

Topic: Bioassays

Subject: Research Methods in Entomology

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Bioassays

- Bioassay – An experiment in which a living organism is used as a test subject.
- Bioassays are typically conducted to measure
- The effects of a substance on a living organism.
- Essential in the development of new drugs.
- In monitoring environmental pollutants.

Basic types of bioassay

- **Qualitative bioassay**
- Qualitative bioassays are used for assessing the physical effects of a substance that may not be quantified,
- Such as abnormal development or deformity.
- One example of qualitative bioassay is mortality response.

Quantitative bioassay

- Quantitative bioassays involve estimation of the concentration or potency of a substance by measurement of the biological response that it produces.
- Quantitative bioassays are typically analyzed using the methods of biostatistics.

Types of variables in Bioassays

- **Response variables**
- (Dependent variables)
 - the random outcomes of the experiment.
- **Explanatory variables**
- (Independent variables)
 - Measurable characteristics of the stimulus that causes the response (the“treatment”).

Important terms during bioassay

- **Experimental unit**
- The entity actually receiving the treatment. Such as if test the effects of pesticides on white fly, then white fly act as experimental unit.
- **Replication** – repetition of the bioassay at a different time but under the same conditions (as much as possible).
- It can precise the results of experiment. If same results obtained after repetition of the experiment under same experimental conditions it means results are reliable.

Control Unit

- The entity did not receiving the treatment, but it only received vehicle the solvent in which pesticide or insecticide or drug is emulsified.
- Individual of the control unit exposed to same environmental factors e.g. temperature, experimental place, light, food etc. as that of treated unit
- If effect of plant oil is observed on the mortality of beetle and ethanol is used as solvent for emulsification then control unit consist of only solvent treated experimental test arena.

Properties of a Good Bioassay

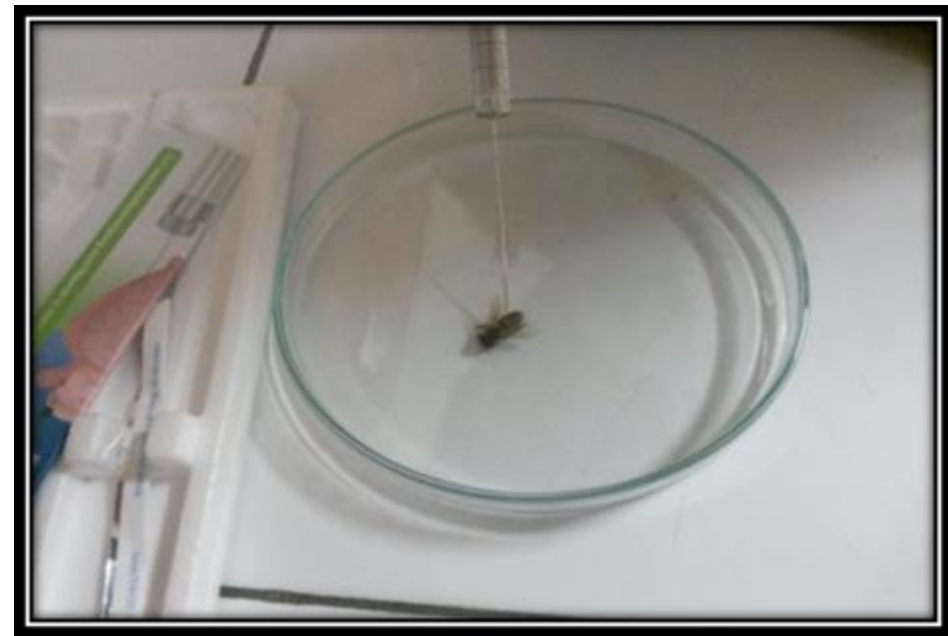
- Reproducibility.
- Results easily observed and measured.
- Relatively low cost.
- Preferably of short duration (less opportunity for confounding factors); more replication.

Types of Bioassay

Topical application (Direct method)

Direct test bioassay:

This mode of administration may be topical or spray. Topical is fixed dose and more precise as it is measured while spray less precise.



