Botanists move from hedgerows to DNA in bid to barcode species

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After more than 300 years of careful poking around the hedgerows, botany has remained the quaintest of sciences, seemingly trapped in a timewarp of magnifying glasses and polished wooden cabinets.

But botanists have an ambitious plan that will drag their field into the 21st century. They want to make a catalogue that will use DNA signatures to "barcode" every plant species in the world. The pilot project could cost more than £20m and take a decade to complete.

"The idea is that, for any organism on earth, you can find a short piece of DNA that can tell you what it is," said Johannes Vogel, keeper of botany at the Natural History Museum.

Dr Vogel said that Britain was the best place to do such a preliminary study. "We have a good knowledge of what surrounds us. If you go into a tropical rainforest, how do you know how many ferns you should find? For the British Isles, we know it has to be 85."

Reliable identification is crucial in monitoring biodiversity and the effects of climate change around the world in addition to finding new species in unexplored areas. But DNA barcodes would also prove invaluable in unexpected places: police could use barcodes to identify fragments of plants or seeds at a crime scene and customs officers could better monitor the illegal trade in endangered plants.

Modern botanists identify flora using methods that their 19th century counterparts would recognise: plants are identified by the shape of their leaves, for example, or the types of flowers they produce. It is not only a labour-intensive technique, it can be difficult and give rise to mistakes.

Peter Hollingsworth, head of genetics and conservation at the Royal Botanical Gardens, Edinburgh, said that working out the biodiversity of a given area is often a difficult task for taxonomists. "Some species need material to be in flower to identify it; if you've got juvenile material, it's very difficult to know what you're working with," he said.

In a similar project to identify animals, scientists came up with the idea of using a fragment of DNA in the mitochondria of the body's cells, transferred directly from the mother. But in plants mitochondrial DNA does not mutate rapidly enough so the first problem for the project has been to find some DNA that could be used as the barcode.

Robyn Cowan, project manager for DNA barcoding at Kew Gardens, west London, said: "What we're looking at is the chloroplast genome to settle on which one would be suitable to use as a barcode." Chloroplasts, which help plants convert light into energy, have their own DNA and different species have different profiles.

Barcoding would be useful to biologists in forensics, in regulating the safety of herbal medicines, and in monitoring the trade in endangered species.

"If you would have any piece of plant fragment that contains DNA, be it a pollen grain on a shoe in forensics or a flower, you could come up with what it is, where it's likely to occur," said Dr Vogel. "If somebody brings in a crop

variety that is prohibited how does a customs officer know? Barcoding would provide quick answers."

A crucial element would be in helping to find new species. "There are probably all sorts of species hiding away in the flora," said Dr Hollingsworth.