INTRODUCTION
The use of plants and products thereof for curing and managing various ailments has been known to the word since time immemorial, and is gaining momentum these days due to toxic effects by synthetic drugs. Crude extracts of local plants are frequently being used by traditional communities like tribal and rural population of India and elsewhere. This, and medicines manufactured on principles of natural compounds even by pharmaceutical companies, may lead to a large-scale exposure of humans to natural products. Though apparently believed non-toxic, a clean chit offered to these plant products requires strict scientific tests, besides clinical ones on different vital system, moreso because these natural products may contain toxic ingredients in them as secondary metabolites (Nakamura and Yamamoto, 1982). These toxic secondary metabolites are used as molluscicides and insecticides (Godan, 1983, Singh et al., 1996, Singh et al., 2005). But few toxic metabolites have perilous side effects including mutagenic potentials (Awasthy et al., 1999, stich, 1991).

Biology of Molluscs:

Molluscs are the second largest group of animals, in variety, after insect, occupying all possible habitats except aerial.
Although the exact number of existing molluscan species is still a matter of speculation, Abbott (1954) has estimated a total of about 1,10,000 living species, 80,000 amongst which are gastropods, 10,000 bivales, and 5,000 belonging to the other three classes of mollusca. Godan (1983) on the other hand believe the number of living species is about 1,20,000.

Terrestrial snails and slugs cause considerable damage to both cultivated and useful non-cultivated plants. The animals can make their appearance in any damp area, but damage can occur also during relatively dry weather. Field slugs cause maximum damage in two periods, these coincide with the periods of maximal hatching of young slugs and with the rainy seasons where the activity of the slugs is most pronounced. Wet weather was a prerequisite for heavy damage to the seedlings of vegetables, tobacco, lettuce and straw berries by field slugs in the months april to august (Godan, 1983). Field slugs of genus Arion infest potatoes crops very heavily in USA (Large et al., 1954) and England (Rayner, 1962; Stephenson, 1965; Warley, 1970, Anon 1975, Rayner 1975, Roger-levis, 1976).

The small Arion sp. as well as Milax sp. are ground slugs which usually avoid the surface of soil and instead attack seeds, seedlings, bulbs, roots and tubers in the ground. Frost and dryness drive Arion hortensis fer; and Milax budapestensis still deeper in to the soil (Runham and Hunter, 1970). In southern Canada, vegetable gardens and green houses are extensively harmed by three sp. of slugs viz, Agriolimax reticulatus,
Agriolimax laeve and Lehmania valentiana (Howe and Findlay, 1972). Along with slugs, terrestrial snails also cause considerable damage to vegetable gardens, agricultural crops and fruits orchards. Singh and Agarwal, (1981) reported that Pila globosa an amphibious snails causes damage to paddy crops in northern part of India.

Ariophanta madraspatna, a terrestrial snails, rapidly grazes on tender shoot of garden plants (Krishna kumari et al. 1978). The giant African snail Achatina fulica, a voracious eater of paddy started out from the Andaman Islands, come to North East India. It alone grazes upon seedlings, stems, leaves, flowers and seeds of 55 species of Indian plants (Raut and Ghose, 1984). It destroy paddy and prefers commercial plants of family cruciferae, leguminosae and cucurbitaceae along with mulberry and tea. Achatina zanzibariea, another species of Achatina cause damage to sisal and cotton plants, while A. craveni attacks sesame and coffee in Tanzania (Raut and Ghose, 1984).

Like terrestrial, a large population of aquatic snails inhabits in fresh water cause serious destruction of freshwater vegetation. Which ultimately affect the growth of organism feeding on them (Reinert 1972). In freshwater, the larvae of parasite trematodes also pass part of their life. Many aquatic snails act as vectors for the larvae of trematodes and there by, cause a number of disease. Two diseases carried by aquatic snails, schistosomiasis and fascioliasis cause immense harm to man and his domestic animals (Bali et al. 1986, Agarwal and Singh 1988).
Schistosomiasis is caused by *Schistosoma*, it is a devastating disease of mankind second only to malaria in its deleterious effect (Lambert, 1966; Jobin, 1973). *Schistosoma* is the digenetic trematode found in the blood vessels of man and live-stock, is transmitted by several species of *Bulinus, Biomphalaria, Planorbus, Oncomelania, Lymnaea luteola Indoplanorbus exuts* (Lambert, 1966; Deshiens et al., 1969; Mousa et al., 1969; Amin et al., 1976; Duke and Moore, 1976; Weinzett and Jurberg, 1990; Zidan et al., 1990 a,b,c, Geerts et al. 1992; Sukumaran et al., 1995).

