

# Biotech, the environment and the three Ps

To answer your first question: the three Ps in the title stand for people, profit and preservation. I must admit that when I was asked to participate in a discussion on 'The Biotechnology Industry and the Environment' at the recent BioVision conference in Lyon, France, I did not immediately think of the three Ps. At a factual level, the biotechnology industry seems to be environmentally friendly and non-polluting, especially when compared with the chemical or other traditional industries.

But the sad fact is that the environment is under assault from many human actions, first and foremost rapid population growth, which provides a different platform from which to view its interactions with the biotech industry. With the unavoidable increase in the demand for food and a mounting need for arable land on which to grow it, genetically modified (GM) crops could be one source of relief for both humanity and the environment. Indeed, the use of GM crops is increasing at a rate of about 5% per annum, particularly in developing economies. Several hundred field trials are now underway to test the efficacy and safety of a wide range of species.

In addition, human industrial activities have polluted large areas of land. Nature, through various mechanisms, is able to deal with many such toxins in the environment, as Peuke & Rennenberg describe in this issue, but it is not always efficient enough to reclaim this land in a reasonable timeframe. GM organisms tailor-made to tackle specific pollutants are, on paper, much more effective and efficient. And yet, in Europe, GM organisms are considered as controversial as embryonic stem cells or the use of animals in research. The potential contribution of the biotech industry towards feeding people and cleaning up the environment is held ransom by the precautionary principle, which demands that, regardless of its possible benefits, a new

technology should only be introduced when there is a guarantee that no risk will arise. However, as the Nuffield Council on Bioethics noted in their discussion paper on the use of GM crops in developing countries, the decision to do nothing also harbours risks—and the risk for many people in the poorer parts of the world is very real: they will starve.

Reflecting on this combination of food, the environment and people leads rapidly to the three Ps, and the question of how biotechnology should be used gives rise to quite different answers depending on one's perspective. In Africa, millions of people still suffer and die from starvation and infectious diseases. Consequently, the challenge to overcome malnutrition and improve healthcare is a clear primary objective of policy makers. When assessing options, the focus of primary relevance would therefore be on the first P: people.

Some months ago, I was in Jordan, where food and healthcare are amply provided, but where the economy is weak and the annual income per person is low. To improve the quality of life for its citizens, Jordan now plans to invest in biotechnology, among other things, as a means for economic development. Clearly, for Jordan and other countries that are trying to catch up to economically more advanced nations, the focus when making policy choices is on the second P: profit. Of course, at the level of companies rather than countries, profit is usually associated with shareholders' dividends. But in a global economy, policy choices ideally should not focus solely on maximizing profits, as this might counteract the focus on people elsewhere. For example, decisions on research and development topics in Philadelphia or Basel may mean that vaccines are not developed, particularly because technological barriers are too high for those who need vaccines to enter these or related fields.

In a strong economy with quality healthcare and a high standard of living, there is the luxury and perhaps the imperative to look at the third P: preservation. From this perspective, the goal is to preserve the world, the environment and nature for future generations to come. Unfortunately, concern for the environment has various meanings; natural approaches are often lauded even when ineffective, whereas 'unnatural' solutions, such as GM organisms, are vilified. On balance, by limiting the processes we use, the consequences for the environment may be negative. The consequences for people, particularly in the developing world, may also be negative, but this distant problem is often of tertiary relevance.

In our globalized world, the decisions of policy makers in European capitals or in the boardrooms of leading industries can create an imbalance due to the deference given to the three Ps. There is no mechanism to diminish this, as politics are local and all decisions are made with an awareness of the neighbouring community. What we can hope for is greater consideration for the needs of others and an awareness of the domino effect. Blocking field trials of GM plants in well-fed countries can have an impact on the availability of rice elsewhere. The emphasis of research on superficial improvements to well-being, rather than on fatal diseases, can further distort social injustices worldwide. The lack of attention to the environment by misguided deforestation has consequences for people far removed from those areas. There is a clear need to find a balance for these varying interests. The three Ps are three perspectives that need to align rather than conflict with each other. This is easier said than done, but surely this is the real challenge for world and business leaders.

---

**Frank Gannon**

doi:10.1038/sj.embor.7400443