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Pesticide Production Scenario and its Usage in India

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SUMMARY

Chemical control is still the most common way to reduce the pest population in the field. They play a crucial role in agriculture as plant protection agent by minimizing the crop losses. The losses caused by the pests are high in developing countries because of the high burden of pests. Pesticides act as an essential input and plays an important role in raising agriculture returns. Although they increase the yield but the overreliance on pesticides have caused a serious threat on food quality, environment, and human health. After their application, pesticides reach to the lower horizons and contaminate the environment, ground water and other water bodies. In this context, integration of other strategies including bio-pesticides, botanicals, genetically modified crops and other cultural methods should be practiced to reduce the effect of harmful pesticides.

INTRODUCTION

Pesticides are the chemical substances which are meant to control insect pests, diseases and weeds. They play a crucial role in agriculture development by enhancing crop yield. In the market, pesticides are available in a variety of forms like herbicides, weedicides, insecticides, and nematicides. According to Food and Agriculture Organization, 20-40 % of the losses to crops are caused by pests, whereas 6-7 % of these losses occur at post-harvest. The pest problem is more severe in tropical countries as the climate provides favorable temperature and moisture to the pest. In developing regions like Asia and Africa, 50 % losses are caused by insect pest, diseases and weeds. According to various estimates, nearly 1 billion people in the world are undernourished. Moreover, the human population is growing with a rapid rate and likely to surge 9.1 billion by 2050. In India, the effective pesticides are need to be developed to combat pest problems to ensure the food security as India is the second most populated country in the world. With the increase in global trade, each year the problem of invasive pests is increasing in the country. Consequently, the use of chemicals became integral part of crop production to save the crops and money of the farmer. Standing Committee on Fertilizer and Chemicals reported that India is at the stage of food surplus, and country's total food production has been increased to 252 million tons in 2014-15 from 83 million tons in the year 1960. Pesticides act as an essential input and plays an important role in raising agriculture returns. However, the overreliance on pesticides have caused a serious threat on food quality, environment, and health hazards. Various developed countries have already banned a number of pesticides nearly two and half decades ago due to the problem of residues and bioaccumulation (Thullner, 1997). In developing countries, Around 20,000 people have been died due to consumption of pesticides through the food (Bharadwaj and Sharma, 2013). Worldwide around 77,000 people died in 2016 due to unintentional pesticide poisoning (WHO, 2018). There are also alternatives available other than the pesticides such as biological and genetically modified crop approaches and botanicals but because of instant action on bringing down the pest population below ETL, farmers still prefer to use pesticides. Seeing the negative impact of pesticides on human health, and ecosystem various states have started transforming conventional agriculture to organic mode of crop production. In India, Sikkim became the first state to announce adoption of organic farming in 2003. Kerala has also adopted organic crop production. The Indian government is also giving more emphasis on organic farming (Devi 2011).

Production scenario of pesticides in India

In India, pesticide production was started in the year 1952 when BHC technical plant was set up by Indian pesticide production industry in Calcutta. Again in 1969, Hindustan insecticides limited established DDT production plant. There are so many government owned pesticide companies in India such as Hindustan Insecticides Ltd. (HIL), Insecticides India Ltd, Rashtriya Chemicals and Fertilizers Limited (RCF), The Fertilizers and chemicals Travancore Limited (FACT) and Pyrites, Phosphates and Chemicals Limited. Now, India is the second largest manufacturer of agrochemicals after China and hold twelfth rank globally. As per the report of Statista Research Development, 217 thousand metric tons of pesticides were produced in fiscal year 2019 across India which is dominated by insecticides and fungicides. The production of insecticides has decreased from 70

percent in 2003-04 to around 39 per cent in the year 2016-17 but the fungicide share was found to be increased due to their use in fruit and vegetable crops (Subhash et al. 2017).

Pesticide usage in India as compared to the world

India is the only country which has used more than 10,000 tons of DDT for agricultural and malaria control program until it was banned in 1989 for agricultural use (Kannan et al. 1995). Even though it was banned but India has sought some exemptions under the Stockholm Convention, for restricted use of DDT (10,000 tons) in public sector. Tons of DDT was used in 2001 under national malaria control program in rural and peri-urban areas for residual spraying. In India, the consumption of pesticides during 2014-15 was 0.29 Kg/ha which was 50 per cent more than 2009-10 (Subhash et al., 2017) (Figure 1). This increase in pesticide use is due to more use of herbicides as a result of increase in agriculture wages (FICCI, 2015). While the use of rodenticides and fungicides were declined. In 2017-18, country used 69,282 tonnes of pesticides, a rapid increase from 61,273 tonnes used in 2014-15 (Kapil, 2020).

