Chapter 6

Pesticides in Vegetables: Their Impact on Nutritional Quality and Human Health

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ABSTRACT

Pesticides are very harmful for the environment as well as for the human health. Many studies reported that vegetables like tomato, pumpkin, cucumber, potato, brinjal, etc., that are consumed by people all over the world to get nutrients are contaminated with different pesticides residues. Most of the studies revealed that the presence of pesticides in these vegetables is above the permissible limit. The aim of the chapter is to review the results of previously reported data on levels of different pesticides in the vegetables. The study has also documented the possible health risk factors to the consumers of contaminated vegetables and its impact on the their nutrient value. In order to ascertain the provisions of food suitable for human consumption, it is imperative to monitor pesticides in food commodities by the country’s responsible authority and enforce guidelines based on permissible limits.

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INTRODUCTION

Pesticide is the substance that is intended for preventing, destroying, repelling or mitigating different types of pests, it may be chemical substance, biological agent (such as a virus or bacteria), antimicrobial, disinfectant or device that is intended for preventing, destroying, repelling, or mitigating different types of pests that may be insects, plant pathogens, weeds, molluscs, birds, mammals, fish, nematodes and microbes that compete for food, damage property, cause diseases and spread nuisance.

“The most intelligent species on earth poisons its food before eating it.” These startling words by Rishi Miranhshah, (2011) reveal the stark reality of destruction that we face today due to the relentless and injudicious use of pesticides. We are continuously fed on pesticide diet as they reach our food, drinking water, air, etc. Their continued use on pests is also known to develop pest resistance, thus arises the need to probe and develop new alternatives. United States federal law under Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) defines pesticide as (FIFRA, 2002)”any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any insects, rodents, nematodes fungi or weed or any other form of life declared to be pest, and any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.”

Food and Agriculture Organization of the United Nations (FAO) defined pesticide as:

Any substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals causing harm during or otherwise interfering with the production, processing, storage, transport or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs, or substances which may be administered to animals for the control of insects, arachnids or other pests in or on their bodies. Plant growth regulators, defoliants, desiccants or agents for thinning fruit or preventing the premature fall of fruit, and substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport are included in the category of pesticides. The different types of pesticides that are used to kill algae, birds, bacteria, fungi, weeds insects, mites, sludges and snails, nematodes, rodents and virus are known as algicides, avicides, bactericides, fungicides, herbicides, insecticides larvicides, miticides, mollusccicides, nematicides, rodenticides, virucides respectively.

Pesticides are having two broad categories, synthetic and biological pesticides based on their origin. The pesticide that moves inside a plant following absorption is known as systemic pesticide and the movement of pesticide is usually upwards (via xylem) and outward in case of insecticides and fungicides. However, synthetic pesticides are manufactured with the help of chemical synthesis in bulk quantities and are quite harmful for the environment. The average pesticide consumption in India is a low 288 g/ha as compared to the global average of 900 g/ha. (Agnihotri, 2000).

With the evolution of Green revolution in India, the use of pesticides and input of agricultural fertilizers have gained their momentum. The Indian farmers are currently using one-third of pesticides that are consumed in third world countries and it contributes about 25 percentage of its agricultural land (Reddy, 1985). The undue persistence, high toxicity and resistance to the organochlorines, organophosphate and carbonate insecticides led to ban on their use in many developed and developing countries including India.

India is one of the most dynamic generic pesticide manufacturers in the world with more than 60 technical grade pesticides are manufactured indigenously by 125 producers consisting of large medium scale enterprises including about 10 multinational companies and more than 500 pesticides formulators spread over the country (Annual report, 2011).