Endangered foods – Yes! We Have No Bananas!

This hit song from the 1920s reflected a shortage brought on by the rapid spread of a lethal disease that was wiping out the vast banana plantations across Central and South America.

Originally regarded as an oddity and a luxury, with advances in reliable shipping and refrigeration, bananas soon became everyone's fruit of choice, even replacing the apple in popularity. This growing trade was almost entirely based on a single variety, the Gros Michel or 'Big Mike'. Larger and by many accounts better tasting than the bananas of today, it was, like them, seedless and tolerant of long-distance transport.

Unfortunately, Gros Michel was also highly susceptible to Panama Disease, a virulent wilt caused by the Fusarium oxysporum fungus. As its spread wiped out the original plantations, new areas were planted and the immediate shortage eased. But the disease continued to advance and by the 1950's it had annihilated most of the Gros Michel plantations in the world.

Enter the Cavendish

The banana industry was in crisis. They needed a new banana and thought they had found the answer in the Dwarf Cavendish, the variety synonymous with our idea of bananas today. It was wonderful: seedless, able to be transported long distances, consistent in taste, and best of all, apparently immune to Panama Disease. Perfect! To meet increasing demand, thousands of acres of Cavendish bananas were planted all across the tropical and subtropical world, quickly dominating the desert banana market.

And then the plants began to die.

Initially it seemed they were succumbing only where cooler winter temperatures stressed them but soon plants were failing even in tropical areas such as Malaysia. It took several years to identify the problem: that old enemy, the fusarium wilt! Alas, while the Cavendish is immune to the strain that destroyed

Gros Michel, it is **not immune** to TR4, a new, even nastier strain of the same pathogen. TR4 has spread to many parts of the world and is now wiping out Cavendish plantations, just as the original Panama strain destroyed Gros Michel. And there is still no effective remedy. So far TR4 hasn't made it to the Americas, but given modern travel patterns, it is only a matter of time before it reaches our hemisphere and the Cavendish vanishes.

So once again, the hunt is on. Growers are seeking another replacement, one resistant to both strains of F. oxysporum (plus another fungal nasty, Black Sigatoka) **and** meeting all the other requirements of commercial fruit production - not a simple task.

But the problem doesn't end there.

Bananas are actually a giant grass. There are hundreds of varieties in existence, most descended from two wild species, Musa acuminata and Musa balbisiana, in various ratios. After the fruit matures, the stem is cut down causing the base to produce suckers. These are then cut off and replanted but unfortunately this means they're genetically identical clones. Once a pathogen has overcome their defenses, it can quickly wipe them out!

As disturbing as this threat is to our much-loved bananas, a much worse possibility is that this more virulent form of fusarium could also wipe out the Cavendish's starchy plantain cousins. Ranking fourth as a source of human calories worldwide, the disappearance of plantains could be truly disastrous.

Unfortunately for breeders the best-loved banana cultivars are triploid, having three sets of chromosomes, which makes them infertile. On the plus side, that's why they don't have seeds but it also makes them impossible to breed from. Worse yet, even fertile varieties tend to suffer from low seed set and poor viability.

Various breeding programs have been working on this replacement problem for many years. One program has resulted in a number of new varieties but the fruit

lack acceptable shelf-life: they're fine for local consumption but unsuitable for our send-it-half-way-round-the-world expectations of eating bananas in cold climes.

Some authors suggest that Genetic Modification (GM) may provide the only answer. This involves the introduction of genes from totally unrelated sources (even fish!) to create disease resistant varieties. But fungal diseases have generally proved unresponsive to GM techniques and regardless, the resulting variety must still have decent taste, tolerance to shipping and easy growth habit. The fruit must also be acceptable to markets around the world, another potential hurdle for GM solutions.

Will an answer be found? Will we expand our banana palate and try other species? Or will we someday be singing the no banana blues once again?