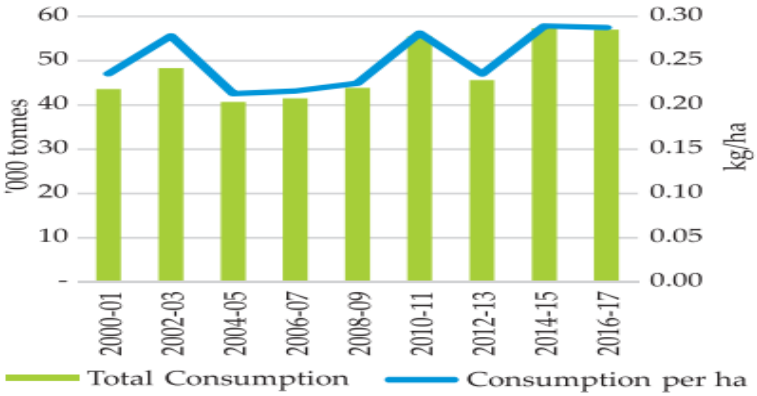

Fig 1: Pesticide consumption per ha (technical grade) in India (Source: Based on Ministry of Chemicals and Fertilizers)

However, the data on pesticide consumption in India is much lower than other countries like China (13.05 Kg/ha), Japan (11.84 Kg/ha), and Brazil (4.5 Kg/ha) (FAOSTAT, 2017). As on 2019, 292 pesticides have been registered for use in India. With the share of 24%, Andhra Pradesh is leading consumer of agrochemicals. Eight states including Andhra Pradesh, Maharashtra, Punjab, Madhya Pradesh, Gujarat, Chhattisgarh, Haryana, and Tamil Nadu consume more than 70% of agrochemicals in India (FICCI, 2019). Pesticide Usage was comparatively lower in states like Rajasthan, Karnataka and Bihar. Paddy accounts for the maximum (26%-28%) share of pesticide consumption followed by cotton (18%-20%) (FICCI, 2019).

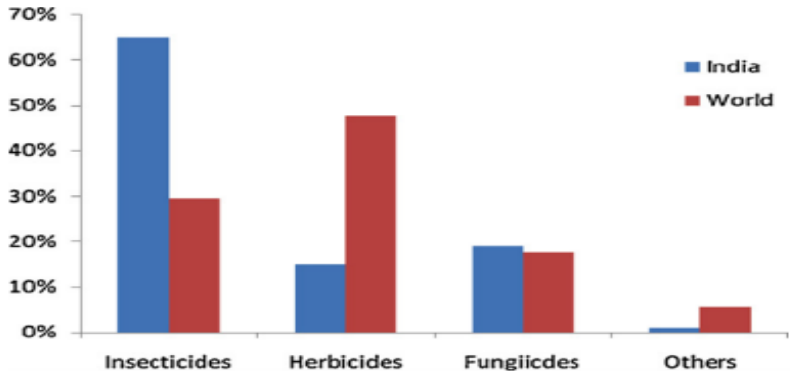

Fig: 2 Comparision of pesticides used in India and world **Source: (Abhilash and Singh, 2009)**

However, the adoption of Bt cotton across the country, has led to reduced consumption rate of pesticides in cotton. In India, insecticides form the largest share of 65 % followed by herbicides (16 %), fungicides (15 %) and 4 % are others (Devi 2011). Globally, 47.5 % of the pesticide consumption is dominated by herbicides followed by insecticides (29.5 %), fungicides (17.5 %) and others (5.5 %) (De et al. 2015) (Figure 2). Various

developed countries like USA, Europe, and Japan consume twenty times more pesticides compared to India. The annual consumption of pesticides is approximately 2 million tons throughout the world. In continent, the percentage of insecticide use is approximately 71 per cent in South America, 45 % in Europe, 19 % in Oceania and more than 90 % in Asia and Africa together. In Asia, this higher usage of pesticides is can be linked to high cereal production, plague control, and other vector borne disease control (Froneman, 2018). The two leading countries in consuming pesticides are China and United States. China is applying 3,981,548,455 pounds of pesticides in the field mainly for rice crop every year. While United States is applying 850,984,332 pounds of pesticides annually. After field application, pesticide reaches to lower horizons through leaching and contaminate ground water. US Department of Agriculture reported that 50 million people in US getting water from the waterways contaminated with agrochemicals and other pesticides (Ward et al. 2000).

CONCLUSION

No denial to the fact that pesticides are effective for short term control of pests but their long term negative impact on humans, environment and animals are also established. So, proper guidelines should be followed regarding registration of hazardous pesticides. These pesticides either should be phased out or their use should not be permitted beyond a certain limit. The second most important consideration is the promotion of safe application practices and awareness among farmers. Pesticides use can be limited by integrating other safer practices in the field such as bio-pesticides, botanicals, genetically modified crops and other cultural methods should be practiced in order to keep our food and surroundings free from poison.

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