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Survey Based Research Paper

Pesticides Pollution: Perceptions of Farmers in Punjab

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ABSTRACT

Like most other developing countries, India has benefited from the availability of a growing spectrum of pest control chemicals but has produced its share of pesticide poisoning and wider environmental contamination. In past years, pesticide pollution has become one of the major agendas among environmental problems. Pesticide pollution basically refers to development of more specialized and toxic chemicals and their increased use. These chemicals include a wide variety of insecticide, fungicide, herbicides, etc. Pesticide residues in food have been investigated in India over the last three decades. Varying amount of DDT and BHC residues have been found in agricultural products like milk, fats, meat, fodder, etc. This study was conducted to explore the ideas, attitude and level of understanding of Punjab farmers about the benefits and hazards of pesticides. The results clearly showed that Punjab farmers have poor knowledge about management and handling of pesticides. Majority of Punjab farmers were aware of the fact that pesticides get washed by rain water and move into water bodies, body should be covered properly during pesticides handling, and crop rotation would minimize pesticide consumption. However, many misconceptions like crop production increases with increased number of spray, alcohol is an alternative for pesticides, vegetable can be preserved by spraying pesticides, pesticides mixed with the fertilizers would destroy pests more effectively, and food products size would increase with use of pesticides are prevailing in the mind of Punjab farmers.

INTRODUCTION

The economy of India, like many other developing countries, depends heavily on agriculture. The green revolution achieved in India has been possible only because of the inputs to agriculture provided mainly by the energy sector, fertilizers and pesticides, and the effective land and water resource management.

Of all the chemical products in extensive use in India, pesticides probably have the greatest potential for harming both people and their environment. Pesticides, in general, are chemicals used to kill or control unwanted pests. The unused pesticides and their degradation products and metabolites in various compartments of the environment may find their way into the human body through food chain, causing various health hazards. Pesticide poisoning is a daily hazard for the majority of the world's rural population. It affects health, environment, and livelihood, while poverty drains the ability of those affected to take action. In developing countries, where pesticide use is growing, some of the most hazardous chemicals are widely used to control insects, rodents, weeds, diseases and other pests even though the conditions of use would be unacceptable in industrial countries. Pesticides exposure occurs during mixing, from leaking equipment or inhaling fumes while spraying, and from saturated work clothes. General agricultural workers and rural communities are affected by spray drift, when entering or working in fields after spraying, by washings work clothes and through

home pesticide storage, use of pesticide containers for food or water storage, polluted drinking water, or proximity to obsolete pesticide dumps.

Recovering from the euphoria of green revolution, India is now battling from residual effects of extensively used chemical fertilizers and pesticides. When India's green revolution started, Punjab had a pioneering role. Here was India's northern state with its hardy farmers toiling to transform their fields into gold. They worked hard, experimented with new seeds and invested in fertilizers and pesticides. Punjab prospered and developed into the rice and wheat bowl of India. But now, in districts like Bhatinda and Ropar, there is a new story playing out in the fields. The water table has collapsed, water bodies are poisoned with chemicals, the land has been degraded with excessive use of pesticides, and yields are falling.

Many years ago, a large number of farmers in Bhatinda district decided to move out from growing rice and wheat and shift to cotton as it was a cash crop with rich dividends. All was fine till the cotton crop was introduced. The first few years were good and brought in good returns. But when the American bollworm attack came, the crop got destroyed. Panic stricken, the farmers guided by pesticide dealers, started pumping in huge amounts of pesticides. Initially, the pests died, but later on, year after year, the pests started developing immunity to pesticide sprays and continued to attack the cotton crop and destroy it. The pests developed immunity fast as pesticide was often adulterated. The body mechanism of the pest fought against the excessive spraying.

The use of pesticides can cause adverse health effects to humans and animals. Significant numbers of accidental poisoning from pesticides have been recorded around the world. Among the main causes of these occurrences were spillages during transport or storage, contaminated clothing, improper application, explosion, leakage, and consumption of contaminated food (Dikshith 1991). Connell (1988) recognized that organochlorine pesticides bioaccumulation causing impacts on some species and recently Colburn et al. (1997) have suggested that they might even have estrogen like properties leading to effects on the fertility of humans. Charles et al. (1995) have shown that wide spread use of these first organic pesticides, particularly DDT and other organochlorine insecticides such as dieldrin and heptachlor led to another unforeseen problem that they were persistent and bioaccumulated. This presented a potential residue problem in food, while from an environmental view point; reproduction in fish and birds was affected. Farmers in Bhatinda, Ropar and Malwa districts of Punjab are today battling environment related health problems including a noticeable rise in cancer cases, kidney ailments, immunological disorders, Parkinson's disease and infertility as a result of large scale use of pesticides and fertilizers. Looking at the grave situation, the authors felt necessary to explore the attitude and knowledge of Punjab farmers towards pesticides and their health hazards.

