Effects of Insecticides Rogor and Malathion on Seed germination and Seedling Morphology of Onion (Allium cepa)

Dr. Vandana Pandey

Abstract: Insecticides are chemicals, which are used to kill or repel especially the insects. Here two insecticides i.e. Rogor and Malathion which are commonly used by farmers, were taken to evaluate the toxic effects of the insecticides on the plants. Onion was taken as a test material. Onion seeds were treated with different concentrations i.e. 0.1%, 0.15%, 0.2% and 0.25% of both insecticides. There are different parameters like seed germination, seedling morphology (abnormal and normal type) etc. were considered to evaluate the effect of the insecticides. It was noticed that as insecticides concentration increases, reduction in all parameters were observed. Both insecticides caused more or less similar inhibitory effects on these parameters.

Introduction: Farmers use some common insecticides Rogor and Malathion in their crop in order to control the occurrence of diseases in them. These chemicals besides checking plant diseases also cause various types of damages in the plants, thereby invariably affecting viability and yield of crop plants. They invariably get entry into the human system through food chain. Hence to evaluate the toxic effects of these commonly used insecticides is carried out through the treatments on seeds of onion. Onion (Allium cepa) is an important crop of the world. Like other condiments it is widely used in culinary preparations and as a flavouring agent. As a pharmaceutical value, onion possesses stimulant, diuretic, expectorant, antibiotic, hyperglycaemiant, antiinflammatory and antihelminthic and many other properties. It is probably a native of Asia, perhaps from Palestine to India. China and India are the leading onion producing countries in the world.

The seeds of onion are albuminous, small, black, wrinkled and three sided or fairly semicircular in shape. For the experiments, seeds of onion were collected from National Seed Corporation Ltd. Jaipur. Rogor and Malathion both insecticides are of organophosphate group. The organo phosphate insecticides are all phosphorus derived insecticides. These insecticides block the phosphorylation of a serine hydroxyl group on the active site of the enzyme cholinesterases. These enzymes are responsible for normal neural transmission in insects.

Materials and Methods: Seed treatment of two insecticides (Rogor and Malathion) was given to onion, only Genetically pure and ‘dry’ seeds, belonging to Onion (Allium cepa, var. N-53)treated with different doses (0.1%, 0.15%, 0.2% and 0.25%) of Rogor and Malathion. For each dose treatment, 100 seeds were treated with Rogor and Malathion for 72 hours separately. A control of 100 seeds each was maintained for these treatments. 3 replicates per treatment using 100 seeds per replicate were given in these cases.

Quantitative characters were subjected to statistical analysis. Following statistical formulae were used for observation data.

Arithmetic Mean (X̄):  
\[ \bar{X} = \frac{S}{n} \]
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Discussion & Results: The effect of two insecticides Rogor and Malathion (0.1%, 0.15%, 0.2% and 0.25%) were studied in onion, on seed germination and seedling morphology. These treatments were given to the seeds of onion for 72 hours, after presoaking of seeds of onion in distilled water for 6 hours. The parameters, used for this study were namely day of maximum germination, germination percentage, percentage of seedling morphology (normal and abnormal types) and root - shoot ratio (Table). The Rogor treatment did not cause any major shift in the day of maximum germination in onion seeds as compared to control. The maximum germination was slightly delayed by 24 hours. The germination percentage was gradually reduced by different doses of Rogor insecticide. It was rather inversely proportional to the higher doses of Rogor treatment. The highest dose of Rogor's treatment (0.25%) caused 59.73% seed germination in onion seeds as compared to 90.56% observed in seeds of control. In control, both normal seedlings as well as abnormal seedlings occurred in rare frequency (19.61%). The abnormal seedlings were characterized as stunted seedlings and incomplete seedlings. The stunted seedlings were overall smaller in size. In case of incomplete seedlings, their radicles grew upto some length only. They did not possess any plumule and cotyledon. They finally died. Rogor treatment caused gradual increase in total percentage of abnormal seedlings. It was maximum (38.34%) in small population of seedlings raised after 0.25% treatment. The root shoot ratios in seedlings were slightly affected by Rogor treatment. The Malathion treatment caused more or less similar effects on seed germination and seedling
morphology of onion, whereas these parameters are concerned (Table). It appears that both Rogor and Malathion insecticides caused similar effects on seed germination and seedling morphology of onion. (Plate 1-2)

1. Seed germination of Onion after different doses of Rogor Treatment

2. Seedling morphology of Onion after different doses of Malathion Treatment (note - See stunted seedling)

Both insecticides caused inhibitory effects on seed germination and seedling morphology. They were toxic at higher doses as germination percentage was highly reduced and total percentage of abnormal seedlings were very high.

