

Screening plants for potential natural products

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In vitro cultures at the Institute of Cell Biology and Genetic Engineering, in Kiev, Ukraine showed enough biodiversity to serve as a faster, cheaper and more stable alternative to intact plants for natural product screening.

Humans have been making use of plants for as long as there have been humans and plants. The actual cultivation of plants for food and other products began with the Neolithic Revolution some 12,000 years ago and has been evolving ever since. Products derived from plants today span a wide range of applications, encompassing foods, materials, medicines, fuels and so on. Despite all of our technological advances, however, screening plants for potential products is still primarily done the old fashioned way – growing intact plants in nature, botanical gardens or greenhouses then subjecting them to tests. Conventional wisdom has held this to be the only way it can be done as in vitro cultures lack the ability to accumulate specific compounds that can be found in intact plants. As often proves to be the case, conventional wisdom appears to be wrong.

Tamas Torok, a microbiologist with Berkeley Lab's Earth Sciences Division, served as the principal investigator for an international collaboration that demonstrated in vitro biodiversity is sufficiently broad enough to be used for natural plant product [screening](#). In a study conducted at the Institute of Cell Biology and Genetic Engineering, in Kiev, Ukraine, the collaboration carried out reproducible screening and genomic analysis for insecticidal and fungicidal activity on 1,200 of the more than 2,000 plant cell lines the Institute maintains in culture. The screening of these cell lines, which represent diverse geographic regions, climates and soil and growing conditions, revealed a wealth of natural compounds with potential applications for crop improvement and protection.

"Screening in vitro cultures for biological activity is much faster and more economical than working with intact [plants](#), and also provides much greater stability in the source material," Torok says. "Plants in nature may change over time while cell and tissue cultures are maintained under highly controlled conditions. As an additional benefit, endangered plant species do not need to be sampled time and again."

The results of this study have been reported in *Industrial Biotechnology* in a paper titled "Screening Plant Biodiversity In Vitro for New Natural Products." In addition to Torok, other authors are Nikolay Kuchuk, Valeria Belokurova, Nadia Matvieieva, Anton Peterson, Maksym Yu Vasylenko, Irina Kurchenko, Lubov Kurbatova and Jennie Hunter-Cevera.

In their *Industrial Biotechnology* paper, the authors report that "plants, including rare species, can be collected in very small quantities, introduced into in vitro culture, and propagated into quantities sufficient for any kind of screening." Kuchuk, the lead author, spent months at Berkeley Lab working with Torok, who likewise, made several trips to Kiev during the course of the study.

More information: "Screening Plant Biodiversity In Vitro for New Natural Products." Kuchuk Nikolay V., Belokurova Valeria B., Matvieieva Nadia A., Peterson Anton A., Vasylenko Maksym Yu, Kurchenko Irina M., Kurbatova Lubov E., Torok Tamas, and Hunter-Cevera Jennie C.. *Industrial Biotechnology*. October 2014, 10(5): 363-368. [DOI: 10.1089/ind.2014.0015](https://doi.org/10.1089/ind.2014.0015)

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