



CHEMICALS OR ORGANIC?

DR. KAREN O'HANLON'S NEW STRATEGIES
OF FERTILISATION IN BONSAI

by Gil Marriner

Species: All

Phases: All

Topics: Fertilizing bonsai, utilizing microorganisms, avoiding chemical fertilizers and pesticides, advantages of organic and sustainable methods

Scene: Europe

As bonsai practitioners, we are perpetually refining our skills - seeking not only improved aesthetics but also stronger, healthier trees. For many years, I followed a familiar path: investing heavily in chemical fertilizers and pesticides, often with disappointing or short-lived results. Eventually, it became clear that there had to be a more intelligent, sustainable approach.

That turning point came almost by accident. One of my students mentioned a relatively new Irish company, Probio Carbon, whose products were based on microbial biology rather than conventional chemistry. The company is led by Dr. Karen O'Hanlon, who holds a PhD in microbial genetics and a BSc in biological science. My curiosity was piqued.

After watching several detailed discussions by Peter Warren (Saruyama Bonsai, UK) on the application and benefits of these products, I decided to test them myself. They are not, as with anything in bonsai, a miracle solution. However, after more than three years of consistent use, I have observed clear improvements in overall tree vitality, colour, and - perhaps most importantly - resilience to disease. In several cases, trees that were in serious decline recovered to full health.

One example stands out. I acquired a Japanese white pine from an estate sale and, upon repotting, discovered extensive root loss, either from rot or previous heavy-handed work. The tree was clearly in trouble. I repotted it into fresh substrate and, aside from basic care, relied almost exclusively on Probio products. Three years later, the pine is thriving, with strong growth and notable back-budding, even on older wood.

After years of correspondence, Dr. O'Hanlon and I finally met in person at the Trophy in Belgium. What follows is an edited excerpt from our conversation, which I hope will encourage bonsai growers to reconsider how they approach fertilisation and plant health.



1 - Mountain pine (*Pinus mugo*) in 2017. It is obvious that it was not in the best of health.



2 - In 2026 the same pine could be exhibited in perfect condition at the Trophy in Belgium and even received a nomination. Together with Probio Carbon CEO and owner Dr. Karen O'Hanlon (on the right) I was delighted with the outcome.



3 - In 2022, I couldn't quite believe my eyes when I first took this **Japanese white pine** (*Pinus parviflora*), which I had just received, out of its original pot. It was questionable as to whether or not it would survive at all. It had hardly any root system and no visible mycorrhiza.



4 - What a nice surprise! When repotting 4 years later, after using primarily Probio products, the situation had completely changed.



5 - The root system was healthy and greatly improved.

An Interview with Dr. Karen O'Hanlon

What sparked your interest in bonsai and its unique challenges compared to general horticulture?

I was exhibiting microbiological alternatives to pesticides at a horticultural show in Ireland in 2019. Michael Guerin of Búdán Bonsai attended and became interested in the potential of microbes for bonsai cultivation. After testing them on his own trees with promising results, he recommended the products to Peter Warren. That feedback from experienced bonsai professionals was the catalyst for developing a line specifically for bonsai.

What problems are Probio Carbon products designed to address?

The range evolved directly from the needs of bonsai growers. With guidance from Michael Guerin, Peter Warren, Ian Young, and Ray Egan, I learned which diseases, stressors, and aesthetic goals were most relevant. I then selected and combined microbes based on the metabolites they produce, aiming to stimulate specific, desirable responses in the tree. Danú was developed first as a general probiotic to support root health, reduce internode length, and provide antifungal benefits. Later, growers expressed the need for a stronger natural fungicide, which led to Marú, a *Bacillus*-based formulation. Given the wide range of species grown as bonsai, feedback from users has been invaluable in refining these products.

Root health is a major concern for bonsai growers. How do your products address this?

All Probio products are designed with root health in mind. The microbes in Danú promote root hair development, improve nutrient uptake, and support nitrogen fixation. A healthier, more active root system is the foundation of long-term bonsai health.

How should growers integrate these products into their routine?

Danú is most effective when applied once in spring and again in summer for species with a second flush.

Marú is used as a preventative or treatment for fungal diseases and should be applied when foliage is present, or in autumn for conifers to prevent overwintering pathogens. Biochar is best incorporated during repotting. Seaweed (Marú) and fish extract (Iasc) can be applied throughout the growing season. CalMag is applied early in the season to correct calcium and magnesium imbalances caused by water pH or repeated seaweed use.

