



Effect Of Pesticides And Fertilizers On Development Of Root Of Onion *Allium Cepa* (Linn.)

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Abstract:

The pesticides like Methyl Parathion (2 %W.P.) and Rogar -Dimethoate 30% E.C. and fertilizers like Urea (46% N) and Vermiwash at concentrations 25, 50, 75 and 100% were selected. These were tested for their effects on onion root tips. The onion root tip technique provides a rapid method for making preliminary tests for suspected agents. The vegetative propagation was fast in concentrations of vermiwash than control and urea solutions. Rapid cell division in terms of growth observed in vermiwash and there was no chromosomal aberration found. Retarded vegetative growth and chromosomal aberration noticed at anaphase in these pesticides. The chromosome aberration consisted of acentric fragments and dicentric bridges.

Key words: *Onion root growth, pesticides, methyl parathion, dimethoate, fertilizers, urea, vermiwash*

1.Introduction

Crops and wild plants are some of the most frequent recipients of pesticides among biota. Different species and forms (varieties, cultivars) respond differently to different pesticides in terms of their uptake, translocation, degradation or activation, and accumulation of residues and metabolites, the consequence of which is differential toxicity, including genotoxicity. Nevertheless, such data on plants are generally not taken into account in the assessment of the environmental hazard of pesticides^{1,4}.

Pesticides are applied to soil or sprayed on seedlings, and their effects are measured mostly by the wet or dry weight of the whole plant or separate shoots, roots, and leaves. The toxic effects of pesticides accumulated in soil or water can be measured on intact plants grown in the natural communities or in the field, on intact plants cultivated in the greenhouse or growth chambers, or on plant cell cultures in vitro. Pesticides have also produced changes in plant metabolism and in nutritional patterns that may have secondary effects on the ecology. Differential sensitivity of plant species to toxic and genotoxic effects of pesticides has been shown to cause overall changes in species ratios, both among weeds in a crop field and in natural plant communities, due to the reduced abundance of susceptible species with concurrent increases in naturally tolerant species. This may have further consequences for the entire ecosystem⁶. This work mainly aims to focus the light on effect of pesticides and fertilizers on plant growth by using simple onion root tip squash technique to observe the cell growth or damage. The onion root tip technique provides a rapid method for making preliminary tests for suspected agents. The selected pesticides Methyl Parathion (2 % W.P.) and Rogar -Dimethoate 30% E.C. and fertilizers like Urea (46% N) are very commonly being used. The vermiwash is urine of earthworms or excess of water that drip from vermicompost, its utilization has been started now a days and how much it is effective in comparison to synthetic fertilizer i.e. urea is our Endeavour.

2.Materials And Methods

- For studying the effect of pesticides and fertilizers crop material selected is bulbs of onion root tip.
- The pesticide selected are Methyl Parathion (2 % W.P.) and Rogar -Dimethoate 30% E.C.
- Fertilizers utilized are Urea (46% N) and Vermiwash (Dept. Of Zoology, Rahuri).

- 100 gm. Urea dissolved in 1lit. dist. water considered as 100 % concentration.
- 3ml of Dimethoate diluted in 1000ml of dist. water.
- 1 kg Methyl Parathion (2 %W.P.) dissolved in 4000ml of dist. Water i.e.1/4000.
- The concentrations of the above solutions tested are 25, 50, 75 and 100%.
- The bulbs of onion were trimmed off at their disc with a blade and placed in concentrations of above solutions in 100 ml capacity beaker at room temp.37⁰C.
- Each set was replicated five times. At the same time control experiment was run by using normal water.
- Observations were recorded at every 24 hrs. for vegetative growth and rate of cell division, chromosomal aberrations if any.
- For Studying the cellular effect simple squash preparation technique was utilized. Slides were prepared by using 1% acetocarmine solution.
- Rate of cell division and chromosomal changes were recorded in between 10 am to 12 pm under compound microscope (45X).
- The results obtained were compared with control expt.
- The other material utilized for the present study includes 1N HCL, Acetocarmine Satin and Microscope.

