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A STUDY ON USAGE OF PESTICIEDS IN PAST FEW DECADES IN INDIA – A MARKET SURVEY

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Abstract

Pesticide use has changed considerably over the past five decades. Rapid growth characterized the first 20 years. The total quantity of pesticides applied to the 21 crops analyzed grew from 196 million of pesticide active ingredients in 1970 to 540 million 1981. Improvements in the types and modes of action of active ingredients applied along with small annual fluctuations resulted in a slight downward trend in pesticide use to 516 million in 2008. These progressions were driven by financial elements that decided harvest and info costs and were affected by bug weights, natural and climate conditions, edit acreages, farming works on (counting reception of hereditarily designed products), access to arrive concede augmentation faculty and yield specialists, the cost-viability of pesticides and different practices in securing crop yields and quality, mechanical developments in bug administration frameworks/rehearses, and ecological and wellbeing controls.

Introduction:

A pesticide is any substance used to murder, repulse, or control certain types of plant or creature life that are thought to be irritations. Pesticides incorporate herbicides for pulverizing weeds and other undesirable vegetation, bug sprays for controlling a wide assortment of bugs, fungicides used to keep the development of molds and buildup, disinfectants for keeping the spread of microbes, and mixes used to control mice and rats. In view of the far reaching utilization of rural synthetic substances in nourishment generation, individuals are presented to low levels of pesticide buildups through their eating regimens. Researchers don't yet have an unmistakable comprehension of the wellbeing impacts of these pesticide buildups. Results from the Agricultural Health Study, a continuous investigation of pesticide exposures in cultivate families, demonstrate that ranchers who utilized horticultural bug sprays encountered an expansion in cerebral pains, weariness, a sleeping disorder, discombobulation, hand tremors, and other neurological manifestations. Confirmation proposes that kids are especially helpless to unfavorable impacts from presentation to pesticides, including neuro formative impacts. Individuals may likewise be presented to pesticides utilized as a part of an assortment of settings including homes, schools, healing centers, and work environments. Two centuries back there were no logical bases for plant assurance exercises. In this way crude plant assurance measures were utilized, for instance wheat was absorbed salt water, utilization of vinegar, slag among others. In any case, over 2700 years back the Greeks used sulfur as a fungicide while the Chinese in this same period utilized arsenical mixes as bug sprays.

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The term pesticide covers a wide range of compounds including insecticides, fungicides, herbicides, rodenticides, molluscicides, nematicides, plant growth regulators and others. Among these, organochlorine (OC) insecticides, used successfully in controlling a number of diseases, such as malaria and typhus, were banned or restricted after the 1960s in most of the technologically advanced countries. The introduction of other synthetic insecticides – organophosphate (OP) insecticides in the 1960s, carbamates in 1970s and pyrethroids in 1980s and the introduction of herbicides and fungicides in the 1970s–1980s contributed greatly to pest control and agricultural output. Ideally a pesticide must be lethal to the targeted pests, but not to non-target species, including man. Unfortunately, this is not the case, so the controversy of use and abuse of pesticides has surfaced. The rampant use of these chemicals, under the adage, "if little is good, a lot more will be better" has played havoc with human and other life forms.

The pattern of pesticide usage

India, being a tropical country, the consumption pattern is also more skewed towards insecticides (Indian Pesticides Industry; 2011). So the pattern of agrochemical-application in India is not similar to that for the world in general. In India 76% of the pesticide used is insecticide, as against 44% globally (Mathur, 1999). The herbicides and fungicides' application is correspondingly less heavy. Crop wise, cotton accounts for the maximum share of pesticide consumption i.e. around 37% followed by paddy (20%). In India together they account for around 57% of the total pesticide consumption. While the wheat and pulses contribute of about 4 %, vegetable 9 % and the other plantation crops 7 % (Ministry of Agriculture, 2009). State wise Andhra Pradesh is the highest pesticides consuming state (23%) followed by Punjab & Maharashtra.

Production and usage of pesticides in India

The production of pesticides started in India in 1952 with the establishment of a plant for the production of BHC near telengana region, and India is now the second largest manufacturer of pesticides in Asia after China and ranks twelfth globally. There has been a steady growth in the production of technical grade pesticides in India, from 5,000 metric tons in 1970 to 102,240 metric tons in 1998. In 1996–97 the demand for pesticides in terms of value was estimated to be around Rs. 22 billion (USD 0.5 billion), which is about 2% of the total world market.

