

Study Effect Of Pesticide On Live Stock And Strategies To Combat With Pesticide Residues Related Problems

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Abstract : In the thirst of modernization and industrialization man has contributed pollution to the life and ecology of plants, animals and microbes. Increased demand for food and fiber has lead to the chemicalization of agriculture and we have reached on such a stage that

modern agriculture is dependent on high yielding varieties, which can only be grown under the influence of fertilizers and pesticides. Pesticides are the man made chemicals which are being used to produce enough

cheap food. In India, 90,000 MT of technical grade pesticides are used annually to control pests and plant diseases.

Majority of these pesticides are beneficial when used for specific purposes, handled properly and applied as per the recommendations of the manufacturer.

However, over the years, there has been a mounting fear and concern that indiscriminate and impropportionate use of pesticides may lead to their residues in food chain which may exert their harmful effects in human beings and animals.

Status Of Pesticide Residues In Animal In India

The presence of pesticide residues have been detected in various items and in food chain. The levels of the pesticides are found much higher than expected level because of heavy contamination of environment. The primary concern of the chronic low dose toxicity in animals is related to the carcinogenic, teratogenic, mutagenic, immunotoxic, immunopathological and/or neuropathic effects of pesticides. The perusal of literature in this regard reveals the studies directed towards only one or two pesticides while in nature, when a large number of pesticides are present and their combined effect has not been measured; which of course will give very dangerous view. Various Pathological effects of low doses of pesticides in animals and man are as under:

1. Immunopathological effects: Immunopathological effects of pesticides in animals and man are classified under acquired immunodeficiency or immunosuppression, autoimmunity and hypersensitivity.
 - a). Acquired Immunodeficiency: Most of the pesticides studied during last two decades are found to exert immunosuppressive effect on both the wings of immune system i.e. humoral and CMI. Organochlorines, organophosphates, carbamates and synthetic pyrethroid pesticides were found immunotoxic at “no adverse effect dose” levels in poultry, sheep, and in bovine calves. However, the organochlorines are comparatively much more harmful to immune system. They are considered to be the cause of vaccinal



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failures or occurrence of disease epidemics in animals due to lowered immunocompetence. It has also been reported that a state of immunosuppression for a longer period may also lead to the development of neoplasms as the immune surveillance mechanism becomes defective. Such animals also exhibit recurrent bacterial infections due to defective phagocytic machinery of the body. Immunosuppressive state of animal for a longer duration may also lead to development of cancers in the absence or defective immune surveillance in body. Since the pesticides affect specific as well as paraspecific immune system adversely, the immune surveillance in body becomes defective. Though, there is no direct correlation but for an example, there is an increased incidence of eye cancer (squamous cell carcinoma of eye) in cattle and buffaloes in western UP during last few years. Similarly the occurrence of canine venereal tumours also increased in dogs during last decade. It is an indication of the adverse effects of polluted environment and may be related with a state of immunosuppression.

b) Autoimmunity: Pesticides are also known to initiate autoimmune reactions in body particularly organochlorine group of pesticides binds with certain proteins of the body to become antigen leading to initiation of an autoimmune response in body. Autoimmune glomerulonephritis or autoimmune hemolytic anemia or autoimmune rheumatoid arthritis are such manifestations in animals and man. Lindane when fed with 'no adverse effect dose' level in lambs for a period of 4 months resulted in autoimmune glomerulonephritis as has been detected by the presence of immunocomplexes in glomerular basement membrane using indirect immunoperoxidase techniques.

c) Hypersensitivity: Hypersensitive reactions are reported due to consumption of pesticide contaminated food stuffs. Pesticides may act as haptens but antibodies against them have been detected in body. Eczema in man was found due to maneb, 2,4-D and 2,4,5-T. DDT has also been known to cause type I hypersensitivity reaction. The dust of pesticides is cause of allergic respiratory disorders like asthma. Cutaneous allergy has been known to occur due to contact of pesticide contaminated food items. However, the studies showed a depression of CMI response on delayed type hypersensitivity reaction using chemical allergens.

2. Carcinogenic effects: Some pesticides exert their carcinogenic effects either directly or indirectly through their metabolites. Most of organochlorine pesticides like dieldrin, gamma isomer of BHC, DDT and PCB may cause cancer in liver and lung. However, there is a lack of sufficient literature to support this belief that the pesticides are having carcinogenic effects. Indirectly, a state of immunosuppression for a longer period is helpful in increasing the susceptibility of an animal for malignancy. Since many pesticides are known to cause mutation in chromosomes of man and animals, it is considered that they may also lead to carcinogenicity.

