



A STUDY OF NEGATIVE EFFECTS OF PESTICIDE USAGE ON NON-TARGETED MICROBIAL FLORA IN AGRICULTURAL FIELD

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Abstract

Pesticides are continuous exercises to prevent, kill or repel any pest. The use of pesticides is not proper in a scientific way, it contributes to various diseases, including neurological, carcinogenic respiratory reproductive, and developmental toxicity. Mancozeb, a fungicide, was listed for the reproductive physiology of non-target organisms. It also affects the mitochondrial enzymes, disturbing mitochondrial function, and adenosine triphosphate (ATP) production. Monocrotophos pesticides are banned in many countries, under the "restricted" Category. Use of Short-term exposure to Carbendazim are produce muscle twitching, headache, nausea, dizziness, loss of memory, diarrhea, and slowed heartbeat. In view of the above problem, the present study examines, if higher amounts of pesticide are used, it accumulates in soil and water and causes lethal effects on living beings of an ecosystem.

Key words

Pesticides, Toxicity, Mancozeb, Carbendazim, Monocrotophos, Public health

Population has been increased with high rates since last few decades. Not only put the pressure on land but also problem to feed the population. So, we required the diet food and nutrition to high yielding occupied by the pests (Giridhar and Indira, 1997). After a few years, some researchers invented new modern technology and define variety of pesticides. It is classified depending on the chemical nature, mode of entry, mechanism of action, and primary target organism. Based on their chemical nature, pesticides are classified as Organochlorides (OC), Organophosphates (OP), Carbamates (CB), Pyrethroids (PY), and Triazines (TZ) (Akashe *et al.*, 2018)

ENVIRONMENTAL HAZARDS OF PESTICIDES

India is an agricultural country producing different types of crops. Thus, Pesticide plays a dynamic functioning in the agricultural field or public health protection programs for preventing and controlling plants from pests and vector-borne diseases, leading to increased food production. Use of this Pesticide have more than doubled in the last 10 years. WHO (1997) data show that 3 million people are poisoned and 2,20,000 lakhs deaths occur by pesticides in every year. Awareness regarding pesticide used in emerging countries is very poor. Even if, the over-application or misuse of these pesticides caused a possible adverse effect on human health and other non-target organisms (Ankley and Jensen, 2001).

Green revolution is one of the basic needs to save our planet and our country from burning environmental issues, there was a quantum bounce in the use of synthetic pesticides which play an important role in agriculture to control destructive pests such as insects, weeds, plant disease - causing pathogenic organisms, nematodes, arthropods, and vertebrates, that cause danger to the quality of food products such as fruits and vegetables, hazardous to the environment, affects soil fertility and causing an imbalance in nature (Priyanka *et al.*, 2022)

Accumulation of pesticides adversely affects the environment and ecosystem (John, 2007). The world health organization discovered only 2-3 % of chemical pesticides are effectively used for preventing, controlling, and killing pests, while the rest remains in the soil (WHO, 1990). Exposure to pesticides can travel up in the food chain leads to poisonous to animals. Some pesticides can accumulate in higher amounts and build up toxic levels in the organisms that consume them over time. When pesticides accumulated in organism's tissue is eaten by a higher organism, it enters the latter's tissue and spread in the food chain.

Recently studies have shown that higher amount of pesticides might contribute to various diseases, including neurological, carcinogenic (Bassil *et al.*, 2007), respiratory (Hernández *et*

al.,2011), reproductive and developmental toxicity (Hanke and Jurewicz, 2004).Furthermore, several studies have recommended that more use of occupational pesticides may induce oxidative stress damage to various physiological systems such as testicular function. (Ihsan *et al.*, 2011; Mehrpour *et al.*, 2014). Day by Day occupational exposure increases the risk towards infertility while residential use of pesticides is less risky (Greenlee *et al.*, 2004).

