

Genetic characterization of Echinacea using new DNA fingerprinting method



Nichole Fairley BSc, ISI, Dr. BL Coomber PhD, University of Guelph, James Ford, MSc, ISI

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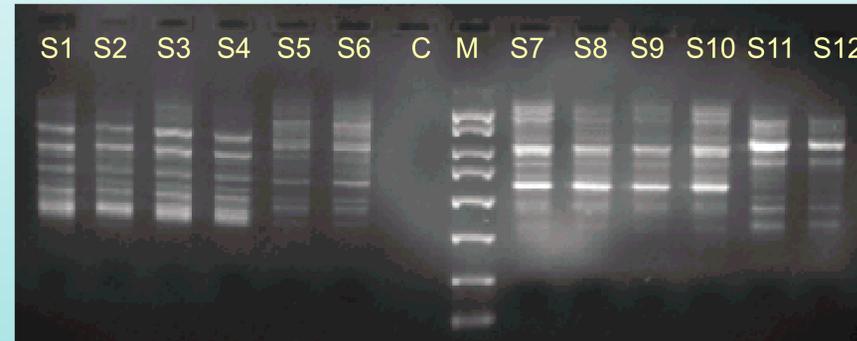
Echinacea: Nature's Antibiotic

There are currently nine known species of Echinacea, three of which have shown to have medicinal properties. The three most sought after species of Echinacea are *E. purpurea* (L.) Moench, *E. angustifolia* DC., and *E. pallida* (Nutt.) Nutt., all of which are very similar in their medicinal properties and morphological homologies¹. This has resulted in considerable confusion concerning which species is present in the final marketable product. Analytical research has revealed that there are significant differences in the chemical composition of each of the three medicinally active species. Using a new molecular technique it is now possible to genetically characterize the three most popular Echinacea species.

Molecular Tool for the Analysis of High Quality Echinacea Products



RAPD-PCR, pronounced 'Rapid PCR', is the acronym for Randomly Amplified Polymorphic DNA - Polymerase Chain Reaction. This relatively new molecular technique is a pivotal tool in assessing the botanical identity of herbal specimens². RAPD analysis is possible because each Echinacea species has its own unique DNA sequence. The end result is a highly reproducible characteristic barcode for each species analyzed.



Typical agarose gel demonstrating RAPD profile of *E. angustifolia* (S1-S4) and *E. pallida* (S7-S10) with their corresponding RAPD primer. Lane M – Marker, Lane C – control, S5-S6 – *E. angustifolia* with incorrect primer, S11-S12 – *E. pallida* with incorrect primer.

Application of Randomly Amplified Polymorphic DNA

The phytopharmaceutical market is not the only area to benefit from the use of molecular DNA-based technology. The forensic sciences use DNA fingerprinting to analyze evidence from crime scenes. Within our DNA there are polymorphisms that are unique to each individual. It is these DNA polymorphisms that are responsible for producing the different number and sizes of DNA fragments. Gel electrophoresis is then used to separate the fragments resulting in a very characteristic DNA fingerprint. The exact number and size of fragments produced is dictated by the polymorphisms within our DNA.

Becoming Commercially Competitive

As the popularity of Echinacea continues to rise it becomes increasingly important to characterize the genetic composition within the genus. Investigative Science Incorporated can provide clarity on the issues of genetic characterization using RAPD-PCR and can accurately identify *E. angustifolia* and *E. pallida* from dried root samples. Currently we are working towards genetically characterizing other Echinacea species as well as common adulterants.