Can you briefly outline the product range?

Danú: A three-strain bacterial root drench promoting antifungal activity and induced systemic resistance without excessive growth.



Enriched Biochar: Biochar inoculated with *Bacillus subtilis* to improve nutrient availability, water retention, and soil pH.



Marú: A foliar spray containing *Bacillus simplex*, *B. amyloliquefaciens*, and *B. subtilis*, supported by Rhizobia.



Iasc: A fish-based fertiliser providing balanced nutrition and enhanced microbial activity.



Mara: Cold-pressed Irish seaweed combined with liquid biochar and nitrogen-fixing bacteria.



CalMg: Developed to address calcium deficiencies, particularly in soft-water regions.



Probio Carbon Instructions for Use

When using Probio Carbon products, there are a few things to keep in mind:

- The biochar should be mixed into the substrate at a maximum of 5% when repotting. If you want to use it on an already potted bonsai, just remove a bit of the substrate and work it in with a chopstick.
- For the liquid products, it is recommended to use either rainwater or tap water that has been left to stand for at least 24 hours. If you use tap water, make sure that any water softening systems are switched off. Additives such as salt can be harmful to plants.
- Use a clean spray bottle that has never been used for chemicals such as pesticides, in order not to destroy the organic composition of the products. A sprayer is preferable to a watering can for more precise and economic application.
- For ease of use, a battery-powered sprayer can be used (ca. €50, a worthwhile investment).
- These purely organic products have a limited shelf life. Especially in summer they should be stored in either a refrigerator, or in a cool dry location.
- Do not, under any circumstances, use additional chemical fertilizers as they will destroy the organic substance. Organic fertilizers like Bio Gold or Saidung, on the other hand, can be a good supplement.
- The application of Probio Carbon fertilizers is very simple: one week Seaweed Extract (Mara) is used, the following week Fish Extract (Iasc). Spray it directly into the substrate until water runs out of the bottom of the pot. The foliage can also be misted, but not in direct sunlight since it may cause leaf damage.
- Probio Carbon's concept, with its microorganisms and organic products, brings about a long-term positive change. Immediately visible results are not to be expected, but that is rarely the case with bonsai anyway.

How does this approach differ from conventional fertilisers?

The microbes used are isolated from Irish soils and cultivated individually before being combined for specific purposes. These microbes produce compounds that trigger phyto-hormonal responses, which the tree itself regulates. Unlike chemical fertilisers and fungicides, microbes can reproduce and establish themselves within the pot environment, reducing the need for constant reapplication.

Can growers still use chemical fertilisers or fungicides?

Yes, though organic fertilisers are preferable. Chemical fungicides should be a last resort. If they are used, it is important to reintroduce beneficial microbes afterwards with Danú or Marú, as chemical treatments will also destroy beneficial organisms.

What common mistakes do you see regarding soil and plant health?

Overcomplicating things. Using too many products simultaneously can create unintended interactions. Bonsai growers are generally patient, and that patience is well suited to biological, long-term solutions.

What is your view on adding mycorrhizae to bonsai soil?

Mycorrhizae are highly species-specific and typically establish at seed germination. Adding general mycorrhizae later often has limited effect, particularly once the original fungal network has been severed.

Finally, what excites you about the future of bonsai cultivation?

Across agriculture, there is growing awareness of the environmental cost of excessive chemical use. Probiotic approaches are proving beneficial not only in soils, but also in human and animal health. Bonsai growers are beginning to adopt similar thinking, and many professionals across Europe are already seeing the benefits. I enjoy working with this community - bonsai practitioners ask thoughtful questions and genuinely want to understand the science behind what they do. In bonsai, as in nature itself, lasting results are rarely achieved through force. A biologically informed approach may not offer instant gratification, but it provides something far more valuable: balance, resilience, and long-term health.

For more information, visit

www.probiocarbon.ie



6 - Up to 5% of biochar can be added to the repotting mix or added to an already potted tree as well.



7 - In this picture, the diluted root strengthening product Danú, which contains three strains of beneficial microorganisms, is applied to a freshly repotted bonsai using a watering can. However, application with a battery-powered sprayer would be more economical.