*Schistosoma hematobium*, which spend a part of its their life in the body of *Bulinus truncatus*, infect the urinary tract, kidney and genital tract. *Schistosoma mansoni* causes intestinal bilharziasis and produces disturbances in the intestinal tract, liver and spleen (Dardenne et al., 1979). Intestinal and urinary schistosomiasis is estimated of effect at least 500 million people in Africa, South-America and Sub-tropical and tropical Asia (Jarotski Davis, 1981; Mott 1987; WHO 1984).

Even though, attempts have been made to control schistosomiasis from time to time (Jobin 1973; 1977, Jordan et al., 1976; Lehman et al. 1976; Makiya et al., 1981; Sathe and Remapukar, 1983; Sleigh et al., 1985; Weinzett and Jurberg 1990; Bruce et al., 1991; Schall et al., 1991; W.H.O. 1992; Hofkin and Hofinger, 1992; symones et al., 1992, Belot et al., 1983; Ndamba et al., 1994; Abdel Hamid, 1996), there is a little indication that the incidence of this disease has really declined.
Fascioliasis caused by *Fasciola hepatica*, the large liver fluke, common in sheep, cattle, goat and other herbivorous animals throughout the World. Froyed (1975) reported that about 21% cattle and 7% sheep were infected with liver fluke in Great Britain. In India, the freshwater snails *Lymnaea acuminata* and *Indoplanorbis exustus* are the intermediate host of *Fasciola hepatica* and *Fasciola gigantica* (Hyman, 1970; Agarwal and Singh, 1988; Singh and Agarwal, 1992) which cause immense harm to domestic animals of this country. Singh and Agarwal (1981), reported that 94% of the buffaloes slaughtered in Gorakhpur District of Uttar Pradesh (India) were infected by liver fluke *Fasciola gigantica*. Even though, snails are the vectors of several important disease of both human being and live stock, serious attempts to control snails in India have not been made.

The best method of controlling both the disease (viz. schistosomiasis and fascioliasis) however is chemotherapy using orally- administered drugs for individuals with moderate or severe level of infection. The disadvantage of this approach are that it does not eliminate the infection entirely, the cost of recurrent treatment may become prohibitive and drug resistance may become a problem. A sure way to tackle the problem of schistosomiasis and fascioliasis is destroy the carrier snails and remove an essential link in the life cycle of the flukes. This can be accomplished in a number of ways including the use of many synthetic or plant molluscicides (WHO, 1965; Thomus, 1973; Godan 1983; Marston and Hostettman 1985; McCullough 1986; Agarwal and Singh 1988; Ndamba et al., 1995; Singh et al., 1996).
Considerable success has been achieved by the use of synthetic molluscicides for elimination of molluscs which transmit cercariae. Ritchie (1973) screened about 7,000 compounds for molluscidal activity. Later, Godan (1983) and Agarwal and Singh (1988), have reviewed the various types of synthetic molluscicides available for the snail control strategy.

The important molluscicides are Metaldehyde, Niclosamide, Carbamate, Organophosphate and synthetic pyrethroids. Singh and Agarwal, (1983c, 1988b) suggested that *Lymnaea acuminata* which is a very fast breeder throughout year may possible be controlled through chemosterilisation. This method, however, has not yet found acceptance amongst the users.

**Metaldehyde:** Metaldehyde treatment effect the gastropods by two ways; first its irritant effect which causes gastropods to secretes large amount of mucus resulting in desication and secondary its neurotoxicity at high concentration (Stringer, 1946). The molluscicidal activity of metaldehyde, is generally influenced by temperature and humidity. Moens (1970), established the relationship between toxicity and temperature for slugs, and demonstrated that the toxicity of metaldehyde increased with a rise in temperature.

**Carbamate and organophosphate compounds**

Carbamate and organophosphate (OP) compounds are esterase inhibiting neurotoxicants, with acute cholinergic effects
preceded by inhibition of acetylcholinesterase (AChE) (Matsumura, 1985). Both the compounds have a wide range of uses as insecticides, herbicides and fungicides (Matsumura, 1985). Now they have also found a role as molluscicides.