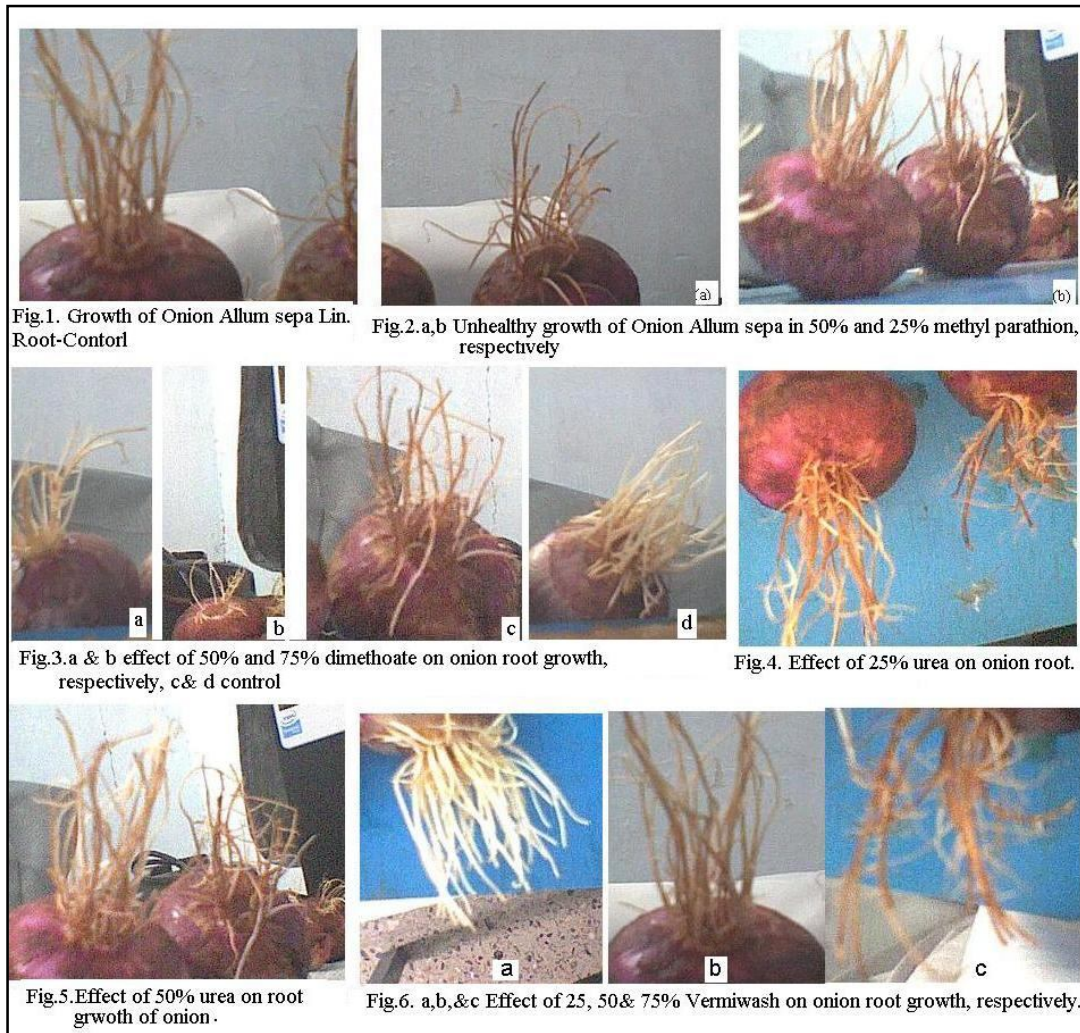
3.Result

The effects of different concentrations of pesticides and fertilizers are presented in Table 1.

- In control experiment normal vegetative propagation and cell division is recorded.
- In Methyl Parathion (2 %W.P.) and Rogar -Dimethoate 30% E.C. less growth of root noticed in all concentrations as compared to control.
- The fast growth rate of roots was recorded in vermiwash except 25 % concentration (Fig.6a, b &c).
- The rate of cell division recorded was fast in natural fertilizer vermiwash than urea (Fig 4 &5).
- Unhealthy Growth was recorded in Methyl parathion (Fig.3a &3b) and Dimethoate (Fig.2a &2b). The chromosomal aberrations recorded in Methyl Parathion (2 %W.P.) and Rogar -Dimethoate 30% E.C. The chromosomal breaks observed at anaphase.

Agents	% Concentrations	No. of Tests	Observations
Pesticides			
1. Methyl Parathion	25	5	No growth Chromosomal aberration
	50	5	
	75	5	
	100	5	
2. Dimethoate	25	5	No growth Chromosomal aberration
	50	5	
	75	5	
	100	5	
Fertilizers			
1. Urea	25	5	No chromosome aberration Chromosomal aberration at 50 to 100 %
	50	5	
	75	5	
	100	5	
2. Vermiwash	25	5	Rapid growth, no chromosome aberration
	50	5	
	75	5	
	100	5	
Control Water	--	5	Normal growth, no chromosome aberration

Table 1: The effects of pesticides and fertilizers on root growth of Onion Allum cepa Linn.



4. Discussion

Uptake and metabolism of methyl parathion in plants is fairly rapid. Four days after applying methyl parathion to the leaves of corn, it was almost completely metabolized⁵. When methyl parathion (an organophosphorous insecticide), was added to an exponentially growing culture of *Chlorella protothecoides* and the effects were followed for 12 days, in both autotrophic and heterotrophic cultures observed that besides photosynthetic apparatus, the insecticide has other sites of action, but the sensitivity of these sites to the insecticide is less than that of the photosynthetic apparatus⁷. The pesticide in higher plants like onion beside the photosynthetic organ may also produce the effect on root when pesticide gets accumulated in soil in excess.

Microbiological study of vermiwash revealed that it contains nitrogen-fixing bacteria like Azotobacter sp., Agrobacterium sp. and Rhizobium sp. and some phosphate solubilizing bacteria. Laboratory scale trial showed effectiveness of vermiwash on Cowpea plant growth¹⁰. In the present study we also observed effectiveness of vermiwash growth of onion root. Likewise, effect of vermiwash was seen on the growth and productivity of Marigold⁸. The vermiwash spray significantly maximum dry chili yield³. Our results also are in confirmation that vermiwash stimulates plant growth.

From this simple experiment it can be concluded that excessive use of the pesticides retard the growth of crop plants. In natural fertilizers the plant shows more growth without any environmental hazards. The pesticides and long use of synthetic fertilizers used may leach in the soil along with rain water or sprinklers and affect the plant growth. The chromosome aberrations which were scored at anaphase consisted of acentric fragments and dicentric bridges. This is preliminary study and requires standardization, frequency count for aberration in percent cell is lacking.

Farmers by just placing the bulbs of onion or garlic in different insecticides and fertilizers can record the effect of suspected substance/liquid on crop growth. He can select the proper and cheapest pesticide or fertilizer for crop growth. Thus the knowledge that is with scientist can be utilized by farmers and public. This demonstration can be placed in exhibition for farmers to protect the environment.

5.Reference

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