Review of literature

Our country’s status is mainly dependent upon agriculture and with increase in population, as well as to strengthen our economic condition increases in production was required. This requirement was fulfilled by the use of modern technologies in agriculture such as better fertilizers and irrigation facilities and the most common was the use of pesticides.

Organochlorides, organophosphates, carbamates, pyrethroids etc. are source of the categories in the series of highly effective pesticides.

These pesticides when used in fields, they causes direct contamination of soil and water including ground water. Some of these animals can persist for many years and thereby cause concern about their potential movements from soil into water system. A study published by the United States National Research Council in 1993 determined that for infants and children, the major source of exposure to pesticides is through diet (National Research Council, 2007).

Pesticide use raises a number of environmental concerns. 98% of sprayed insecticides and 95% of herbicides reach a destination other than their target species, including non-target species, air, water, bottom sediments, and food (Miller et al., 2004).

Children have been found to be especially susceptible to the harmful effects of pesticides (Noyes et al., 2007). A number of research studies have found higher instances of brain cancer, leukemia and birth defects in children with early exposure to pesticides, according to the Natural Resources Defense Council (Melissa et al., 2006).

Peer-reviewed studies now suggest neurotoxin effects on developing animals from organophosphate pesticides at legally-tolerable levels, including fever nerve cells, lower birth weights, and lower cognitive scores. The United States Environmental Protection Agency finished a 10 year review of the organophosphate pesticides following the 1996 Food Quality Protection Act, but did little to account for developmental neurotoxin effects, drawing strong criticism from within the agency and from outside researchers (Pulaski et al., 2006).
One study of EPA on August 30, 2007 noted that pesticides can present danger to consumers, bystanders, or workers during manufacture, transport, or during and after use (EPA, 2007).

According to researchers from the National Institutes of Health (NIH), licensed pesticide applicators that used chlorinated pesticides on more than 100 days in their lifetime were at greater risk of diabetes. In a paper appearing in the May, 2008, issue of the associations between specific pesticides and incident diabetes ranged from a 20% to a 200% increase in risk. New cases of diabetes were reported by 3.4% of those in the lowest pesticide use category. Risks were greater when users of specific pesticides were compared with applicators who never applied that chemical (Montgomery et al., 2008 & Newwise 2008).

Pyrethroid insecticides have been used for more than 40 years and account for 25% of the worldwide insecticide market. Often, pyrethroids are sold or used as mixture containing a combination of two or more compounds (Meister, R.T. 2003).

Franco Cantalamessa, 1992 investigated the comparison of the acute toxicity of cypermethrin (CY), a type I pyrethroid, and permethrin (PERM), a type II pyrethroid, administered orally as a single dose to neonatal and adult rats, and at assessing the importance of pyrethroid biotransformation in CY and PERM toxicity through use of drug metabolism inhibitors. They studied that CY is more toxic than PERM to adult and neonatal rats. The sensitivity of neonatal rats, compared with the adult. It was concluded that the higher level of pyrethroid toxicity is probably due to incomplete development of the enzymes which catalyze the metabolism of pyrethroids in the liver of young animals.

The effect of metaprolol succinate was studied in rats after oral exposure to it for repeated 28 days (Dore MD et al., 2004). The effects were evaluated on the basis of alterations in the haematological parameters, biochemical parameters (serum bilirubin, sodium, potassium, sugar, liver function tests and kidney function tests) and cardiometrics. The clinical symptoms, effects on body weights, mortality, post mortem findings and histopathological changes were also studied.

Bhallataka (Semecarpus anacardium Linn.) is well known highly potent medical plant. In Ayurveda it is consider as Rasayana. Toxicity study of Semicarpus
Anacrdium was conducted in albino rats (Wister strain) of either sex at acute and sub chronic levels (Choudhari CV et al., 2004). SAE from ripen nut was orally administered to albino rats along with feed. Acute and sub chronic study revealed adverse effects on GOT, GPT, LDH & SDH activities of liver. SAE was found to have adverse effects on activity levels of GOT, GPT, LDH & SDH of liver, revealing liver disorders. Histopathological study was also made.

Joel S.V. et al., 2009 studied a comparative analysis of blood and organ system data from trials with rats feed three main commercialized genetically modified (GM) maize (NK 603, MON 810, MON 863). Their analysis clearly reveals for the 3 GMO’s new side effects linked with GM maize consumption, which were sex and often dose dependent. Effects were mostly associated with the kidney and liver, the dietary detoxifying organs, although different between the 3 GMO’s and also in the heart, adrenal gland, spleen and haematopoitic system. They conclude that these data highlights signs of hepatorenal toxicity, possibly due to the new pesticides specific to each GM corn.