A number of carbamate pesticides such as carbaryl (Barry, 1969; Brar and Simwat, 1973; Singh and Agarwal, 1982; 1983a; 1983b; 1986a), Mexacarbate (Barry, 1969; Singh and Agarwal, 1989; Mahendru and Agarwal, 1983; Singh et al., 1993a) Aldicarb (Judge, 1969; Brar and Simwat, 1973; Singh and Agarwal, 1981) Isolan (Daxl, 1970, 1971) and Methiocarb (Hunter and Symonds, 1970; Rayner, 1975; Symonds, 1975) and Mesurol (Crowell, 1967; Judge, 1969; Smith and Boswell, 1970) have been used against various molluscan pests.


**Niclosamide**: Niclosamide is considered as the standard molluscicide (Godan 1983) as it was active against all the stages of snails at 24h exposure up to 0.03 ppm (Gonnert and Schraufstatter, 1959; Khajuria and Bali, 1988). The niclosamide is not an irritant, as the snails treated with this compound, did not
exhibit any symptoms like crawling, excessive production of mucus or quick contraction in to the shell (Khajuria and Bali, 1988.)

**Synthetic pyrethroids:** The pyrethroids act primarily on nerve membrane by changing its permeability to Na⁺ and K⁺. This causes repetitive discharges of nerve at the synapse and neuromuscular junction (Wilkinson, 1967; Narahashi, 1983). Adlung and kauth (1956), however, found that a 5% oil emulsion of pyrethrum was quite effective against the freshwater snails, *Radix auricularia, Lymnaea stagnalis* and *Physa fantinalis*. Recently, Singh and Agarwal (1986b, 1987a, 1991b), Singh and Agarwal (1990a, 1993a, 1993b) Singh and Agarwal (1996) and Sahay et al., (1991) studied the toxicity of four synthetic pyrethroids (Cypermethrin, Permethrin, Fenvalerate and Deltamethrin) singly and with the synergist piperonyl, butoxide against *Lymnaea acuminata* and *Indoplanorbis exustus*. They reported that all these pyrethroids are very active molluscicides.

Singh and Agarwal (1987a, 1991b, 1993a, 1993b) and Singh and Srivastava (1999), reported that permethrin, Cypermethrin and fenvalerate also inhibit the respiratory enzymes, lactic dehydrogenase, succinic dehydrogenase and cytochrome oxidase in sails *Lymnaea acuminata* and fish *Channa striatus*.

Indiscriminate use of synthetic pesticides contaminate most of the water bodies. This contamination is done either by direct application of pesticides in water bodies to control
animals or by their spray against pests concerned to agriculture or forestry (Srivastava, 1999).

Once a pesticides is released in environment, chemical, physical, biological and other allied factors determine its fate and distribution in ecosystem. In India, heavy use of pesticides to control pests and their improper handling without precautionary measures, result in the pollution of the environment affecting many non-target species viz., Phytoplankton, Zooplankton, fish and so on (Sphehar et al., 1980, Gopal, et al., 1981; Singh and Singh 1980 a, b). Pesticides interfere with the physiological and metabolic function in animals, which some time result in death. Accumulation of toxic substances in body leads to physiological and biological disorder (Jhingran 1977; Vernberg et. al., 1977; Arasta et. al., 1996).

Toxic residues of pesticides entering human diet are major concerns today. The average dietary intake of pesticides residue in India is 362.5 mg/day/person (vegetarian) and 356.3 mg/day/person (non-vegetarian) compared to 20.0 mg/day/person in Australia and 7.6 mg/day/person in U.S.A. (Ghosh et. al., 1999).

+ The major portion of residues in diet is due to DDT and BHC isomer residues.

+ Tolerance limit for DDT is 12.5 mg/day/person, though it varies according to pesticides.
Indian takes about 40 times more pesticides through food item than the average American.

The recognition of the persistence of synthetic pesticides in the environment has led to their restricted use in favour of least persistent alternatives pesticides i.e. plant origin pesticides (Marston and Hostettmann 1985, Singh et. al., 1996, Singh etal,2005)

**Plant Origin Molluscicides**

Plant origin molluscicides are gaining greater acceptance amongst users as they have better biodegradability and cost less than synthetic pesticides. Morston and Hostettmann (1987) and Singh etal, (1996) have laid down the certain criteria for the plant products becoming a molluscicides.

These are:

- The molluscicidal activity should be high. The extract from which the compound is obtained should have an activity at concentration lower than 100 ppm. It is advantageous if the molluscicide also kill snails eggs.

- The plants should either have a high natural abundance or easy to cultivate in endemic areas.

- Extraction of the active moiety by water is an advantage.
Application procedure should be simple, and safe for the operator.

