

**Ex No. 1**

**Date:**

## **STUDY OF DISTRIBUTION PATTERNS OF INSECTS IN CROP ECOSYSTEMS**

### **Objective:**

To get familiarized with distribution patterns of insects in crop ecosystems.

Study of distribution patterns of insects in a crop-ecosystem is most important to validate methods for population estimation and to understand the pest population. Information on distribution or dispersion of pest species provides a valid base for developing a sound sampling plan and gives information about behavior of the species. The dispersion of species is influenced by social instincts such as breeding, protection against natural enemies and heterogeneity of the environment. Individuals of a population arrange themselves in a manner that is specific to each population and these arrangements in space appear to be of considerable importance in the study of dynamics of ecosystem.

### **Dispersion**

The manner in which members of pest population are distributed in space is the dispersion or the distribution pattern of the species.

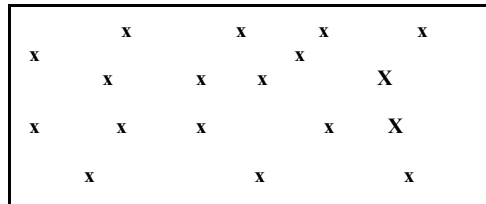
The internal distribution patterns are important which are related with some characteristics of a population. Individuals in any population may be distributed according to three basic patterns.

1. Regular / Uniform distribution
2. Random/poisson distribution
3. Clumped / aggregated / over-dispersed/contagious distribution



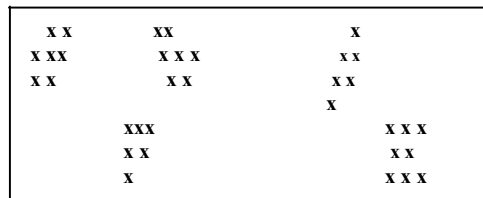
## 2) Random or Poisson distribution:

It is relatively rare in nature and occurs where the environment is very uniform and there is no tendency to aggregate. Each insect has equal probability of occupying any point in space and the presence of one individual does not influence the distribution of another. Here the variance-mean ratio (VMR) is always one ( $S^2 = \bar{x}$ ), IDM is equal to zero, Index of Lexis is unity and the Charlier Coefficient is zero.



## 3) Aggregated/Clumped / Aggregate/Negative binomial distribution:

This is the most frequently observed pattern and individuals show varying degree of clumping together due to attraction or instinct as in case of some insects. Large scale clumping helps to evade possible danger of predation, climate or diseases. Bees are able to exist in cold climate by increasing the input of heat among them thus modifying the environments. Usually the environment decides the degree of aggregation of clumped patterns. Here the variance-mean ratio (VMR) is more than one ( $S^2 > \bar{x}$ ), IDM is more than zero, Index of Lexis is more than one and the Charlier Coefficient is more than zero.



The aggregation may also be due to

1. Response of microclimatic differences and daily and seasonal changes in weather.
2. As a result of reproduction or social attraction
3. Characteristics of the species *i.e.* degree of sociality

Aggregation always leads to intra-specific competition for food, space and reproduction etc. The degree of aggregation as well as the overall density, which results in optimum population growth and survival, varies with species and conditions.

**Record Work:**

Workout the mean, variance and different indices to conclude the Distribution/Dispersion patterns *Spodoptera litura* (Fab.) based on the following larval population data on cabbage.

Number of Insects Per Plant x	Plant Frequency f	fx	fx <sup>2</sup>
0	22		
1	3		
2	5		
3	8		
4	12		
5	11		
6	9		
7	23		
8	7		
9	6		
10	4		
n=		Σfx =	Σfx <sup>2</sup> =

**Table 1.1**