

The Use of Synthetic Pesticides among Farmers: A Synopsis of the Effects in the Agricultural Sector

Owojaiye Oluwasanjo Biodun¹ and Adegbola Jacob Adetayo²

¹Principal Research Officer, Research Outreach Department, Nigerian Stored Products Research Institute, Ilorin, Nigeria

²Chief Research Officer, Research Outreach Department, Nigerian Stored Products Research Institute, Ilorin, Nigeria

SUMMARY

The widespread use of synthetic pesticides in the agricultural sector aids in mitigating the activities of pests as well as in the intensification of agricultural production. It plays crucial roles in the bid to guarantee food availability in both developed and developing countries. The advantages of its use seem exaggerated when juxtaposed with the attending deleterious consequences on human health and the environment. The importance of synthetic pesticides, its effects on health and the environment are discussed in this review.

INTRODUCTION

The bid to guarantee stable supply of food all year round and increase crop yields, preserve the nutrient composition of food and facilitate storage; all common features of modern agriculture is signposted by increased use of pesticides. The peculiar characteristics of developing countries make pesticides more valuable than ever before as they seek to diversify their revenue base and gain a foothold in the global market through the provision of primary commodities (Ismail, Sameni and Halimah, 2011). The actualization of this goal and the accompanying pressure is further enhanced by agricultural inputs such as herbicides, fungicides, insecticides, which make up the whole gamut collectively referred to as pesticides. High insect pest and disease incidence remain the major agricultural production constraints mitigated by the use of pesticides (Lagerkvist, Ngigi, Okello and Karanja, 2012).

Pesticides are vital and popular tools in combating damage from pests and in reducing both direct and indirect pre-harvest and postharvest losses. They are labour saving, economic and highly efficient pest management tools (Damalas and Eleftherohorinos, 2011) that ensure continuous food production and availability and guarantee improved yields. Despite the enormous challenges in producing crops that meet consumer requirements, pesticides have proven useful for the intensification of agricultural production to meet high local and external demand. The demand for fresh high quality and blemish-free agricultural products by consumers is made possible by pesticides. Pesticide application is premised on the need to shield important agricultural and industrial commodities from harm and the quest to suppress the impact of plant and animal pests. Furthermore, pesticides have the potential to improve the nutritional value of food and occasionally, its safety. There are other advantages and beneficial attributes of pesticides that are largely unnoticed by the public.

Effects of Pesticide Use

The benefits of using pesticides notwithstanding, evidence abound in literature of intended and unintended dangers associated with its use, both to humans and the ecosystem (Damalas, 2009). The control of insects and weeds using pesticides has serious drawbacks, such as the development of resistant strains, toxic residues and increasing costs. In other words, the perception of pesticides as relatively cheap, easy to use and effective pest control method is overstated when the harmful environmental and social effects of their misuse are considered. Inappropriate handling and contact with pesticides have adverse effects on farmers and farm workers' health and wellbeing in both subsistence and commercial agriculture. Ogah, (2012) stated that the environment and human health are affected by residues from the application of pesticide while Zhang *et al.*, (2011) asserted that an estimated 180,000 deaths are recorded among agricultural workers annually among rural folks in developing countries with about 25 million suffering mild pesticide poisoning and another three million serious pesticide poisoning.

Effects on Human Health

Pesticides are produced because they are toxic to one pest or a group of pests and are therefore basically poisons. Pesticide poisoning has become a significant public health challenge in developing countries as is the use of pesticides for suicide through digestion. In spite of inadequate records, about 14-20% of suicide attempts involved the use of pesticides (Gunnell, Knipe and Chang, 2017). Kesavachandran et al., (2009) asserted that though developing countries account for less than 25% of worldwide pesticide use, casualty rates are the highest in these countries. Residues from application of pesticides become potential health hazards to man and animals. The health effects of pesticides may be acute or delayed (chronic) after exposure; when ingested with foods and depending on the level and span of exposure, they could be immediately harmful, or become so over time, from accumulated consumption irrespective of the toxicity. Oral, dermal, respiratory pathways and the eyes represent the common ways pesticides get into the body with the most common route of pesticide poisoning being through dermal exposure. Coronado, Vigoren, Thompson, Griffith and Faustman (2006) identified work-to-home transmittance as a key source of pesticide exposure for children. Pesticide exposure through occupational or home use through inhaling pesticide-contaminated air or via drinking liquids and eating foods containing pesticide residues is also common (Gilbert, 2011).

The use of synthetic pesticides may lead to the development of cancerous cells in certain organs in the body including liver, breast, lungs, colon, thyroid and prostate. Bonner *et al.*, (2017) reported that soft tissue sarcoma, lymphomas, bladder, stomach, rectum and lung tumors, leukemia, neuroblastoma are risks of continuous intense exposure to pesticides. Other impacts include breathing challenges, loss of consciousness, excessive salivation, severe headaches, nausea, diarrhea and seizures (Medline Plus, 2015) rashes, reproductive complications and neurotoxicity. Moretto and Colosio (2011) provided evidence that depression and suicide along with many neurodegenerative diseases, such as neuropathy, Parkinson's disease, cognitive impairment, peripheral nervous system changes, Alzheimer's disease and neurobehavioral disorders could result from acute and chronic levels of exposure to pesticide. Impairment of fine and gross motor skills, social behavioural problems and neurodevelopment delays are some of the effects of this exposure on children (Gilden, Huffling and Sattler 2010). Acute and chronic neurological effects and neurobehavioral changes among women have also been reported. Kabir and Rainis (2012) stated that ingesting pesticides may cause infertility and miscarriage in women and reduce testosterone in men while pregnant women who consume pesticides run the risk of brain cancer in the fetus. The sympathetic and parasympathetic nervous system is also affected with reported cases of fatal respiratory paralysis (US EPA, 2005). Across the rural and urban centres of Borno State, Nigeria, food poisoning and deaths have been recorded from multiple sprays of lethal quantities and the resulting high levels of pesticide residue from improper application (Gwary, Hati, Dimari and Ogugbuaja, 2012).

Effects on the Environment

Sufficient evidence to demonstrate the harmful effects of the use of pesticides to the ecosystem abound. This is because pesticides also impact the environment and may become counterproductive since they often come into contact with both target and non-target objects. The contamination of air, water, food, soil and biota (the environmental compartments) by pesticides may constitute hazards for other non-target organisms in the environment. Improper disposal of containers and unintentional spills and spoilages resulting in accidental contamination cause significant harm that sometimes remain unnoticed including increased pest resistance, loss of biodiversity and disruption of the ecosystem balance. Fish samples collected from Lagos lagoon (Adeyemi, Ukpo, Anyakora and Unyimadu, 2008) and Warri River (Ezemonye, Ikpesu and Isioma, 2010) recorded disproportionately high organochlorine and organophosphate pesticide residues. Anzene, Tyohemba, Ahile and Emezi (2014) reported findings that demonstrated quantities of organochlorine pesticide residues in excess of the maximum residue level recommendation in certain cereal crops from Nasarawa state in Nigeria.

CONCLUSION

Synthetic pesticides are efficient pest management tools in the agricultural sector; however, they affect the health of farmers and contribute to the obliteration of wildlife and beneficial insects, development of pesticide resistance in pests and the decreased future productivity and stability of farming systems.

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