MATERIALS AND METHODS

The objective of the present study is to explore the level of understanding among the farmers of Punjab about the use of pesticides, and causes and consequences of pesticide pollution. 183 farmers from different villages of three districts, i.e., Bhatinda, Kasaragod and Ropar were asked to complete a questionnaire having closed and open type questions. The questionnaire was designed to probe farmer's concern about pesticide use and its hazards. The questionnaire contained a total of 24 questions in all in two sections, i.e., Section A and B. Both the sections contained closed type questions in the form of statements. Section A dealt with causes and consequences, while Section B with the remedies of pesticide pollution.

In Section A, there are 12 questions of which five are scientifically acceptable, and seven scientifically unorthodox statements. In Section B, there are 12 questions of which six are scientifically correct and six are scientifically not acceptable. The acceptable and non-acceptable statements are interspersed at random. The farmers were asked to respond to the statements in the questionnaire by ticking boxes labeled "I agree", "I don't agree" and "I don't know".

RESULTS AND DISCUSSION

Responses of Farmers About Causes and Consequences of Pesticide Pollution

The data for responses of farmers to causes and consequences of pesticide pollution are plotted graphically in Figs. 1 and 2. More than three-forth of the farmers (77%) were aware of the fact that pesticides are drained by rain water and accumulate in water bodies. The widespread use of pesticides makes it inevitable that some will reach water. The pesticide may persist in water depending on the type of chemical and water bodies. HCH and DDT have been observed in the drinking water of various cities (Jani et al. 1991, NEERI 1992, Singh 1993, Thakkar et al. 1993, ITRC 1995). Experimental studies have shown that pesticides may have mutagenic, carcinogenic, and/or teratogenic potential on long term exposure (Seth et al. 1998). In addition consumption of pesticide contaminated food may also damage the central and peripheral nervous system, liver and kidney, or produce birth defects. In the present study only two-fifth of the farmers (41%) knew that lindane and endosulfan in body affect nervous system and causes health problems. Majority of farmers did not know that endolsulfan not only affects central nervous system but also causes hyperactivity, nausea, dizziness, headache, convulsions and severe poisoning resulting in death (Arun et al. 2006-07). Cotton crop consumes half of the pesticides used in the state was known to only one-third of the farmers (37%). A little more than half of the farmers (55%) have basic knowledge that different types of pesticides should be used for different crops and also according to the season. Less than two-fifth of the farmers (39%) only affirmed that endosulfan and lindane sprayed food products should be stored for at least three months for degradation of pesticides.

Many misconceptions are prevailing in the mind of farmers that increased number of pesticide spray would increase yield enormously (58%), that alcohol can be used as pesticide since it is cheap and easily available (40%), that pesticide enhances the nutrient content of the soil (64%) and that pesticides could be sprayed over stored food to keep it fresh (56%). However, little less than three-forth of the farmers (72%) rightly rejected that spraying of pesticides must be done frequently to avoid growth of weeds, and almost all farmers (97%) did not agree that only use of hand gloves is enough for protection during spraying. Ironically, the most dangerous misconception showed by the three-forth (75%) of the farmers was that any pesticide can be used for any crop.

Responses of Farmers About the Remedies for Pesticide Pollution

The responses of farmers to the remedies of pesticide pollution are plotted graphically in Figs. 3 and 4. Majority of the farmers strongly affirmed that shifting to food grain and vegetable crops would reduce consumption of pesticide (86%), that body should be covered properly at the time of spraying pesticides (88%), and crop rotation would minimize pesticide requirement (85%). Surprisingly, only half of the farmers (50%) were aware of the fact that switching over to organic farming would retard the use of pesticides while about two-third farmers (63%) thought that pesticide use could be reduced by switching over to genetically modified crops. However, three-fifth of the farmers (60%) were ignorant of or have no interest in following MRI (maximum residual value) and

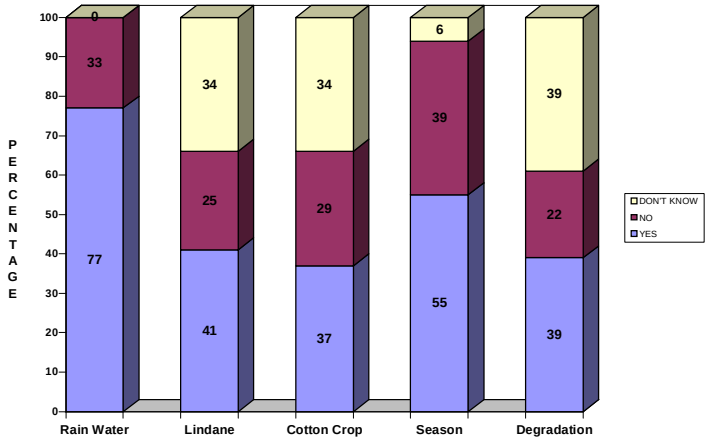

Fig. 1: Responses of Punjab farmers to scientifically true statements about causes and consequences of pesticide pollution.

