Malathion is a pesticide that is used to kill insects on agricultural crops, on stored products, on golf courses, in home gardens, and in outdoor sites where trees and shrubs are grown at home. It is also used to kill mosquitoes and Mediterranean fruit flies (medflies) in large outdoor areas. Additionally, malathion is used to kill fleas on pets and to treat head lice on humans. It is usually sprayed on crops or sprayed from an airplane over wide land areas. Malathion, an organophosphate pesticide has been reported to cause human birth defects. Malathion stays in the environment from a few days to several months, but is usually broken down, to other chemical compounds by water, sunlight and bacteria found in soil and water. Malathion does not tend to stick to the soil and is rapidly broken down by bacteria within a week, thus, it is unlikely that malathion will reach groundwater in significant amounts. In water, malathion breaks down quickly by the action of the water and the bacteria in the water. In air, malathion is broken down by reacting with other chemicals formed naturally in the air by sunlight, to form a more toxic product called malaoxon. If malathion is present on dry soil or on man-made surfaces such as sidewalks, pavements, or playground equipment, it usually does not break down as fast as it would in moist soil.

The toxicological manifestation like eczema hyperpigmentation, respiratory disorders and hematological effects on factory workers engaged in manufacturing these pesticides and farm workers using these pesticide in their crops has already been reported. Wide spread use and disposal of organophosphorus and carbamate compounds that have been used as an alternative to organochlorine compounds for pest control resulted in the release of their residue into natural water, thus inducing an environmental problem. Pesticide pollution of surface waters and wastewaters has increased sharply and it constitutes a major pollutant problem and health hazards due to an extensive use of these substances. Alvanja et al. observed breast cancer risk induced by use of pesticide in farmers. EPA reported different diseases caused by pesticide in field workers. Assini et al. observed behaviour changes developed by exposure to Malathion. Fortunato et al. reported that oxidative stress induced by Malathion in rat Brain. Dimethoate, malathion and methomyl considered to be priority pollutants in water due to the wide range use of these pesticides against different pests. Meerut region is a rich green belt of western Uttar Pradesh. The occupational workers use of pesticides, indiscriminately on various crops, therefore, it is necessary to evaluate the harmful outcome of this practice.

MATERIALS AND METHODS
Malathion, an organophosphorous pesticides, selected for the study. It is sold in the trade name Cythion or Malathion. It is sold in the brownish liquid form. It is widely used for pest control in vegetable and field crops: It is used on Barely, beans, broccoli sprouts, cabbage, carrot, cauliflower, celery, cotton, sweet potato, turnip, wheat and fruits. It is also used for ornamental trees and shrubs. This study was done on farm workers in different sites of Meerut Region. In Rural area, Lawar, Mawana, Behsuma, and Sardhana and in Urban area, Modipuram, Meerut city and Daurala were selected where Malathion is used for ornamental plants. Blood sample of the occupational workers were collected by venipunture and used for hematological studies. Blood samples were estimated for Hb% by Gouvers haemometer using 0.1N HCl as dilutant, RBC were counted with the help of haemocytometer (Neaubauer’s Counting Chamber), Packed cell Volume (PCV) estimated by ultra-micromethod by Nelson, Mean Cell Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Haemoglobin concentration (MCHC) by Nour-Eldrin method and Erythrocyte sedimentation rate (ESR) test done by wintrobe tube.
PESTICIDES A THREAT TO MANKIND

Malathion. Malathion is generally known as least toxic of the organophosphorous insecticides. If sufficient amount of Malathion is absorbed poisoning will ensure the present study observations were made on clinical symptoms, on behavioural and haematological change the farm workers. It was observed pesticide cause many harmful disorders in workers of Meerut region. After spraying the pesticides in field headache, nausea, vomiting and dizziness was reported by the workers. On inquiry some farmers reported that they have breathing problems and diarrhea. Some workers reported pin point pupils, eye tearing, increased sweating, salivation and localized muscle contraction due to poisoning of pesticide.

In present study various changes in blood parameters were observed. Haemoglobin Percentage was significantly decreased and showed positive relation with the total number of erythrocyte count. RBCs normally fluctuate in the normal range in urban area but decreased in rural areas. Decreased No. of RBC or erythrocyte may be due to toxic injury in donan's membrane of Erythrocytes. Pravavati and Prabu also reported inhibition of RBCs and Hb% due to toxicity of Pesticide. But in present study on occupational workers the fluctuations were mostly under the normal value. It is probably due to the reason that the spraying of the pesticide on crop is occasional, so the workers are not exposed to the pesticide constantly.

