

10 Scientific Experiments: Organic Tobacco vs. Conventional Tobacco

Marie Landry's Spy Shop Research Division

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Ethically safe, scientifically rigorous — designed for labs, students, and spy scientists alike.

Safety and Ethical Guidelines

- **Do not smoke or inhale** tobacco products.
- Use **PPE** including gloves, goggles, and lab coats.
- Conduct chemical work in **fume hoods**.
- **Dispose of tobacco waste** according to hazardous material guidelines.
- **No animal testing.**

Experiment 1: Nicotine Content Comparison

Question: Does organic tobacco contain less nicotine than conventional tobacco?

Hypothesis: Organic tobacco has a lower nicotine concentration.

Design:

- Independent Variable: Type of tobacco
- Dependent Variable: Nicotine concentration (mg/g)
- Control Variables: Sample mass, extraction method
- Materials: Tobacco samples, methanol, spectrophotometer or HPLC, lab glassware

Procedure:

1. Weigh 1g of each tobacco sample.
2. Extract nicotine using methanol.
3. Measure concentration using spectrophotometry or HPLC.

Data Analysis: Use bar graphs to compare nicotine concentrations.

Conclusion: Evaluate hypothesis and discuss agricultural and processing differences.

Experiment 2: Pesticide Residue Test

Question: Are pesticide residues higher in conventional tobacco?

Hypothesis: Conventional tobacco has higher pesticide residues.

Design:

- Independent Variable: Tobacco type
- Dependent Variable: Residue concentration (ppm)
- Materials: GC-MS or ELISA kit, solvents, tobacco

Procedure:

1. Extract residues from samples.
2. Analyze using GC-MS or ELISA.

Data Analysis: Table and graph comparing pesticide levels.

Conclusion: Assess organic certification's effectiveness.

Experiment 3: Burn Rate Test

Question: Does organic tobacco burn more slowly?

Hypothesis: Organic tobacco burns slower due to fewer additives.

Design:

- Dependent Variable: Burn time (s)
- Materials: Stopwatches, fireproof tray, pre-rolled samples

Procedure:

1. Ignite samples under controlled airflow.
2. Measure time to full combustion.

Data Analysis: Plot average burn times per type.

Conclusion: Evaluate combustion rate differences.

Experiment 4: Ash Residue Mass

Question: Does conventional tobacco produce more ash?

Hypothesis: Fillers in conventional tobacco increase ash residue.

Design:

- Dependent Variable: Ash mass (mg)
- Materials: Precision scale, fireproof dishes

Procedure:

1. Burn samples in controlled environment.
2. Weigh residual ash.

Data Analysis: Compare mass in bar graphs.

Conclusion: Discuss implications on purity and fillers.

Experiment 5: Moisture Content

Question: Do moisture levels differ between tobacco types?

Hypothesis: Organic tobacco retains more natural moisture.

Design:

- Dependent Variable: Moisture content (%)
- Materials: Drying oven, scale

Procedure:

1. Weigh samples before and after drying at 105°C for 3 hours.
2. Calculate moisture loss.

Data Analysis: Compare moisture percentages.

Conclusion: Discuss effects on texture and shelf life.

Experiment 6: Fungal Growth Rate

Question: Is organic tobacco more prone to fungal growth?

Hypothesis: Lack of preservatives leads to faster fungal colonization.

Design:

- Dependent Variable: Mold coverage (mm^2)
- Materials: Humid containers, camera, graph paper

Procedure:

1. Store samples in humid environments.
2. Photograph and measure fungal spread over 10 days.

Data Analysis: Plot mold growth over time.

Conclusion: Relate findings to storage requirements.

Experiment 7: pH of Tobacco Infusions

Question: Do pH levels differ in tobacco extracts?

Hypothesis: Organic extracts are less acidic.

Design:

- Dependent Variable: pH value
- Materials: pH meter, beakers, distilled water

Procedure:

1. Steep samples in water for 1 hour.
2. Measure pH using calibrated meter.

Data Analysis: Bar chart of pH values.

Conclusion: Evaluate implications on processing.

Experiment 8: UV Absorption Test

Question: Do chemical additives affect UV absorption?

Hypothesis: Conventional tobacco absorbs more UV light.

Design:

- Dependent Variable: Absorbance (nm)
- Materials: Spectrophotometer, cuvettes

Procedure:

1. Prepare aqueous extracts.
2. Run UV absorbance scans.

Data Analysis: Plot absorbance spectra.

Conclusion: Infer presence of additives.

Experiment 9: Biodegradability Test

Question: Which tobacco type breaks down faster?

Hypothesis: Organic tobacco decomposes more rapidly.

Design:

- Dependent Variable: Mass loss (%)
- Materials: Soil containers, scale

Procedure:

1. Bury equal mass samples in compost.
2. Weigh remaining mass weekly.

Data Analysis: Line graph over time.

Conclusion: Consider environmental impact.

Experiment 10: Heavy Metal Content

Question: Are heavy metal levels higher in conventional tobacco?

Hypothesis: Industrial farming leads to more heavy metal uptake.

Design:

- Dependent Variable: Metal concentration (ppm)
- Materials: ICP-MS or AAS, digestion chemicals

Procedure:

1. Digest tobacco with acid.
2. Analyze for Pb, Cd, and As.

Data Analysis: Table and bar graph of metal content.

Conclusion: Relate to soil and fertilizer sources.