**Faculty of Science**
**Entomology Department**

# Application of Remote Sensing technology in detecting the ecological distribution of the house fly, *Musca domestica* L. with respect to trachoma disease infection in El-Fayoum Governorate, Egypt

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## ABSTRACT

Our study aimed to alert our society about the role played by *Musca domestica* L. in carrying and transmitting *Chlamydia trachomatis*, the causative organism of trachoma disease in Egypt.

Measuring of different environmental variables were derived from RapidEye and Landsat8 satellites imageries included Land Use Land Cover (LULC) and Land Surface Temperature (LST). Application of (RS) and (GIS) may help the decision makers to take a decision about control program for fly borne diseases at right place, time and in right direction. House fly population densities were estimated in fifteen villages representing five administrative centers in Al-Fayoum Governorate and ten sites at Mansheit El- Gammal village.

The correlation between some parameters as agriculture, fishing, water supply, garbage management, health activity, community network and education with fly densities and prevalence of *C. trachomatis* was measured.

The highest fly density in Mansheit El- Gammal village was 42.6 ± 9.29 fly/trap while the lowest density was recorded as 6.6 ± 2.08 fly/trap from Terssa village. Wastes as breeding sites for house fly were sorted according to its type and content to four different types, household, slaughterhouse, agriculture and general waste type. *C. trachomatis* was isolated for the first time in Egypt as twelve isolates from eleven villages at Al-Fayoum Governorate. The molecular studies including PCR method for amplification of MOMP 1 gene region of *C. trachomatis* and this gene proved to be positive within eleven villages.


**Keywords:** Trachoma - *Musca domestica* – remote sensing – geographic information system – MOMP 1

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| **Bp** | Base pair. |
| **DNA** | Deoxyribonucleic Acid. |
| **O.D.** | Optical density. |
| **OTUs** | Operational Taxonomic Units. |
| **PCR** | Polymerase Chain Reaction. |
| **TAE buffer** | Tris acetate-EDTA buffer. |
| **TE buffer** | Tris EDTA buffer. |
| **EDTA** | Ethylenediaminetetraacetic Acid. |
| **Kb** | Kilobase. |
| **Hcl** | Hydrochloric acid. |
| **cm** | Centimeter. |
| ° | Centigrade. |
| **gm** | Grame. |
| **CTAB** | Cetyltrimethylammonium Bromide |
| **Mg** | Milli-grames. |
| **Mm** | Milli-meter. |
| **r.p.m.** | Revolutions per minutes. |
| **RNAse** | Ribonuclease. |
| **DNAse** | Deoxyribonuclease |
| **µg** | Microgram. |
| **pm.** | pico-mole. |
| **L** | Liter. |

| | |
|---|---|
| **M** | Molar. |
| **mM** | Milli Molar. |
| **mol.** | mole. |
| **mmol.** | millimole. |
| **min.** | Minute. |
| **ml** | milliliters. |
| **Ml** | Micro-liters. |
| **NaCl** | Sodium Chloride. |
| **Ng** | Nano-Grames. |
| **Nm** | Nanometers. |
| **Taq. Polymerase** | Thermus aquaticus polymerase. |
| **U** | Unit. |
| **U.V. Violet** | Ultra Violet. |
| **V** | Volt. |
| **MOMP** | Major Outer Membrane Protein. |
| **GPS** | Global Positioning System. |
| **RS** | Remote Sensing. |
| **GIS** | Geographic Information System. |
| **FAO** | Food and Agriculture Organization. |
| **LCCS** | Land Cover Classification System. |
| **UNEP** | United Nations Environment Programme. |

| | |
|---|---|
| **AVHRR** | Advanced Very High Resolution Radiometer. |
| **NOAA** | National Oceanic and Atmospheric Administration |
| **USGS** | United States Geological Survey |
| **NDWI** | Normalized Difference Water Index |
| **MODIS** | Moderate Resolution Imaging Spectroradiometer |
| **Rad** | Pixel radiance unit |
| **DN** | Pixel digital number |
| **$T_o$** | Radiance temperature |
| **K1 and K2** | Thermal band constants |
| **$E_o$** | Surface Emissivity |
| **NDVI** | Normalized Difference Vegetation Index |
| **LST** | Land Surface Temperature |
| **$B_{NIR}$** | Near Infrared Band |
| **$B_{red}$** | Red Band |
| **SD** | Standard Deviation |
| **LSD** | Least Significant Difference |
| **HFN** | Hyper Frame Number |
| **SWIR** | Short Wave Infrared |
| **OLS** | Ordinary Least Squares |

| | |
|---|---|
| **TOA** | Top-Of-Atmosphere |
| **OLI** | Operational Land Imager |
| **TIRS** | Thermal Infrared |
| **Pan** | Panchromatic |
| **ERDAS** | Earth Resources Data Analysis Systems |
| **SPSS** | Statistical Package for the Social Sciences |
| **MDSSM** | *Musca* Density Site Selection Model |
| **MDA** | MacDonald, Dettwiler and Associates |
| **SSTL** | Surrey Satellite Technology Ltd |
| **SCC** | Spacecraft Control Center |
| **AIT** | Assembly, Integration and Test |
| **JOP** | Jena Optronik |
| **RGB** | Red-Green-Blue region |
| **NASA** | National Aeronautics and Space Administration |
| **PCA** | Principle Component Analysis |

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