



CYTOTOXIC EFFECTS OF SOME PESTICIDES ON SEEDS OF *Vicia faba* L.

Naina Srivastava

Dept. of Botany, D.A.V. PG. College, Dehradun (U.K.)

E-mail : drnainasrivastava@gmail.com

ABSTRACT

Increasing use of agricultural chemicals for improving the field crops is now in routine use. Results of the study indicate the genotoxicity of Malathion and Carbendanzine. Based on the present findings, Malathion and Carbendanzine probably one of the most effective insecticide and fungicides. The higher concentrations of insecticide and fungicide showed the genotoxic effects and damage the chromosomal integrity. It has been widely known that chemical pesticides represent a genetic danger for human being. Two pesticides are selected for study which are used as agricultural pesticides were observed for cytotoxic and effects using root tips of *Vicia faba* assay. Four different concentrations of two pesticides has taken 150, 300, 550 800 ppm were used for 8hrs exposure time. The chromosomes abnormalities were disturbance, stickiness, bridges in anaphase and telophase, lagging chromosome appearing in interphase cells. The result indicates that both insecticides had cytotoxic activities on mitotic index and chromosomal aberration. The higher concentration of 800 ppm of both the pesticides used in the present study showed obvious poisonous effect. The mitotic index was decrease with increase in pesticides concentration. The chemical pesticide malathion and Carbendanzine affect the mitotic index accompanied with considerable percentage of chromosomal aberrations. These abnormalities include stickiness and disturbed chromosomes. The mitotic index (MI) declined due to the exposure with higher concentration and longer duration period. It is observed that mitotic index is minimum at 800 ppm concentration of Malathion for 8 hrs that is 12.89 which is lower as compared to control 22.11. where as reduction of mitotic index at 800ppm concentration of Carbendanzine is higher at 8hrs exposure than malathion that is 17.98.

Keywords : Cytotoxic, pesticides, *Vicia faba*

Farmers by coincidence used pesticide every year . Studies on pesticides have proved that these can cause cancer. Cytotoxic effects due to exposure of pesticides has become a major concern to health because of pesticides are broadly use in the agriculture. Carbamates are a main group of synthetic pesticides widely used in agriculture as insecticides, fungicides, herbicides. Various provisional data have proved that pesticides have cytotoxic properties. Many chemicals which are used for insect and weed, control and measured environmental mutagens and pollutant. Among the most widely used insecticides, some are also of economic important organophosphorus and organochlorine insecticides. many insecticides have great impact on ecosystem because of their persistence in the environment. Most chemical

compounds cause serious harmful effects in human being, these compounds accumulate and detectable. Carbendanzine, was tested in the past for the control of rambutan postharvest diseases and showed effectiveness The use of pesticides on causes toxic effect on the environment. Fungicides were reported to eradicate the microbial population .The use of plant material or crude plant extracts and other chemicals for the crops protection and agriculture products protection from insect pests is as old as crop protection itself (Thacker, 2002). Cytogenetic effects of synthetic chemical used for protection of plants have been well documented (Vyuyan, 2002; Mekki, 2008). All studies confirm the injurious effects of synthetic chemicals used in agriculture but increase in pollution, that is a global trouble (Soliman, 2010).

MATERIAL AND METHODS

For cytological studies the root meristem fixation, staining and scoring of aberrations were carried. The soaked seed coats were gently removed and seeds were placed on wet filter papers in the petridishes left for germination after 3-4 days when the primary roots were 3-4cm these primary roots were removed to facilitate lateral roots when lateral roots became 1-2 cm seedlings were exposed to test concentrations 1).0 ppm(control),2).150ppm,3).300ppm,4).550ppm,5).800ppm. Three sets of seeds were employed the one set was exposed for 8 hrs. The root tips were harvested /collected and fixed in acetoalcohol (1:3) for future study. The root tips were pretreated with paradichlorobenzene and the root tips washed thoroughly with distilled water and thereafter transferred to 70% alcohol for future use. The fixed root tips were hydrolysed with 1 N HCL and were smeared in acetocarmine solution and mitotic indices for the root tips of *Vicia faba* varieties were recorded. The experiment was carried in three replicates. The mitotic observations in root meristem of *Vicia faba* with all different test concentrations subjected differently at different durations were made.

RESULT AND DISCUSSION

The treatments and concentration are considerably altered MI gradually with increase of concentration and exposure time. Gradual reduction in MI was recorded in root treatment with pesticides that is at 550ppm of malathion show 15.99 while mitotic index is 19.86 in **Carbendanzine** treated seeds at 8 hr time duration. The dangerous effects of direct treatments were also observed by Pavel & Creanga (2005), Jose *et al*(2008), Marant (2003), Haroun and Al shehri (2001) and Banerjee (1992). The lowest values of MI were recorded was 12.89 at 800ppm for 8 hrs. The changed percentage of mitotic aberrations was also observed which is influenced by reduction in mitotic index.. It is clear that the percentage of abnormality and mi reduction increase as the concentration increase and increased exposure time. The highest values recorded for this parameter were

