

Forensic DNA Profiling Protocols (Methods in Molecular Biology)

Chapter 4

Plant Genetics for Forensic Applications

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Abstract

An emerging application for plant DNA fingerprinting and barcoding involves forensic investigations. Examples of DNA analysis of botanical evidence include crime scene analysis, identifying the source of commercial plant products, and investigation of trade in illicit drugs. Here, we review real and potential applications of DNA-based forensic botany and provide a protocol for microsatellite genotyping of leaf material, a protocol that could be used to link a suspect to a victim or to a crime scene.

Key words: Forensic botany, Microsatellites, Crime scene investigation, Plant product identification, DNA barcoding

1. Introduction

Plant DNA fingerprinting is an under-utilized tool for forensic applications, but the potential for DNA profiling of botanical specimens to contribute forensic evidence is an important, emerging field. Depending upon the crime, assignment of botanical material to a particular species may aid an investigation and provide important evidence. Such species-assignment requires a barcoding approach and the establishment of a database of species-specific sequences at one or more genetic loci—often on the chloroplast genome. Alternatively, if the source species is identified, it may be possible to match botanical material to an individual plant, clone, or population, through DNA fingerprinting. This could be accomplished by using multilocus genotypes at highly variable loci such as DNA microsatellites, also known as simple sequence repeats (SSRs), short tandem repeats (STRs), or variable number tandem repeats (VNTRs). We briefly review both of these general approaches, then provide examples of a wide range of forensic applications utilizing these approaches.

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