Cost should be low.

The plant extract or molluscicides should possess low toxicity to non-target organism (Including humans).

Since 1933, when control of schistosomiasis using fruits of *Balanites aegyptica* (Balanitaceae) was proposed, over 1400 plant species have been tested for molluscicidal activity. (Marston and Hostettmann 1985; Kloos and Mc Cullough, 1987; Kuo 1987; Jurberg et. al., 1987; Shoeb et. al., 1996; Schall et al., 1998). Until about 25 years ago, relatively little was known about natural products responsible for the molluscicidal activity of plants. Concerned but in the intervening period a number of active compound have been isolated. Thus, alkaloids, sequiterpene lactones, saponins, tannins, glycosides, terpenoids, steroids, flavonoids, phenols and lactons have been found to be toxic to snails at acceptable doses ranging from <1-100 ppm (Adewunmi and Safowara, 1980; Mastron and Hostettmann, 1985, 1987; Okunji and Iwu, 1988; Baptista et. al., 1994).

Several plants of family leguminosae have compounds highly toxic to harmful snails. Of the 153 crude extracts of Panamanian plants of different families, *Hymenaea coubaris* (Leguminosae) is most effective against *Biomphalaria glabrata* (Marston et al., 1996). The extracts of *Tamarindus indica* fruit
pulp is effective against *Bulinus truncatus*, the molluscidal activity of this plant is may be due to the presence of saponins (Imbabi and Adu-Al-Futuh, 1992). Perrett et al., (1995) reported that a chloroform extracts of *Millettia thonangi* seeds is effective against snails and activity is thought to be attributed to the presence of isoflavonoid alpinumisoflavone.

*Ambrosia maritima* a common plant of family Asteraceae, have significant molluscidal activity against snails species *Biomphalaria, Bulinus* and *Lymnaea*, examined both in lab (Geerts et al., 1992) and in fields (El-sawy et al., 1984, Belot et al., 1993). The acitive molluscidal compounds in the plant in thought to be sesquiterpenes (Geerts et al., 1992). Sesquiterpene lactones are also responsible for the molluscidal activity of Brazilian species *Vernonia* (Callegarilopes, 1991).

Shoeb et al., (1993) screened several plants of family agavaceae for their molluscidal activity against freshwater snails. One of them *Agave attenuata* powder show effective molluscidal activity against *Biomphalaria alexandrina, Bulinus truncatus* and *Lymnaea cailliaudi* (Shoeb et al., 1993). Sukumaran et al., (1994) evaluate the molluscidal activity of *Agave americana* and found that it is effective against all stages of snails development. The methanolic extracts of *Dracaena mannii* fruit pulp have also shown promise for the control of snail vectors.

There is a high correlation between plants employed as fish poison or soap substitutes, and their molluscidal activity,
Phytolacca dodecandra (Phytolaccaceae) is an example of such a plant. The molluscicidal activity of its berries was first noticed by Lemma (1965) in Ethiopia. Aqueous extracts of berries of P. dodecandra contains 19 saponins in various froms, of these only two monodesmosidic saponins exhibited molluscicidal activity (Thiiborg et al., 1994; Ndamba et al., 1995).

Members of the Guttiferae are shown to contain compounds highly effective against Biomphalaria glabrata (Cepleanu et al., 1994). Garcina kola seeds from the same family, has been reported to possess molluscicidal activity against Bulinus globosus snails (LC$_{50}$, 8 ppm) due to the flavonoid substances characterised as biflavanone GB (Okunji and Iwu, 1991).

Anacardium occidentale and Spondias mombin belongs to family Anacardiaceae shows strong molluscicidal activity against freshwater snails Biomphalaria glabrata. (Carthout et al., 1994; Laurens et al., 1997). Some prenylated p-hydroxibenzoic acid and their derivatives isolated from leaf of Piper adduncum (family-piperaceae) has been reported to possess molluscicidal activity (Orjala et al., 1993). Aqueous and alcoholic extracts of Asparagus racemosus (Chifundera et al., 1993) and Uruginia epigaea leaves (Amusan et al., 1997) of the liliaceae family, exhibit high mortality rate (100%) against Lymnaea natalensis (LC$_{50}$, 1 mg/l) and Bulinus africans (LC$_{50}$, 50-100 ppm), respectively. Hussein et al., 1994 reported that the molluscicidal principle of Calotropis procera (Asclepiadaceae) is identified as Uscharin and found to be highly toxic to the land snails, Theba pisana.
Pestoban (a herbal molluscsidie) is a *Cedrus deodara*, *Azadirachta indica* and *Embelia ribes*, has high molluscsidal activity against *Lymnaea acuminata* and *Indoplanorbis exustus* with LC\(_{50}\) values 6.5 \times 10^{-3} and 5.9 \times 10^{-3} mg/l respectively (Singh and Singh 1994; Singh et al., 1995a). Singh et al., (1996b) have reported that neem oil, bark, leaf and cake are potent molluscsidie against *Lymnaea acuminata* and *Indoplanorbis exustus*. In another study, Singh and Singh (1997a) also reported that neem based pesticides viz, Rakshak, Neemgold, Multineem, Neemazal caused nearly same mortality in the snails population as do synthetic molluscsidies.