3. Mutagenicity: Pesticides may cause alterations in structure or number of chromosomes resulting in translocations, mutations and chromosomal breakage. The altered chromosomal



number may become lethal during fetal stage. Several pesticides like DDT, Endrin, PCB and HCB are known to cause chromosomal aberrations. The mutagenic effect of pesticide poses a more serious threat to the future of human race.

4. Teratogenicity: The accumulation of pesticides in body tissue and congenital birth defects in children has not been well correlated so far. However, there are certain pesticides which causes teratogenic defects in animals. Carbaryl, thiram, propoxur, parathion, leptaphos, 2,4-D, lindane and diazinon are having teratogenic defects in animals. In mice, cypermethrin, alphemethrin and malathian are found to exert birth defects in baby mice.

5. Neuropathy: Most of the organophosphates, organochlorines carbamates may cause neurotoxic effects in man and animals including increased irritation, loss of memory, in coordination of movement, ataxia, delayed response, convulsions, spasms and paralysis. Such changes appear due to demyelination of nerves in central and peripheral nervous system. Pesticide residues are also responsible for marked behavioural changes in man and animals.

6. Nephropathy: The pesticide residues present in food stuff may act as hapten and when they bind with certain body proteins, they may become antigenic. This antigenicity is responsible for initiation of immune response in body and a continuous presence of antigen and antibodies in body may lead to the formation of immune complexes. The immune complexes when produced in excess are deposited in glomerular basement membrane leading to glomerulonephritis, commonly known as renal failure for which patient needs dialysis after a regular interval to survive.

7. Hepatotoxicity: The pesticide residues in food may harm liver tissue as they are metabolized here. There are instances of chronic liver disorders leading to cirrhosis. Certain pesticides are not so dangerous but their metabolites cause severe damage to hepatic parenchyma. The cirrhosis once starts, it never stops even after withdrawal of the primary cause.

8. Reproductive Disorders: It has been observed that the pesticides are lethal to dividing cells of genitalia. They may cause abnormalities in sperms leading to decrease their ability for fertilization. On the other hand the ova becomes defective and not able to implant on the uterine surface leading to early abortion or miscarriage. DDT has been found to cause weak egg shell in birds leading to their decreased population. The pesticide residues in food, thus may ultimately lead to sterility, early abortion, still births or repeat breeding.

9. Recurrent infections: Animals having reduced immunocompetence due to pesticides are more liable to attract infections very frequently. A good treatment provides relief to animal but soon after recovery, the same disease occurs again due to immunosuppressive state of animal. Needless to emphasize that most of the antibiotics are bacteriostatic, which do not kills the organism but prevent their growth. In such conditions the suppressed growth of bacteria flares up



just after withdrawal of the antibiotic therapy in the absence of defective immune system of body due to pesticides.

Strategies to combat with pesticide residues related problems

A. Government level

1. The farmers should be advised about the harmful effects of pesticides so that they should minimize the use of pesticides in crops. They should judiciously use the pesticide in terms of their quantity and frequency.
2. It should be assured that the pesticides produced in country should be distributed proportionately so that the indiscriminate and impropionate use can be avoided.
3. All emphasis must be laid on the development of Bio-pesticides like viral, bacterial or fungal pesticides or pesticides of botanical origin like Neem or Tulsi or of cow urine based pesticides, which can be used in crops to kill the insect pests without polluting the environment.
4. The harmful pesticides like some organochlorines, organophosphates and carbamates must be banned strictly in India, their production, import or use should be completely banned.

B. House hold level / Individual level

1. Avoid the use of chemical pesticides in house such as mosquito repellents, cockroach killers, sprays, mats, coils, etc. All of them are harmful to the body responsible for making body susceptible to various kinds of ailments.
2. Avoid to use synthetic chemicals, dyes, flavouring agents, preservatives, antifungal and antibacterial agents in food items.
3. Use fresh foods as far as possible and after proper cleaning. Vegetables should be kept in lukewarm water with 0.89% salt for at least 30 min before use.
4. Avoid the shining vegetables fruits such as tomatoes, brinjal, lady's finger, apple, etc.
5. Try to have such vegetables/fruits/cereals/ pulses which are grown under organic farming.

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