When Malathion was introduced, no one realized the basic similarities between human and other forms of life at subcellular level or that existence of the chemical in the environment and their bioaccumulation biomagnifications, their hormone disruptive impact, immunotoxic, neurotoxic, carcinogenic and other cumulative multigenerational health damaging impact on the ozone layer, would be the cause of many of the health problems. The haematological parameters are studied, as they demonstrate certain health indices. The measurement of haemoglobulin and erthroyocyte disclose the possible relations of blood deformitites due to the exposure of Malathion. Malathion is generally known as least toxic of the organophosphorous insecticides. If sufficient amount of Malathion is absorbed poisoning will ensure the present study observations were made on clinical symptoms, on behavioural and haematological change the farm workers. It was observed pesticide cause many harmful disorders in workers of Meerut region. After spraying the pesticides in field headache, nausea, vomiting and dizziness was reported by the workers. On inquiry some farmers reported that they have breathing problems and diarrhea. Some workers reported pin point pupils, eye tearing, increased sweating, salivation and localized muscle contraction due to poisoning of pesticide.

In present study various changes in blood parameters were observed. Haemoglobin Percentage was significantly decreased and showed positive relation with the total number of erythrocyte count. RBCs normally fluctuate in the normal range in urban area but decreased in rural areas. Decreased No. of RBC or erythrocyte may be due to toxic injury in donan's membrane of Erythrocytes. Pravavati and Prabu also reported inhibition of RBCs and Hb% due to toxicity of Pesticide. But in present study on occupational workers the fluctuations were mostly under the normal value. It is probably due to the reason that the spraying of the pesticide on crop is occasional, so the workers are not exposed to the pesticide constantly.

Packed Cell Volume (PCV) was normal change in urban area but slightly decreased in rural area. These changes was caused probably because of haemolysis of corpuscles. Prasad et al., Prabu, Jain and Bhargwava (1992, 1994) also

---

### RESULTS AND DISCUSSION

The Hb% of occupational workers were slightly decreased in some sites of Meerut region i.e. in site II, site III, site IV, site V, site VI, site VIII in both areas. There was a minute decrease in Hb% in workers.

The RBCs number decreased in some different sites of Meerut region i.e. site IV, site V, and site VII in rural area. There was a minor decrease in RBCs in these workers.

No variation in PCV was observed in urban as well as rural area except insignificant decline on site V & VI. The ESR increased on three sites, site IV, site VI, site VII in rural area but in normal range in urban area. In urban area no significant variation was seen whereas in rural area a significant increase was observed in MCV and MCH. No significant change was observed in MCHC in either rural or urban area except site I.

When Malathion was introduced, no one realized the basic similarities between human and other forms of life at subcellular level or that existence of the chemical in the environment and their bioaccumulation biomagnifications, their hormone disruptive impact, immunotoxic, neurotoxic, carcinogenic and other cumulative multigenerational health damaging impact on the ozone layer, would be the cause of many of the health problems. The haematological parameters are studied, as they demonstrate certain health indices. The measurement of haemglobulin and erthroyocyte disclose the possible relations of blood deformitites due to the exposure of Malathion. Malathion is generally known as least toxic of the organophosphorous insecticides. If sufficient amount of Malathion is absorbed poisoning will ensure the present study observations were made on clinical symptoms, on behavioural and haematological change the farm workers. It was observed pesticide cause many harmful disorders in workers of Meerut region. After spraying the pesticides in field headache, nausea, vomiting and dizziness was reported by the workers. On inquiry some farmers reported that they have breathing problems and diarrhea. Some workers reported pin point pupils, eye tearing, increased sweating, salivation and localized muscle contraction due to poisoning of pesticide.

In present study various changes in blood parameters were observed. Haemoglobin Percentage was significantly decreased and showed positive relation with the total number of erythrocyte count. RBCs normally fluctuate in the normal range in urban area but decreased in rural areas. Decreased No. of RBC or erythrocyte may be due to toxic injury in donan's membrane of Erythrocytes. Pravavati and Prabu also reported inhibition of RBCs and Hb% due to toxicity of Pesticide. But in present study on occupational workers the fluctuations were mostly under the normal value. It is probably due to the reason that the spraying of the pesticide on crop is occasional, so the workers are not exposed to the pesticide constantly.