MANCOZEB

Mancozeb, a manganese/zinc ethylene-bis-dithiocarbamate, is a pesticide widely used in pest control management. It acts as a contact fungicide used to protect vegetables, fruits and other field crops against fungal diseases (Miles and Kemmitt,2004) It is widely used due to its high pesticidal properties, low mammalian toxicity, lower persistence, and fast biodegradability in the environment (Fishel, 2017). Application of mancozeb is also used for the treatment of cottonseed, potatoes, corn, sunflower, sorghum, peanuts, tomatoes, flax, and cerealgrains. Mancozeb is combined with metalaxyl is more potential for the control of downy mildew of cucumber instead of applied individually (Samoucha and Cohen,1984).Recent studies also found that a combination of carbendazim and mancozeb are very effective for the control of leaf blight on sunflower (Mathivanan and Prabhavathy 2007) and chili rots (Roy *et al.*, 2010).

MANCOZEB AND ITS HAZARDS

The focus of much attention at the research level has been on the search for novel or reconsidered aspects of the toxicity of mancozeb to the adverse effects of the reproductive physiology of non-target organisms. However, over doses of mancozeb affect the mitochondrial enzymes, disturbing mitochondrial function and adenosine triphosphate (ATP) production. It can also react with the sulfhydryl groups of amino acids and enzymes in fungal cells, resulting in metabolism disorders and activated apoptotic pathways (Afsar and Demirata,1987). Although it has been reported to possess low acute toxicity, persistence in the environment, diverse chronic health effects like increased carcinogenic potential (Shukla and Arora,2001) endocrine system disruption, and toxic effects on the immune (Pavlovic *et al.*,2016) and neuronal system (Domico *et al.*, 2007) by exposure to mancozeb. Use of mancozeb decrease sperm count with increased aberrant head morphology found in mouse reported by Khan and Sinha, (1994)

A previous study recommended that the use of mancozeb exposure increased frequency of thyroid disease in female spouses. In addition, effect of mancozeb on reproductive organs and its functions have been observed by formation of free radicals (ROS), leading to reduced uterus,

ovary, and testes weights, disrupted estrus cycles, pathological changes, and cellular apoptosis in testis (Mahadevaswami *et al.*, 2000). Besides, excessive production of ROS can impair reproductive capacities by modifying sperm mobility, viability, and integrity of their membrane (Abd-Ellah *et al.*, 2015). At high doses of exposure mancozeb disturbs convulsions, slurred speech, confusion and slowed heartbeat in human. In lower doses, mancozeb can also cause a skin rash if the chemical has contact with the skin.

MONOCROTOPHOS AND ITS EFFECT

Another pesticide is Monocrotophos (MCP). MCP belongs to the organophosphate group used extensively in agriculture and animal husbandry. This is a banned pesticide for different types of vegetables in many countries (Bonvoisin *et al.*, 2020). In India, MCP is used extensively to protect cotton and sugarcane crop from the broad spectrum of chewing, sucking, and boring insects. It is under "restricted use." Category. Many countries banned MCP, but this demand is very high due to its low cost and effectiveness. MCP is highly water-soluble and can easily contaminate the aquatic environment due to indiscriminate use.

EFFECT OF CARBENDAZIM ON DIFFERENT TYPES OF DISEASES

Carbendazim (Camry 767) is a broad-spectrum Benzimidazole systemic fungicide and a metabolite of Benomyl. Carbamate pesticides affect the nervous system by disrupting reversibly an enzyme that regulates acetylcholine, a neurotransmitter. Short-term exposure can produce muscle twitching, headache, nausea, dizziness, loss of memory, diarrhea and slowed heartbeat. Application of Carbendazim in an appropriate amount to controlling various insect-pests and diseases in fruit harvest time. It is generally used to control anthracnose diseases and stem end rot through either preharvest spray (Prakash and Pandey, 2000) or postharvest spray and dip in hot fungicidal solution in mango plant (Bhattacharjee *et al.*, 2009).

Currently, the wide use of pesticides in combination like cypermethrin, mancozeb, and metalaxyl is ready-to-use by local manufacturers instead of using individual ones, which may cause more health damage (British, 2013). The potential effects of these mixtures in damage of reproductive system reported by Wade *et al.*, (2002). Therefore, this research aimed to evaluate the adverse effects of the three pesticides mixture or individual (cypermethrin, mancozeb, and metalaxyl) on the reproductive system and oxidative stress in non-targeted organism

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