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Stomatal Number and Stomatal Index

Experiment 8 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To measure stomatal density and calculate stomatal index for a specified leaf surface.

Principle

Stomatal number is the number of stomata per defined area, commonly per mm². Stomatal index is the percentage of stomata among stomata plus ordinary epidermal cells in the counted field. A pair of guard cells enclosing one pore is counted as one stoma, not as two stomata.

Requirements

- Authenticated leaf and instructor-prepared epidermal peel or cleared preparation.
- Microscope, calibrated field-area method and counting sheet.

Procedure

1. Identify the surface

Record the species, leaf maturity and upper or lower surface. Use representative regions selected by the prescribed method.

2. Calibrate area

Determine the viewed area with the stage micrometer or the validated field-area method; magnification alone does not provide area.

3. Count stomata

Apply a consistent boundary rule and count S stomata in each selected field.

4. Count epidermal cells

In the same fields count E ordinary epidermal cells, excluding the guard cells from E.

5. Calculate and repeat

Stomatal number = $S \div \text{area}$. Index = $100S \div (S + E)$. Calculate each field and report the prescribed summary with the surface stated.

Observations and Record

Field / surface	S and E	Area / calculated values
1 / ____	S ____; E ____	____ mm ² ; ____ / ____
2 / ____	S ____; E ____	____ mm ² ; ____ / ____
3 / ____	S ____; E ____	____ mm ² ; ____ / ____

Introduction to Pharmacognosy

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Field example: $S = 20$, $E = 80$, area = 0.25 mm^2 . Stomatal number = $20 \div 0.25 = 80 \text{ stomata/mm}^2$.
- Stomatal index = $20 \div (20 + 80) \times 100 = 20\%$.
- The index is dimensionless; the density has an area unit. These two measurements should not be reported interchangeably.

Result

On the ____ leaf surface, stomatal number = ____/ mm^2 and stomatal index = ____%, using ____ fields.

Precautions

- Count on the same leaf surface and use representative comparable regions.
- Avoid damaged or obscured fields and document the selection method.
- Do not count two guard cells as two separate stomata.

Viva Questions and Answers

1. Why is field calibration necessary?

Density requires a known area, not just a cell count.

2. Which cells are included in E?

Ordinary epidermal cells in the same field, excluding guard cells.

3. Can upper and lower surface counts be mixed?

Not without an explicitly defined method; their distributions can differ.

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