Atef M. et al., 2010 studied the influence of α-lipoic acid treatment in rats exposed to malathion. This study demonstrated that pretreatment with α-lipoic acid significantly attenuated the physiological and histopathological alterations induced by malathion.

Varsha W. et al., 2009 studied the effect of malathion toxicity on acetylcholine-esterase activity in mice liver. They found that malathion inhibited the AChE activity in mice liver. The degree of inhibition increased upto 4 days of exposure period but declined later on and there was maximum recovery of AChE activity by 30th day of expose. These results indicated that the continuous and prolonged exposure to sub-lethal dose of malathion resulted in recovery of AChE activity.

The toxicological effect of pendimethalin (N-(1-ethyl propyl)-2,6 dinitro-3,4-xylidine) a herbicide, was studied in Wister rats in a 90 day (sub chronic) study by Geeta Nirody et al., 2004. The terminal fasting body weight was decreased in high dose males and females and high dose recovery females. A significant increase in absolute and relative weight of liver was observed in high dose males and females. Microscopically, higher incidences of hepatocellular hypertrophy in liver in males and females. In liver (both sexes) and in kidneys (males) the microscopic changes were associated with the increase in organ weights.
Mariana Astiz et al., 2009 demonstrated that the treatment of rates with the low doses of dimethoate, zineb or glyphosate alone or in combination induces oxidative stress (OS) in liver and brain. The treatment of Wistar rates with the pesticides (I.p. 1/250 LD50, three times a week for 5 weeks) caused loss of mitochondrial Tran membrane potential and cardiologic content, especially in substantia nigra (SN), with a concomitant increase of fatty acid peroxidation. The activation of calpain apoptotic cascade (instead of the cascade-dependent pathway) would be responsible for the DNA fragmentation pattern observed. Thus, these results may contribute to understand the effect(s) of chronic and simultaneous exposure to pesticides on cell survival.

In studies with rats, inhalation of cyfluthrin for three weeks caused a decrease in body temperature, weight loss, and changes in the weight of liver and spleen (U.S. E.P.A. Office of pesticide programs, 1989).

Moharwal, J. et al., 2005 studied the radioprotective effect of Rajgira leaf extract (800 mg/kg b.wt.) in liver of Swiss albino mica at various post- irradiation intervals between day 1 and 30 after its oral administration for 15 consecutive days prior to whole body gamma irradiation with 6, 8 and 10gy of gamma rays. In this study, abnormal and binucleated hepatocytes were counted in both the control and experiment sets because these hepatocytes are good indicators of radiation- induced damage. In the experimental ( RLE+ irradiation ) sets, the percentage of abnormal and binucleated hepatocytes was lower compared with their respective control (irradiation alone) sets at each autopsy interval with all three radiation doses studied. The increase in the percentage of these hepatocytes was also found to be dose – dependent in the control as well as in the RLE treated (experimental) sets. Thus, Rajgira leaf extract (RLE) treatment given GSH content and decreasing the LPO level.

Tuzmen,N. et al., 2007 investigated the effects of chlorpyrifos(CP, an organophosphate) and deltamethrin (DM, a pyrethroied pesticide) treatments at low and high doses on lipid peroxidation (LPO) and antioxidant enzyme activities such as SOD, GSH-Px and CAT in rat liver following 16 weeks exposure. Antioxidative defence mechanisms and lipid peroxidation in rat liver tissues display different pesticide treatments and doses. Biochemical analysis showed that administration of the chlorpyrifos that lipid peroxidation levels are higher at high doses than at low
doses, but DM caused more pronounced increase than CP. Experimentally, they have also observed that oxidant-antioxidant balance is more affected by Deltamethrin treatment than by chlorpyrifos.

N. Kocak-Toker, 1996 investigated endogenous lipid peroxide levels in the liver and brain tissue of rats aged 6 and 22 months together with ascorbate-induced lipid peroxide levels remained unchanged in aged animals, hepatic lipid peroxidation was seen to be elevated. Glutathione (GSH) content was found to be decreased, but SOD and GPx remained unchanged. No apparent difference in any parameter in brain tissue was observed in the old group.