Singh and Singh (1997b) observed that the combinations of essential oils of cedar and neem tree powder from bulbs garlic and ginger rhizome oleoresin are more toxic against *Lymnaea acuminata* than the individual compounds. Recently, Singh et al., (1998) have reported that the combination of piperonyl butoxide and MGK-264 synergist with plant molluscsidies viz; neem oil, garlic powder and ginger oleoresin are against highly toxic to both the snails, *Lymnaea acuminata* and *Indoplanorbis exustus*. The aqueous extracts of garlic (*Allium sativum*) bulb has high molluscsidal activity against *Lymnaea acuminata* and *Indoplanorbis exustus* and the active moiety responsible for snail death is allicin (Singh and Singh, 1995, 1996 a,b). Singh et al., (1997a) have reported that active components of some spices such as *Zingiber officinale*, *Trachyspermum ammi*, *Trigonella foenum-graecum* and *Allium cepa* are potent molluscsidie to the snails, *Lymnaea acuminata* and *Indoplanorbis exustus*. 
Euphorbiales: Plants belonging to family Euphorbiaceae are polyphyletic in origin, and cosmopolitan in distribution. It has about 8000 species in 300 genera, are of the largest and most diversified family of angiosperms. There is great diversity in form and the plants range from tall rain forest trees to lianas, shrubs, perennial and annual herbs, geophytes, succulents, and floating aquatics; only the epiphytic habit is lacking amongst the major ‘niches’ of vegetative adaptation (Webster, 1975).

The euphorbiales in our society have been used for food, various kinds of poison, medicines and other industrial materials. (Hill, 1952; Purseglove, 1968; Kupchan et al., 1976).

_Euphorbia fischeriana_ has been used in traditional chinese medicine for more than 2000 years for obtaining antitumor drugs (Schoreder et al., 1980). In India, members of following genera are used for medicinal purpose; Acalypha, Aleurites, Andrachne, Antidesma, Aporosa, Baliospermum, Bischofia, Breynia, Bridelia, Chrozophora, Cicca, Cleistanthus, Croton, Euphorbia, Exoccaria, Fluegga, Glochidion, Hippomane, Homonoia, Hura, Jatropha, Macaranga, Mallotus, Manihot, Phyllanthus, Putranjiva, Ricinus, Sapium, Sebastiania, Tragia and Trewia (Chopra et al., 1983; Kirtikar and Basu, 1984).

The genus _Jatropha_ comprises of some 175 species of herbs, shrubs and small trees. One of the species _Jatropha gossypifolia_ has been employed in various parts of the world in treating leprosy, veneral disease and ulcers, as a cataplasm for swollen
breasts, emetic, emmenagogue, stomachic and febrifuge. The latex and sap of numerous members of the genus are applied on cuts to hasten healing. Many representatives of *Jatropha* are caustic and toxic, causing severe dermatitis (Altschul, 1973; Reis and Lipp, 1982).

**Euphorbiae used as Molluscicides**: Chang (1971) and Amin (1972) have recorded the molluscicidal properties of *Thea olesos, Croton tiglium, Sehima argenta* and *Jatropha* spp. Adewunmi and Morquis (1980) studied the molluscicidal properties of methanolic extracts of the fruit of *Jatropha gossypifolia* and *Jatropha podagrica*. The extracts of these plants were very active against the snail *Bulinus globosa*.