Types of Bioassay

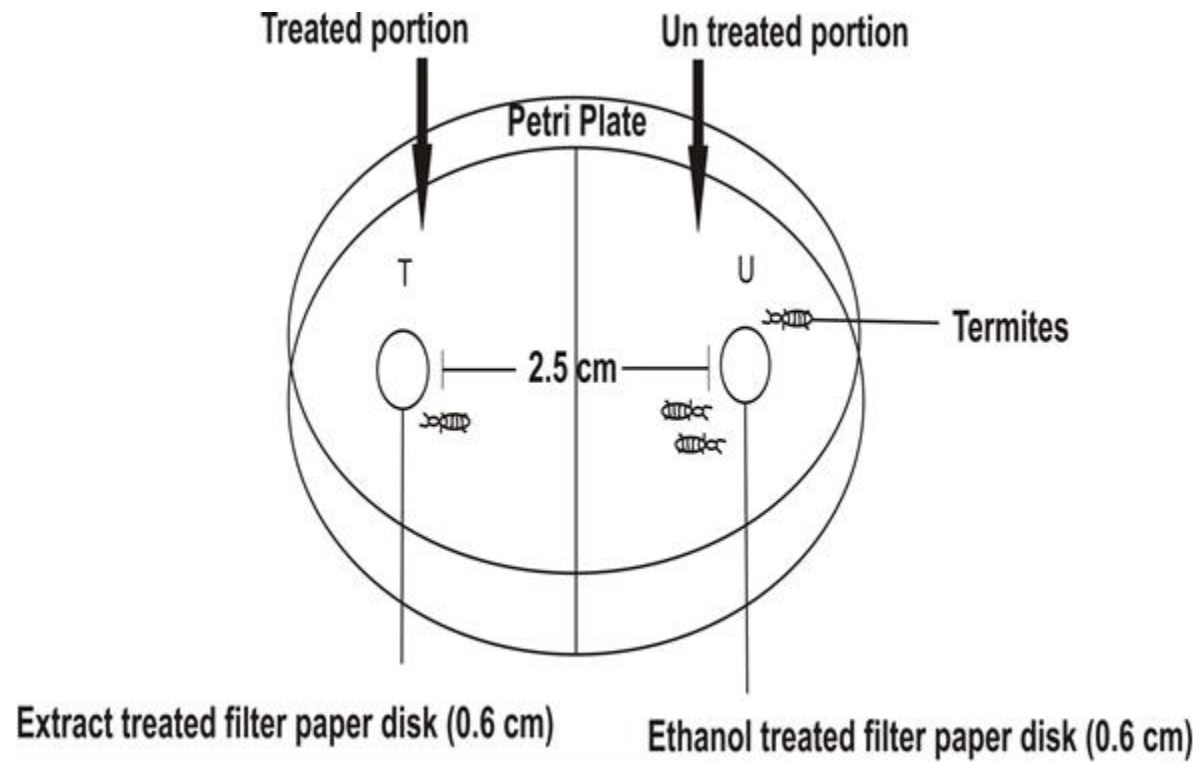
Surface contact bioassay:

In this type of administration test substance applied to substrate where insects make direct contact with treated unit.

Choice bioassay

- This test is most commonly conducting to determine the repellency effects of the insects.
- In these test direct choice is given to the insect between treated and untreated substrate. These experiments are mostly food preference test.

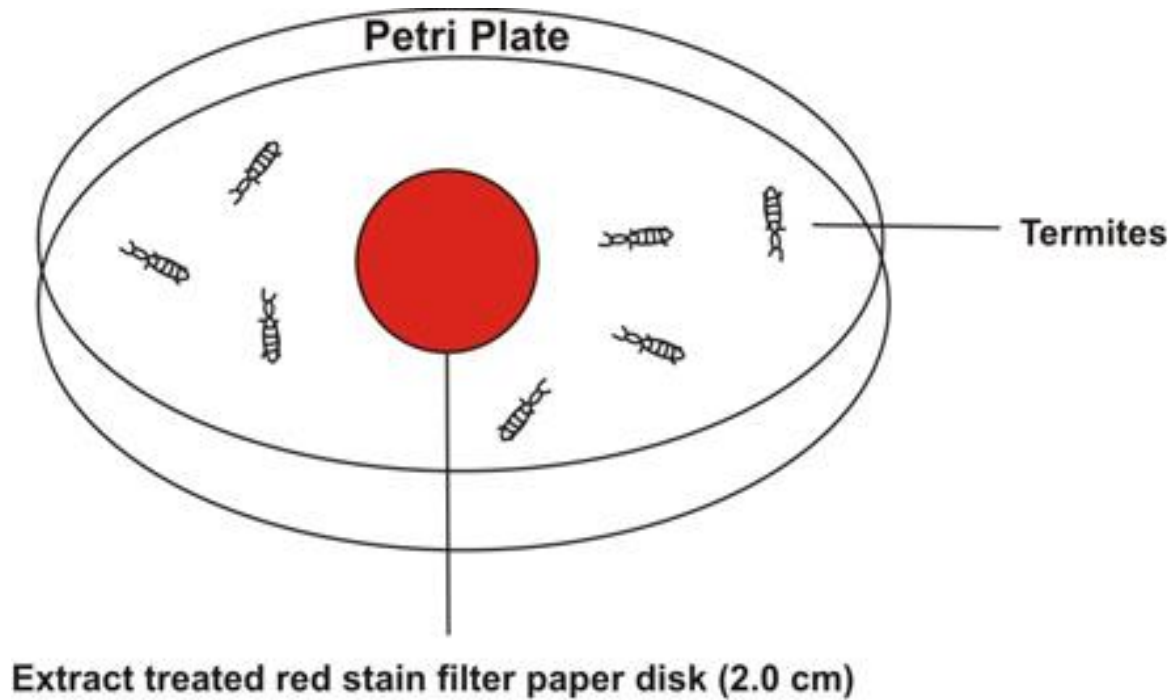
Choice bioassay



No Choice bioassay

These type of test most commonly conduct to determine the toxic effects of the test substance on insects. In these experiments no choice is given. these test most commonly conducting as feeding deterrence test and direct toxicity in the form of mortality is observed.

No Choice Bioassay



Tunneling bioassays

This type of test most commonly conducting to determine the tunneling behavior of the insects such as Termites.

In tunneling bioassays barrier efficiency of insecticides is determine by constructing a soil barrier.

Considerable reduction in number of tunnels occur means more efficient chemical used to construct the barrier.

Arrangement of Apparatus to conduct Tunneling bioassay in lab



Thank you