The pattern of pesticide usage in India is different from that for the world in general. As can be seen in Figure 1, in India 76% of the pesticide used is insecticide, as against 44% globally. The use of herbicides and fungicides is correspondingly less heavy. The main use of pesticides in India is for cotton crops (45%), followed by paddy and wheat.

How Was the Study Conducted?

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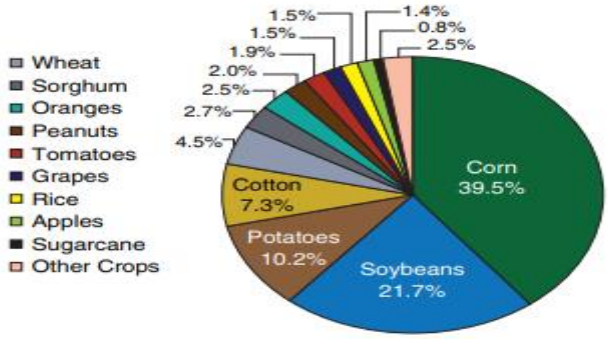
The study analyzes a new pesticide database that was compiled from pesticide use surveys carried out by Ministry of Agriculture & Farmers' Welfare, Government of India and Economic Research Service (ERS), supplemented by proprietary data provided by a market research company to the and shared with ERS under an agreement between the two agencies.

The data were collected for 1970-2010 and focus on 21 crops: apples, barley, corn, cotton, grapefruit, grapes, lemons, lettuce, peaches, peanuts, pears, pecans, potatoes, oranges, rice, sorghum, soybeans, sugarcane, sweet corn, tomatoes, and wheat. These crops account for roughly 72 percent of total conventional pesticide use in Indian agriculture. This report discusses "conventional" pesticides defined by the EPA as substances developed and produced primarily or only for use as pesticides and excludes sulfur, petroleum distillate, sulfuric acid, and hydrated lime. In addition to data described above, the study used pesticide expenditure data covering all U.S. agriculture drawn from ERS publications.



Pesticide use by crop, 21 selected crops, 2010, percent total pounds of active ingredient applied

Consumption of Pesticides' in India

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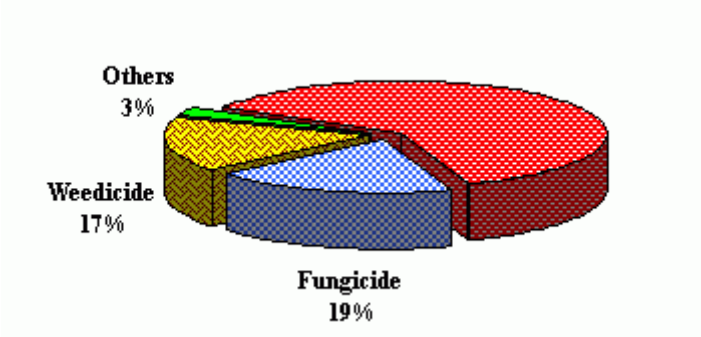
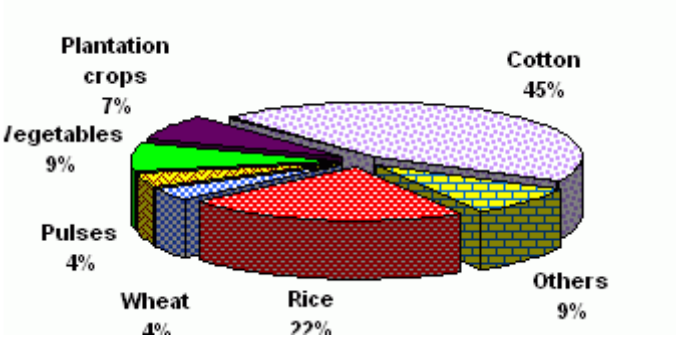


Composition of pesticides usage in India



Pesticide consumption by different crops in India

In recent years, low external inputs and traditional techniques, including non-chemical alternatives, have been increasingly urged for India. These are viewed as technology options that could help create sustainable systems and decrease or avoid the needs for expensive and undesirable chemical inputs. Alternative agriculture has argued for an economically viable production to be viewed in the context of a healthier, environmentally friendly and sustainable chemical agriculture and the need for investment in low external input and non-chemical alternatives that include farmer empowerment. Numerous models exist and have been advocated and based on their respective inputs / nutrient management principles. They may be broadly classified into: (a) Integrated Pest Management (IPM), (b) Low External Input Sustainable Agriculture (LEISA), and (c) Organic Agriculture. Many sustainable agriculture initiatives and approaches based on these principles have now proved successful, with use of pesticides varying from more to only a limited amount. Of these, IPM is the one commonly advocated and widely adopted.