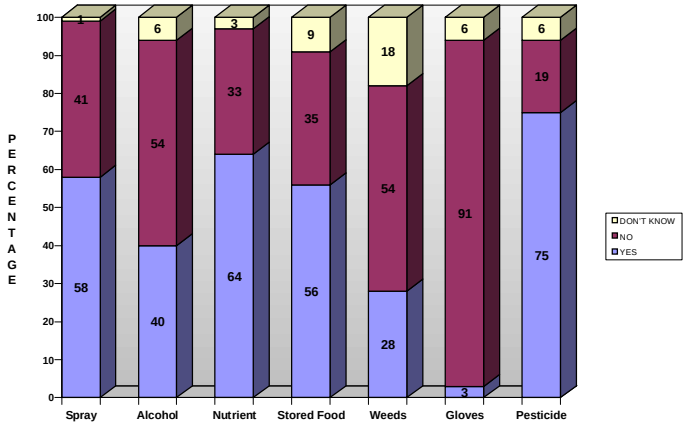

Fig. 2: Responses of Punjab farmers to non-scientific statements about causes and consequences of pesticide pollution.

ADI (acceptable daily intake) of pesticides mentioned by Ministry of Health and Agriculture which would help in minimizing the adverse effect.

Burning land and then farming would reduce pesticides use was rightly rejected by three-forth of the farmers (76%) while about one-fifth (22%) affirmed it. About three-fifth of the farmers (62%) refused to accept that fertilizers could be used as an alternative for minimizing pesticide use. However, common misconceptions showed by the farmers were that pesticides mixed with fertilizers would destroy pests more effectively (41%), that size of food product would increase with use of pesticides (37%), that pesticide sprayed food products should not be stored otherwise they would become distasteful (25%), and by using pure line variety of plants for long period would develop resistance against pests and minimize pesticide use.

The results of the present investigation showed that most of the farmers are uneducated and have poor knowledge about the nature, application procedure and management of pesticides. Chemical pesticides will still be required to control some pests and risk to human health and environment must

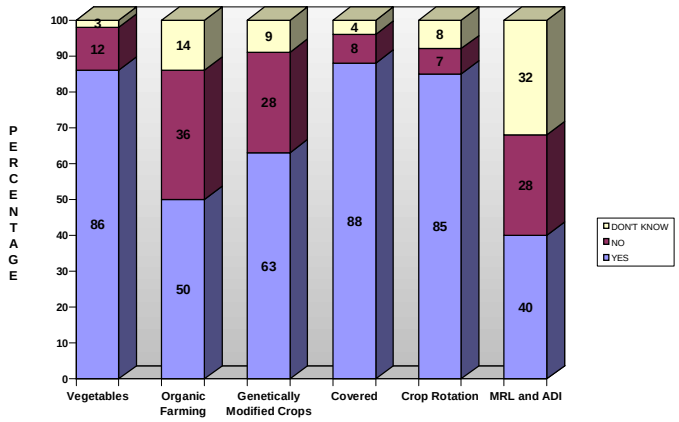

Fig. 3: Responses of Punjab farmers to scientifically true statements about remedies of pesticide pollution.

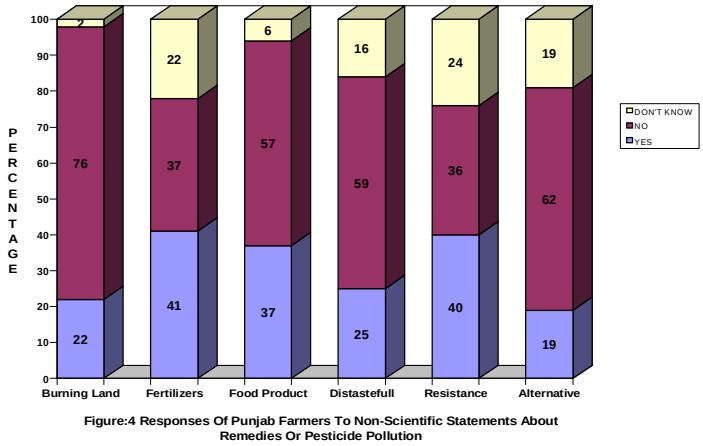

Fig. 4: Responses of Punjab farmers to non-scientific statements about remedies of pesticide pollution.

be balanced against the benefits of efficient food, fibre and forest production. Transgenic crops may even lead to increased applications of herbicides (Charles et al. 1995), despite denials by commercial interests. We need to ensure that harmful residues do not increase by proper selection of chemicals with shorter half lives as growers adopt reduced tillage techniques or as herbicide tolerant crop varieties are introduced.

Some Remedial Suggestions

Creating awareness: The fact that majority of the pesticide poisoning occurs in Punjab clearly shows the lack of awareness among the farmers. So, there should be a greater emphasis on educating the farmers who work with these pesticides.

Efficient laws and their strict enforcement: An autonomous body, consisting of qualified members must be established, which regulates the usage of different pesticides depending on their relative toxicity. Any case of non-adherence to the laws must be dealt with strictly and without delay.

Use of biological pesticides: Biological pesticides are an environmentally sound approach to pest control, since they provide us with a means to fight infestations without the use of any nasty chemicals with high toxicity.

Proper research and development: Before the introduction of any pesticide in the market, proper research and tests must be conducted to ensure that the ill effects caused to the environment by the usage of the pesticide is within permissible limits.

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