

Chapter 8

Pesticide Contamination and Human Health

Jyoti Bisht

Shri Guru Ram Rai (PG) College, India

Lok Man S. Palni

Graphic Era University, India

Nirmal S. K. Harsh

Forest Research Institute Dehradun, India

ABSTRACT

Pesticides play a vital role in modern farming in order to meet the needs of growing population. However, due to their toxic effects, pesticides cause a serious threat to public health. Pesticides when used excessively and carelessly cause social conflict, as most of the workers are intoxicated by these chemicals. These chemicals not only affect farmers and applicators but also adversely affect surrounding communities, flora and fauna. During the present decade, there is an increased awareness among the people regarding pesticide poisoning. The present chapter highlighted the adverse effect of pesticides on environment and on human health. This review helps to seek the attention of researchers, government, and non-government organizations on health issues that have been associated with the exposure of harmful chemical pesticides and encourage research on finding the new concept in modern agriculture involving a reduction in the use of chemical pesticides.

INTRODUCTION

Ensuring food security for more than one billion Indians with diminishing cultivable land resources is a prodigious task. In order to meet the needs of a growing population, modern farming techniques play a crucial role and involved high yielding variety seeds, balanced fertilizers dose and an appropriate amount of quality pesticides along with farmers' education. The size of the Indian pesticide industry is \$3.8 billion in the year 2011 and expected to grow more in future. Over the years, India has emerged as the 4th largest producer of pesticides after USA, Japan and China and second largest producer and exporter of pesticides in Asia (Indian Chemical Industry, XIIth Five Year Plan: 2012-2017).

DOI: 10.4018/978-1-5225-6111-8.ch008

Any Substance or mixture of substances considered as a pesticide that alters biological processes of living organisms that supposed to be pests, whether these are insects, fungi and weeds. Pesticides are characterized by their uniqueness of their chemical structure or their patterns of use and their interaction with the environment. Depending upon the chemical nature, the major classes of pesticides include organochlorine, organophosphorus, carbamates, pyrethroids and neonicotinoids (US EPA, 2006). Among the various pesticides used in India, 40% of all the pesticides used are organochlorine. The other major category is organophosphate pesticides. Monocrotophos, chlorpyrifos, phorate, phosphamidon, methyl parathion, endosulfan and dimethoate are highly hazardous pesticides that are continually and indiscriminately used in India (Gupta, 2004).

ENVIRONMENTAL CONTAMINATION: A CAUSE OF CONCERN

Humans are continuously interacting with their environment, so it is logical to presume that humans' health is also affected by the environmental quality. It is truly said, "What goes around comes around". As many of the ways environment have been harmed by human activity come back to trouble future generations in the form of various health issues. The use of chemicals in modern agriculture has significantly increased productivity, but it has also significantly increased the concentration of pesticides in food and in our environment. The realization that the pesticide contaminated foods people eat, the smokestack-befouled air they breathe, and the petrochemical-based products they use, negatively affect the quality of life.

Until 1962, pesticide use in agriculture and public health was indiscriminate. Only after the publication of "Silent Spring" by Rachel Carson in 1962, peoples' awareness towards the ill effects of pesticides increased (Carson, 1962). The potential risk to human health makes the remediation of pesticide-contaminated sites a necessary and almost urgent undertaking. Most of the pesticides are banned under pesticide pollution and toxicity prevention act.

Pesticides can contaminate environment in many ways. Their fate in the environment depends on the quality of pesticide and medium in which it is transported. Chemical nature of pesticide and their interaction with environment decides the area it will move and their persistence. The longer the half-life resulted greater the potential for pesticide movement for longer distance. A pesticide with a half-life greater than 21 days may persist long enough to leach in soil or move with surface runoff before it degrades (Gavrilescu, 2005).

Soil constitutes a major environmental sink for many pesticides from which they are taken up by plants, moves into the bodies of invertebrates, pass into water or air, and are broken down (Khan, 1980). Heavy use of pesticides not only affects the surrounding communities but it also causes a serious threat to natural microflora and fauna of soil which are responsible for soil fertility (Sardar and Kole, 2005). Pesticides applied for the agricultural and nonagricultural purpose can move to the atmosphere by volatilization and by wind erosion of particles on which the pesticide is sorbed and cause pesticide drift (Seiber and Woodrow, 1995).

Pesticides can accumulate in the tissues of organisms. This process (the so-called bioaccumulation) leads to higher concentrations of pesticide. Pesticides that bioaccumulate in organisms are often very persistent in the environment. They do not break down easily and retain their form even when ingested and stored in the body. Among animals, tissues of the respiratory and digestive system are usually much more permeable than the skin (Fishel, 2005).

11 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/pesticide-contamination-and-human-health/213501

Related Content

Potential Impacts of Climate Change on the Inland Fisheries of Arid and Semi-Arid Regions of Africa: Impacts of Climate Change on Inland Fisheries

Imefon Udo Udoand Imekan Isaac Akpan (2019). *Climate Change and Its Impact on Ecosystem Services and Biodiversity in Arid and Semi-Arid Zones* (pp. 196-216).

www.irma-international.org/chapter/potential-impacts-of-climate-change-on-the-inland-fisheries-of-arid-and-semi-arid-regions-of-africa/223763

Big Data and Internet of Things for Analysing and Designing Systems Based on Hyperspectral Images

Peyakunta Bhargaviand Singaraju Jyothi (2019). *Environmental Information Systems: Concepts, Methodologies, Tools, and Applications* (pp. 621-641).

www.irma-international.org/chapter/big-data-and-internet-of-things-for-analysing-and-designing-systems-based-on-hyperspectral-images/212961

Energy and Exergy Analysis on Gasification Processes: A Preliminary Approach

Edgardo Olivares Gómez, Renato Cruz Neves, Elisa Magalhães de Medeirosand Mylene Cristina Alves Ferreira Rezende (2017). *Renewable and Alternative Energy: Concepts, Methodologies, Tools, and Applications* (pp. 1613-1646).

www.irma-international.org/chapter/energy-and-exergy-analysis-on-gasification-processes/169651

Approaches to the Management of Heavy Metals in Polluted Soils

(2023). *Global Industrial Impacts of Heavy Metal Pollution in Sub-Saharan Africa* (pp. 285-310).

www.irma-international.org/chapter/approaches-to-the-management-of-heavy-metals-in-polluted-soils/328154

A Picture Is Worth a Thousand Words: Commentary of Broadcast Meteorologists on the Visual Presentation of Climate Change

Helen Mary Meldrum, David Szymanski, Eric A. Ochesand P. Thompson Davis (2018). *Climate Change and Environmental Concerns: Breakthroughs in Research and Practice* (pp. 288-304).

www.irma-international.org/chapter/a-picture-is-worth-a-thousand-words/201706