PIERLUIGI LONGO

Why mine for metals when we can cultivate them instead, asks **Katia Moskvitch**

Good to grow

ALAN BAKER squatted to get a closer look at the delicate white flowers that shouldn't have been there. He knew that the soil in that part of England's Peak District was laced with metals toxic to most plants. Yet here, in the desolate surroundings of an old lead mine, he had found spring sandwort flourishing.

That was 45 years ago and the flowers that Baker spotted on his hike have guided his career as a plant scientist. Over the years, he and his colleagues have shown how some plants can take up certain metals in such large quantities that it is possible to "grow" a crop of metals. The idea could help regenerate landscapes blighted by mining and help farmers improve poor soils. And with metal prices soaring amid ravenous global demand for diminishing resources, it might even become a mining technique in its own right.

Phytomining, as the approach is known, may be about to hit pay dirt. A US patent covering the idea is set to expire next year, and that could allow the technique to blossom, giving metal-loving plants plenty of scope to transform the landscape.

When Baker came across the carpet of spring sandwort, he was a 20-year-old biology student at Imperial College London. Realising how unusual the find was – people have known for centuries that metals and plants don't usually mix – he decided to combine his love for ecology with his childhood fascination with metals by doing a PhD on how plants cope in metal-rich environments.

It was the early 1970s, and more and more countries were beginning to tackle the environmental consequences of mining. In the UK, researchers were intent on finding metal-tolerant grasses that could be grown on contaminated soils to conceal the underlying problem, says Baker. He wanted to try something different: to discover plants that wouldn't just tolerate metal, but suck it up from the ground and lock it into leaves.

On the other side of the Atlantic another young scientist, Rufus Chaney, had a similar idea. Chaney was based in Beltsville, Maryland, where he was working for the US Department of Agriculture (USDA) on using plants to decontaminate minefields and brownfield sites.

After early experiments with farm crops like corn (which didn't work), he began to scour the scientific literature. He came across research by the renowned geochemist Robert Brooks and his colleague Roger Reeves on the nickel-accumulating ability of some plants from the island of New Caledonia in the Pacific Ocean. Slowly Chaney unearthed more and more evidence that certain plant species just loved to take up metals.

In 1979, he presented his findings at a conference in Los Angeles and put forward the idea of phytomining. Sitting in the audience was Baker, on his first conference trip abroad. The two researchers talked heavy metal over a beer and vowed to collaborate.

While Chaney continued his research in the US, Baker criss-crossed the globe on the hunt for "hyperaccumulators" – plants that naturally absorb metals in large quantities. Wherever he went, he discovered new examples. On the islands of Palawan in the Philippines, for example, he stumbled upon an astonishing shrub. "The soils where it was growing were extremely enriched in nickel," says Baker. "We cut the stem, and bright green liquid started pouring out of it." The plant's sap was a hefty 9 per cent nickel. Baker's team called the plant *Phyllanthus balgooyi*.

"The shrub was astonishing – its bright green sap was a hefty 9 per cent nickel"

By 1992, Chaney thought that phytomining was ready for prime time. He and Baker started work on phytomining nickel with Scott Angle, then at the University of Maryland in College Park, and Yin-Ming Li, a plant breeder from USDA. They even found sponsors – a company called Viridian Environmental, backed by a family of lawyers in Houston, Texas, called the Nelkins. "They were looking for some idea relevant to the environment that might make money," recalls Chaney. ›