risks, sustainable practices like controlled fertilizer application, organic alternatives, and integrated nutrient management should be adopted. Proper education and regulation can help balance the benefits of fertilizers while minimizing their negative impacts on the environment and human well-being. Soil degradation can occur when excessive dust accumulates on the ground, altering the soil's physical and chemical properties.

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