Economic Factors Influencing Pesticide Use

Pesticide patterns, including changes in aggregate pesticide use and active ingredients applied, have been influenced by a number of factors over the last 50 years. Major factors affecting the demand and/or the supply of pesticides include:

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• Pest infestation levels. Commonly, at low densities, a pest causes little or no damage to agriculture, but potentially pests "can erupt to population densities that cause devastations of entire crops". From an economic viewpoint, an agricultural pest is an "animal or plant pathogen whose population density exceeds some unacceptable threshold level, resulting in economic damage".

• **Technical improvements** that increase pesticide effectiveness and/or reduce environment/ human health consequences. For example, the development of new chemistries for herbicides such as the very active sulfonylureas and imidazolinones in the 1980s and 1990s reduced the application rates from multiple pounds per acre to a few ounces, or even fractions of an ounce. Similarly, low-use-rate insecticide compounds were introduced, such as synthetic pyrethroids (permethrin, cypermethrin) in the mid-1970s and neo-nicotinoids (imidicloprid, clothianidin) in the mid1990s, increasing effectiveness.

• **The use of Integrated Pest Management** (IPM) practices by U.S. farmers, including crop rotations, mixing or alternating pesticides to reduce development of pest resistance to pesticides, biological monitoring of pests to better understand population densities and phenological development, predictive models that use local weather conditions along with pest phenology to optimize spray timings, improved and more accurate spray technologies, the optimization of planting and harvest dates, and the use of beneficial insects .

• **The adoption of genetically engineered** (GE) crops, including herbicide-tolerant corn, soybeans, and cotton, as well as insect-resistant corn and cotton (Fernandez-Cornejo and Caswell, 2004). GE seeds have genes that provide specific traits such as herbicide tolerance (HT) and insect resistance. HT crops tolerate potent herbicides, allowing adopters of these varieties to control pervasive weeds more effectively. Insect-resistant (Bt) crops contain genes from the soil bacterium Bacillus thuringiensis that produce a protein toxic to specific insects, protecting the plant over its entire life .

• **The use of conservation practices** that yield environmental benefits and reduce soil erosion but may or may not increase pesticide use. For example, the adoption of conservation tillage by U.S. soybean growers rose from about 30 percent in 1996 to 63 percent in 2006 (Fernandez-Cornejo et al., 2012).6 Glyphosate use has been associated with use of conservation tillage as it replaced more intensive tillage.

• **Pesticide regulations**. For example, the ban of DDT forced growers to use different insecticides and pesticide producers to develop new crop protection products

• **Changes in crop acreage**. Aggregate pesticide use has increased during periods of increasing planted acreage, and decreased during periods of decreasing acreage. Acreage planted reflects farm policy and economic factors that influence crop demand. In particular,

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changes in acreage under diversion programs and the Conservation Reserve Program (CRP) influenced the acreage in crop production and thus pesticide use.

• **Increased corn acreage**. While corn is a noteworthy part of domesticated animals feed, development of ethanol creation for fuel use since the mid 2000s, reflecting vitality arrangement, supported corn sections of land significantly further. The expansion in corn grounds prompted an expansion in pesticide utilize and change in the dynamic fixings utilized. The adjustment in dynamic fixings likewise reflects expanded glyphosate utilize related with the appropriation of HT crops.

What's more, numerous variables in a roundabout way impact pesticide utilize, for example, climate, cultivar helplessness or protection from bugs or infection, and shopper interest for flaw free create that urges producers to apply pesticide materials notwithstanding when their IPM checking shows generally. Different elements incorporate item costs and also the costs of different data sources, for example, work and apparatus.

Conclusion

The increasing cost of plant protection and accelerating pest incidents make agriculture a risky and less profitable enterprise. At the same time the toxic materials generated from chemical farming pollute the environment and harm consumers' and farmers' health. A more environmentally friendly and economical alternative for India would be adoption of Integrated Pest Management. Additionally, from the viewpoint of sustainability, attaining growth while maintaining the natural capital intact, IPM is superior compared to conventional farming. It should, therefore be appreciated and encouraged to a greater extent both by governments and NGOs'.

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