### TABLE: The values of different haematological parameters of occupation workers

<table>
<thead>
<tr>
<th>Area</th>
<th>S.No.</th>
<th>Hb g/dl</th>
<th>RBCs mill/mm³</th>
<th>PCV %</th>
<th>ESR mm/hr.</th>
<th>MCH pg</th>
<th>MCV fl</th>
<th>MCHC g/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Area</td>
<td>St. vale</td>
<td>13-17</td>
<td>4.50-5.50</td>
<td>40-50</td>
<td>0-15</td>
<td>27-32</td>
<td>80-100</td>
<td>32-35</td>
</tr>
<tr>
<td>SiteI</td>
<td>13.65</td>
<td>4.70</td>
<td>42.68</td>
<td>10.75</td>
<td>29</td>
<td>91.65</td>
<td>44.55</td>
<td></td>
</tr>
<tr>
<td>SiteII</td>
<td>12.87</td>
<td>4.82</td>
<td>42.87</td>
<td>13.62</td>
<td>27.02</td>
<td>92.26</td>
<td>29.92</td>
<td></td>
</tr>
<tr>
<td>SiteIII</td>
<td>12.5</td>
<td>4.01</td>
<td>40.75</td>
<td>11.37</td>
<td>28.75</td>
<td>95.56</td>
<td>30.78</td>
<td></td>
</tr>
<tr>
<td>Rural Area</td>
<td>SiteIV</td>
<td>12.73</td>
<td>3.77</td>
<td>40</td>
<td>16.25</td>
<td>33.80</td>
<td>106.39</td>
<td>31.94</td>
</tr>
<tr>
<td>SiteV</td>
<td>12.87</td>
<td>3.88</td>
<td>33.87</td>
<td>11.37</td>
<td>34.18</td>
<td>100.35</td>
<td>34.14</td>
<td></td>
</tr>
<tr>
<td>SiteVI</td>
<td>12.12</td>
<td>4.22</td>
<td>39.87</td>
<td>20</td>
<td>30.61</td>
<td>101.96</td>
<td>30.35</td>
<td></td>
</tr>
<tr>
<td>SiteVII</td>
<td>12.93</td>
<td>4.36</td>
<td>42.87</td>
<td>10</td>
<td>33.42</td>
<td>111.24</td>
<td>30.21</td>
<td></td>
</tr>
</tbody>
</table>
reported the initial decrease in PCV in pesticides treated rat. PCV value decreased significantly due to decline in RBC count with increase in concentration of the pesticides. Since the pesticide concentration used by the farmers is low, it does not show much variation.

Mean Corpuscular Volume (MCV) and Mean Corpuscular Haemoglobin (MCH) increased in rural area but in normal range in urban area but Mean Corpuscular Haemoglobin concentration (MCHC) was observed to be increased on one site only. When MCV, MCH and MCHC volume increase with a decrease in the Hb% it might be due to range Macrocytic anaemia. These findings are in agreement to the observation of Bomford17, Varadaraj et al.18 and Prabu14 who reported an increase in MCV, MCH and MCHC in pesticide treated rats.

These results were similar to those reported by Rajni et al.19. These findings in farm workers are in agreement to the observation of Bomford17, Varadaraj et al.18 on Bio-chemical and haematological findings in capacitor workers due to PCV exposure. Erythrocytes sedimentation rate (ESR) was increased in Rural area farm workers but normal in urban area. When the ESR increased it shows increase in RBC cell death rate that causes oxygen deficiency. However, these findings are contradictory to the observation of Jain and Bhargava16, who reported decline in ESR value in methyl parathion and phosphamidon treated rats. Chaudhary19 also reported fluctuation in ESR.

Although variations in Haematological parameters were common in farm workers yet these fluctuations were high in rural as compared to the urban area. The pesticide concentration used by the farmers is low, it does not show much variation. Since the farmers use large quantities of pesticide and more frequently than the gardens using it on mainly ornamental plants.

ACKNOWLEDGEMENTS

The authors are thankful to the authorities to Dr. Triveni Dutt, Principal, D.N.College, Meerut for providing facilities for this work. The first author is also thankful to University Grants Commission (UGC), New Delhi for financial support as Major Research Project for the work.

REFERENCES