

DIFFERENTIATION OF *CENTELLA ASIATICA*, *BACOPA MONNIERI*, AND *HYDROCOTYLE UMBELLATA* AND THEIR COMMERCIAL PRODUCTS USING DNA FINGERPRINT GENERATED BY PCR-RFLP

| Research Simplified | Faculty of Pharmacy | Srinakharinwirot University|

Worapan Sitthithaworn

Suksawat M, Sitthithaworn W.
Differentiation of *Centella asiatica*, *Bacopa monnieri*, and *Hydrocotyle umbellata* and Their Commercial Products using DNA Fingerprint Generated by PCR-RFLP. Thai Pharmaceutical and Health Science Journal Vol. 19 No. 2 (2024): Vol. 19 No. 2 (2024)

worapan@g.swu.ac.th



Centella asiatica



Bacopa monnieri



Hydrocotyle spp.,

What's the problem with *Centella* (Gotu kola), *Bacopa* (Brahmi), and *Hydrocotyle* (False pennywort)?

- In some regions, *Centella asiatica* (Gotu kola) is mistakenly called "Pak Waen," a local term also used for *Hydrocotyle* spp., causing confusion.
- Internet searches using the Thai name "บัวบก" (Gotu kola) sometimes return *Hydrocotyle* images.
- In parts of India, the term "Brahmi" may refer to either *Centella asiatica* or *Bacopa monnieri*, depending on local usage.

These naming overlaps cause confusion in **herbal raw material sourcing**, especially when herbs are in **powdered form**.

Why is using the wrong plant a problem?

- *Centella* and *Bacopa* are both used to support **memory and cognition**, but they contain **different active compounds**. Substituting one for another may cause **variability in effect or allergic reactions**.
- *Hydrocotyle* spp. is **not traditionally used** as a medicinal herb.

What did this research do?

Used **PCR-RFLP** to **differentiate** between the three herbs using their **DNA fingerprints**.

What is PCR-RFLP?

A technique that identifies genetic differences between species in two main steps:

Step 1: PCR (Polymerase Chain Reaction)

Amplifies (copies) the target gene to get enough DNA for testing.

- A specific gene is selected (e.g., *matK*)
- Special primers are used to amplify only that part
- Result: lots of target DNA to work with

Like photocopying a specific page from a book

Step 2: RFLP (Restriction Fragment Length Polymorphism)

Cuts DNA at specific sites using restriction enzymes

- Each plant has unique DNA sequences → cuts occur at different spots
- Cut fragments are separated by gel electrophoresis
- Produces distinct **banding patterns**

Like cutting paper along certain words—each text gives you different piece lengths

Research Methods

1. Retrieved gene sequences from databases
2. Designed primers and predicted restriction enzyme cut sites
3. Extracted and amplified DNA using PCR
4. Digested DNA with specific enzymes
5. Separated DNA fragments via gel electrophoresis
6. Applied the method to test herbal products

Findings

- The DNA fingerprinting method clearly differentiated the 3 herbs
- Out of 8 herbal product samples tested:
 - **2 products were mislabeled**
 - A "Gotu kola" tea was actually **Hydrocotyle**
 - A "Bacopa" tea was actually **Centella**

Conclusion

PCR-RFLP is a reliable tool for distinguishing between visually similar herbs and is valuable for **authenticating herbal products**.