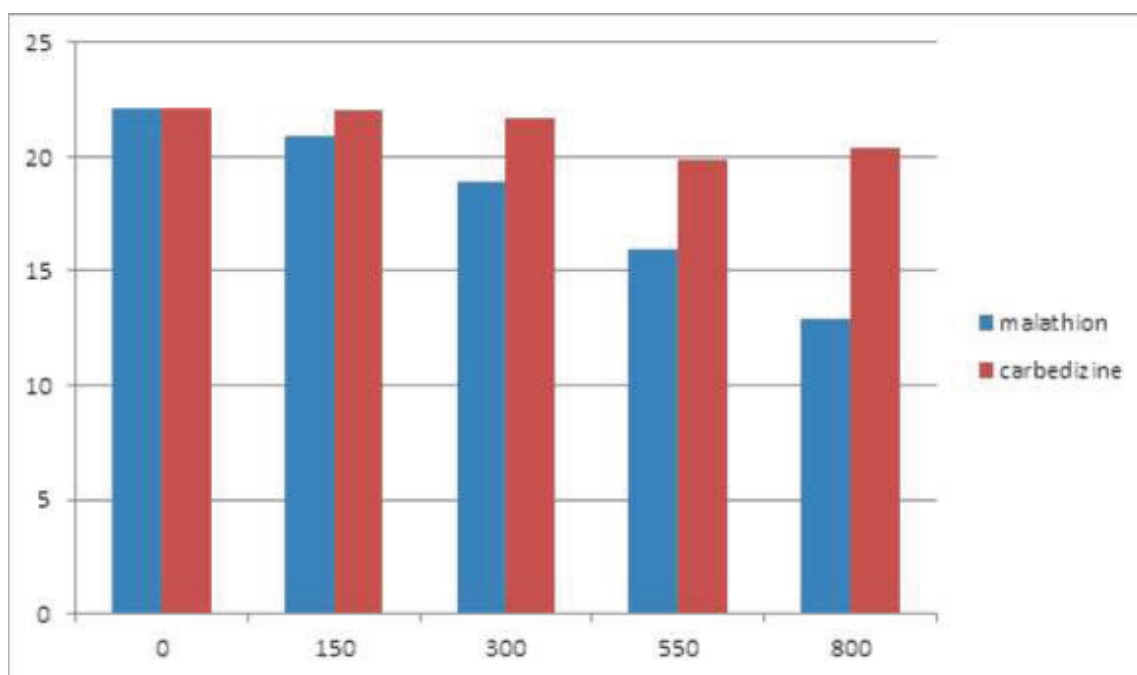
22.11 for seed and root treatment respectively in control. This inclination was earlier recorded by Jose *et al*(2008), Pavel & Creanga (2005).

The reduction and phenomena of mitotic interruption of these pesticides is ambiguous the possibility of mitostatic effects is surely due to higher concentration of pesticides. The concentration of 800 ppm applied in the present study was earlier recommended by (pandey2008) as proper concentration of pesticides is required The present study justify that the injurious effects of these pesticides concentration on plants as non target organism and suggested for use of lower concentrations (150ppm) which show Lower cytotoxic effects on plants and radically control pest growth. In spite of these chemicals much safer than bio pesticides are highly suggested for biological control. The results were articulated as means, and statistical analysis was evaluated by using an analysis of variance (ANOVA). These treatments induced a great inhibition in the MI. These differences were in most cases significant ($p < 0.01$). **Carbendanzine** at different concentration showed reduction in mitotic index that is at 150ppm and 300ppm the mitotic index was 22, 21.67.(Table 1.fig. 1) These observations was also analysed by Fernandes *et al.* (2007) and Hoshina (2002) reported that changes of the MI indicate the cytotoxicity effect of chemicals. The considerable reduction in MI can signify alterations, due to chemical action on the growth. Some times changes in MI lower than the control is a result of an decrease or increase in cell division, which can be harmful to the cells, leading to a disordered cell proliferation and even to the formation of tumor tissues (Leme and Marin-Morales 2008).

TABLE 1 . Effects of different concentration of malathion and carbendanzine on mitotic index of vicia faba l.

TREATMENT	CONCENTRATION	NO.OF CELLS OBSERVED	NOF DIVIDING CELLS	MITOTIC INDEX
CONTROL	0	2542	562	22.11
MALATHION	150	2417	505	20.89
	300	2627	497	18.92
	550	2516	402	15.99
	800	2312	298	12.89
MEAN		..	425.50±	17.17
SD		±134.81	±97.02	±3.49
CARBENDANZINE	150	2428	534	22±
	300	2637	571	21.67
	550	2645	525	19.86
	800	2355	423	20.38
MEAN		2516.25±	513.25±	20.38±
SD		±147.14	±63.37	±1.85
CD				
AT 5%		77.82	49.498	1.752
AT 1%		111.810	71.118	2.517

Fig.1; Effects of different concentration of malathion and carbendanzine on mitotic index of vicia faba l.



Pesticides which are used for plants are harmful and encourage chromosomal aberrations, chemical changes and microbes deprivation, this can cause environmental pollution. The effect of pesticides on the root meristems of *Vicia faba* L. have explained that there is decrease in

mitotic index with increase in concentrations of pesticides. Reduction of mitosis was reported and the treatment of chemical compounds and plant extract on *Vicia faba* respectively. Extensive reduction in mitotic index (MI), observed in the present study due to the mitodepressive activity of the pesticides which disturbed the cell division. The inhibition mitotic index is due to reduction in special proteins which are pesticide target site and inhibit DNA polymerase and other enzymatic activity causes antimitotic effect as reported.

CONCLUSION

Mitotic index drastically decreased with increasing concentration of pesticides, but malathion was more effective at higher concentration 800ppm in

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comparison to **Carbendanzine**. Drastic increase in abnormality percentage was also observed with increasing concentration of pesticides, in which malathion was more prevailing. A marked decrease in MI with increasing concentration of pesticides. The higher concentration of Malathion showed the genotoxic effect and appeared to cause damage the chromosomal activities where the **Carbendanzine (solution)** though affected the cells but not so significantly. The Malathion showed mitostatic effect on the mitotic index (MI) which decreased with the increase in concentration and duration. It is inferred on the basis of comparative studies that that the **Carbendanzine** are less lethal as compared to pesticide Malathion.

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