

## ABSTRACT

Forensic Botany is the application of plant studies or plant material in solving crimes or other legal issues. Although very useful, Botanical resources remain underutilized in forensic investigations with its most common application limited to identifying specific as well as suspected illegal plants. Nevertheless, plant species identification through Classic Botany is not always possible due to the often degradation of plant material preventing its identification by traditional methods. In these cases, Molecular Botany with DNA-based techniques can identify even small traces of plants.

In this study, 38 plant species were analyzed including non-vascular plants (non-vascular cryptogams), seedless vascular plants (vascular cryptogams) and plants with seeds (gymnosperms and angiosperms). Following the recommendations of CBOL (Consortium for the Barcode of Life), a core-barcode system consisting of portions of two plastid coding regions, *matK* (maturase K) and *rbcL* (ribulose-1,5-bisphosphate carboxylase/oxygenase), was used for plant species identification.

As well as plant species identification, other objectives of this work were optimization of extraction methods and PCR (*Polymerase Chain Reaction*) amplification of plant DNA, using two sets of *primers* also recommended by CBOL: the *primers* (*3F\_KIM/1R\_KIM*) for the gene *matK* and the *primers* (*rbcLa\_f/rbcLa\_r*) for the gene *rbcL*. These two sets of *primers* together, amplified and sequenced 73,68% of plant species in this study. Initially designed for angiosperms, the largest group of land plants, these sets of *primers* amplified e sequenced most successfully these plants. Nevertheless, it was also amplified and sequenced non-vascular and vascular cryptogams (ferns and moss) and two gymnosperms with the *primers* (*rbcLa\_f/rbcLa\_r*). In contrast, the *primers* (*3F\_KIM/1R\_KIM*) did not provided any kind of results in amplifying and sequencing these later plants.

This study aims not only its application in forensic laboratories in Portugal, but also to collaborate in genomic databases for plant species identification.