Singh and Agarwal (1984a) observed that the crude latex of *Euphorbia royleana* caused 100% snail mortality within 24h at concentrations as low as 2.7 x 10^-5 (v/v); the snail mortality was dose dependant and the toxic moiety of the latex was stable even at 100^o^C. Mortality caused by freeze-dried powder of latex when extracted with different solvents (acetone, ether ethyl alcohol, carbon tetrachloride and chloroform) showed that the active moiety of the latex was soluble in all the above solvents (Singh and Agarwal, 1984a). Snails exposed to latex of *Euphorbia royleana* exhibited typical symptoms of nerve poisoning and death took place within 24h. It was shown that the latex was an acetylcholinesterase inhibitor and its anti-AChE activity in the snail *Lymnaea acuminata* was very high in comparrison to any synthetic organic pesticides.
In another study, Singh and Agarwal (1984b) also observed that the latex of *Euphorbia royleana* reduced the level of 5-hydroxy-tryptamine (5HT) and dopamine in the nervous tissues of *Lymnaea acuminata*. These changes were found to be dependent on the concentration of the latex extracts. The latex of *Euphorbia royleana* was thus found to affects all the known neurotransmission mechanisms in snail either separately or through a complex interaction between the different neurotransmitters. This may account for its high toxicity to snails (Singh and Agarwal, 1984b).

The genus *Euphorbia* comprises of a large and diverse group of plants which are characterised by the presence of a white milky latex (Kinghorn and Evans, 1975). The toxicological action of the latex can be attributed to a new class of diterpenes such as esters of phorbol, 12-deoxyphorbol, 12-deoxy-16-hydroxy-phorbol, ingenol, 5-deoxyingenol, 2-deoxyingenol, resiniferotoxin and tinyatoxin. It has been reported that phorbol esters interact with and activate the recently discovered protein kinase C, (Takai et al., 1977; Kuo et al., 1980).

The latices of several genera of the euphorbiaceae and in particular of different species of euphorbia have been used extensively by fisherman in different countries as a fish poison of high biological activity, (Watt and Breyer-Brandijk, 1962 Novoek et al., 1980). The rhizomes of *Euphorbia biglandulosa* are pounded in order to release the latex and then thrown into stagnant waters of river with low water levels. The rapidly dissolving poison first paralyzes and then kills the fish. The sap
though causes in these irritant of the human skin, has no intoxicating effect on the people who handle the latex or eat the fish, (Novck et al., 1980).

Bhatt and Dhyani (1990) have studied the lethality of pesticidal compounds of plant origin on some freshwater animals like water beetle, water scorpion, back swimmer, water bug, fresh water snails (Lymnaea) fresh water fish (Bsrillus bendelisi, Hom.) and different stage of tadpol larvae of Bufo melanostictus. They have found that during fish catching operation by the tribes of Garhwal (UP) with the help of piscicidal plant extracts, many aquatic animals have showed toxicity symptoms and died with fishes.

The above mentioned reports brings out the fact that, euphorbiales have the potentail of being utilized for snail control. The products from these plants would be less expensives, easily available and may have the added advantage of being easily biodegradable.

Most of the studies carried out with the molluscs, especially snails in relation to anti-AChE activity, centre around the determination of effective doses for killing them. Very few reports deal with the non-nervous pharmacology of active moiety of plants.

These plants may contain a few toxic ingrediments in them as secondary metabolites, which may have perilous side effects including mutagenic potentials. It is therefore, desirable to evaluate the cytogenetic toxicity (genotoxicity) if any of plant materials to non-target organisms.
Lack of information in this field has become a stumbling block in the development of pesticides, especially suitable for control of these animals.

**Following objectives were taken in the present study**

In the present study, aqueous extracts of latex of three plants i.e. *Euphorbia neriifolia*, *Euphrbia nivulia* and *Euphorbia thymifolia*, were tested against carriers of *Fasciola* spp. viz. *Lymnaea acuminata* and *Indoplanorbis exustus*.

+ The active moiety of extracts present in environment enters in to the body of animals through the outer body surface, digestive tracts or respiratory tracts. They are then carried to different organs of body via blood circulation, where they may or may not be metabolised depending upon their chemical nature. These toxic materials and their active metabolic products may be retained in various tissues caused wide variety of sublethal effects such as retained growth, abnormal metabolism and reduction or cessation of reproductive potential. Thus the biochemical objectives of their study became essential.

+ To find out alteration in total protein, total free amino acids and glycogen level in nervous and hepatopancerease tissues and DNA and RNA in ovotestis, when snail *Lymnaea acuminata* exposed to sublethal doses (40% and 80% of LC₅₀) of above plants.

+ In order to study the genotoxicity, (cytogenetic toxicity) the biochemical experiments were carried out on non-target mice.