**The Design of Biological Experiments**

Hypothesis Testing (Significant Test)

**Procedure of testing hypothesis**

* 1. Setup of hypothesis
	2. Detect the significant level
	3. Setting test criteria
	4. Computing or analysis of data
	5. Making decision
	6. Interpretation of data

**Testing procedures are**

1. T – test
2. Chi square test
3. F – test

**Note;** we use the **T-test**, **Chi Square test**, and **F test** according to

1. Type of distribution.
2. Size of sample.
3. Number of freedoms.

**Hypotheses;** there are two statistical hypotheses involved in hypothesis testing.

1. The **null hypothesis** is designated by the symbol $Ho$. The null hypothesis is sometimes referred to as a hypothesis of no difference.
2. The **alternative hypothesis** is a statement of what we will believe is true if our sample data causes us to reject the null hypothesis. Usually designate the alternative hypothesis by the symbol$ H\_{A}$.

**Null hypothesis (**$H\_{o}$**)**

It's a specified hypothesis about population that has been tested by the means of sampling. Here Ho = m1 = m2 = m3 = …. mn. If the calculated value lesser than tabulated value, we accept Ho vice versa.

**Alternative hypothesis** ($H\_{A}$)

It’s an alternative hypothesis for $H\_{0}$, it means if we rejected null hypothesis, we will accept the alternative hypothesis.

**Significance Level**

The decision as to which values go into the rejection region and which ones go into the **non-rejection** region is made on the basis of the desired level of significance.

**Have two levels for our experiments**

1. **%1 or 0.01 significant level:** It means %99 of the experiment is true only %1 or 0.01 is wrong, so it is more accurate value.
2. **%5 or 0.05 significant level:** It means %95 (or 0.95) of the experiment is correct and %5 or 0.05 is wrong, so it is inaccurate value.

**Note:** as the **level of significance** is **low** the **precision** is high.

**Calculation of the test statistic;** from the data contained in the sample we compute a value of the test statistic and compare it with the rejection and non-rejection regions that have already been specified.

**Statistical decision;** the statistical decision consists of rejecting or of not rejecting the null hypothesis. It is rejected if the computed value of the test statistic falls in the rejection region, and it is not rejected if the computed value of the test statistic falls in the non-rejection region.

**Conclusion;** if $H\_{0} $ is rejected, we conclude that $H\_{A} $ is true. If $H\_{0} $is not rejected, we conclude that $H\_{0} $may be true.

|  |  |
| --- | --- |
|  | **Condition of Hypothesis** |
| **Possible action** | $$Calculated Value \geq Tabulated Value$$ | Accept HA | Reject Ho |
| $$Calculated Value <Tabulated Value$$ | Accept Ho | Reject HA |