The perusal of available literature on effects of insecticides on seed germination and seedling morphology in crop plants, is scanty. Not much work has been done on the effects of insecticides on seed germination and seedling morphology of various crop plants.

Pandya and Mahesh (1982) had studied of some herbicides (TCA, 2, 4-D, DNP and SMA) on various crop plants. However, it is difficult to compare the results of these studies with the present one as the methodology and methods of evaluation were not similar.

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parameters on a weed namely *Celosia argentea* Linn. All these herbicides caused inhibitory effect on seed germination.

Tayal and Agarwal (1982) had studied the phytotoxic effects of nematicides (Oxamyl and EDB) and their interaction with GA$_3$ on the process of seed germination and amylase and protease activities in Tomato and Egg plant. They concluded that the nematicides delayed and inhibited seed germination, retarded seedling growth and lowered the activities of amylase and protease in Tomato and Egg plant. The phytotoxicity of nematicides increased with increase in their concentrations. EDB was more toxic than Oxamyl, however GA$_3$ reverse the toxic effects of nematicides upto some extent by enhancing germination, seedling growth and amylase and protease activity.

Rao, Murty and Rao (1982) also concluded that the seed germination percentage in Green gram (*Vigna radiata* L. Wilezek) was gradually decreased with the increasing concentration and duration of Kitazin, a systemic fungicide. Both seedling growth and plant height were promoted in Green gram by lower concentration but were suppressed by by higher concentrations.

Das (1986) had observed significant reduction in seed germination and growth of radicle of *Vicia faba* L. with reference to higher concentration of Rogor insecticide.

Kumar and Jain (1991) studied the effect of fungicide "Bavistin" on seed germination, seedling growth and chlorophyll development in *Pisum sativum*. They observed stimulatory effect of lower concentration of Bavistin and inhibitory effect of higher concentration, on seedling growth of *Pisum sativum*. They told that indiscriminate use of agrochemicals (insecticides, fungicides etc.) can prove disastrous to plant growth and development.

**Conclusion:**

The effects of two insecticides (Rogor and Malathion) were studied in onion. Both insecticides treatments caused inhibitory effects on seed germination and seedling morphology of onion. Seed germination percentage was gradually reduced by increasing doses of both pesticides. Seedling abnormalities was also occured in higher percentages after these treatments.

### References:


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41.5
Seed Germination and Seedling Morphology of Rogor / Malathion Treated Seeds of Onion

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Doses</th>
<th>Day of maximum germination</th>
<th>Germination (%) (X ±S.E.)</th>
<th>C.V.</th>
<th>Seedling morphology (%)</th>
<th>Root-Shoot Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rogor</td>
<td>Malathion</td>
<td>Rogor</td>
<td>Malathion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Normal Seeding</td>
<td>Abnormal Seeding</td>
<td>Normal Seeding</td>
<td>Abnormal Seeding</td>
</tr>
<tr>
<td>1.</td>
<td>Control Rogor/ Malathion (%)</td>
<td>7th</td>
<td>90.56±0.476</td>
<td>0.910</td>
<td>90.56±0.476</td>
<td>0.910</td>
</tr>
<tr>
<td>2.</td>
<td>0.1</td>
<td>8th</td>
<td>80.56±0.510</td>
<td>1.099</td>
<td>81.83±0.838</td>
<td>1.76</td>
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<tr>
<td>3.</td>
<td>0.15</td>
<td>8th</td>
<td>80.30±0.412</td>
<td>0.883</td>
<td>74.93±0.754</td>
<td>1.741</td>
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<td>4.</td>
<td>0.2</td>
<td>8th</td>
<td>71.33±0.552</td>
<td>1.340</td>
<td>71.20±0.525</td>
<td>1.276</td>
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<tr>
<td>5.</td>
<td>0.25</td>
<td>8th</td>
<td>59.73±0.762</td>
<td>2.208</td>
<td>60.50±0.759</td>
<td>2.171</td>
</tr>
</tbody>
</table>

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