Hydroponics

More than just adding water

A method of growing fruit and vegetables that needs little land, uses two-thirds less water, and increases productivity seven times. Too good to be true? Not quite, but it asks more of you.

Photos Peggy Bradley

Science on the street: three growing beds will yield salad for a family. A yard full of herb beds became a business in Dakar. Start-up costs: US $30.

At a demonstration plot at the Manicaland Agricultural Show in Zimbabwe in 1997, 50-year old Oliver Waziweyi showed off his 'poor man's garden', according to a report in The *Manica Post*. Using hydroponics—or growing food in chemically-enriched water—he explained that one needs neither land nor soil. His garden occupied just one square metre of land, and had ten strawberry plants, four peas, ten spinach, six covo, one pineapple, six shallots, ten carrots, four herbs, two cabbages, three lettuces and several flowers. The plants were growing in bamboo sleeves, with four centimetres of water in the bottom, and requiring just five litres of water a day.

A very ancient medium

Hydroponics is also a rich person's technology, used increasingly by astronauts on missions in space. It is a historian's technology too, thought to have been behind the Hanging Gardens of Babylon several thousand years ago, and the floating gardens on Lake Titicaca high in the Andes mountains of South America. In more recent times, market gardeners in the Netherlands, a "hydroponic nation" composed of waves of refugees who took shelter in a very soggy wetland, have turned hydroponics into an intensive industry, pushing even exotic fruits out of nutrient-enriched water under the glare of 24-hour lighting.

Despite its ancient origins, it is only since the Second World War (1939-1945) that hydroponics have been properly researched and applied. As with many innovations, it was a war that stimulated the research, then into 'nutriculture', as part of Britain's Grow More Food campaign, and to feed military personnel in transit in such non-arable places as Ascension Island in the Atlantic and Bahrein in the Gulf. In the last 50 years, the technology has spread fast in wealthy arid zones, in the land-scarce industrial world, in southern Africa and in several ACP island states. The last decade has seen the technology simplified, for household use, indoors and in greenhouses, raising the question: why did we wait so long?

Essential: correct mix of nutrients

The simple key to hydroponics is the understanding that a plant does not need to grow in soil, as long as it can get from elsewhere the physical support and the nutrients normally provided by the soil. Indeed, soil is a least preferred 'medium', compared with clean water in a bacteria-free sterile container such as plastic trays and other non-corrosive units. This avoids soil-borne pests and weeds, and saves labour.

The thirteen nutrients which a plant needs, in addition to carbon dioxide and oxygen from the air, can be bought in mineral form, or—with great care—made in organic form. The nutrients, which include magnesium, sulphur, potassium and nitrate nitrogen, can be obtained in powder form and dissolved into water in an exact mixture. This is a much more precise way of feeding a plant than trying to calculate a soil's fertility and the amount of fertilisers to be added, having taken into account the tendency of a soil to leach water and nutrients away from plants. This need for precision can be met by buying—usually importing—ready-made mixes of nutrients. A realistic alternative is to make your own mixture, by very carefully following standard 'recipes' or formulae, with such detail as 293 grams of potassium nitrate for each 1000 litres of water. A very precise pair of fine-tuned scales is definitely part of the tool kit of the hydroponic farmer! Furthermore, since all nutrients in the water will be used by the plant, the water will be safer to recycle (heat at 85 degrees for 3 minutes) than run-off water with fertiliser residues.

More folksy, but in fact more complex, is the mixing of the same nutrients from organic sources, such as chicken manure, compost, worm casts, wood ash and straw. Most practitioners advise against this approach, if there is a possibility of using a mineral mix instead. There are risks of infection and contamination, and measures are less precise. Indeed, in the popular hydroponics movement, a vital area for attention is how to break down into simple detail the precise composition of an organic nutrient mixture, as has been done for the inorganic.

Stop the hostilities please!

It is this attention to detail that has fed the reluctance of much of the scientific community to promote hydroponics as a way to improve food variety and production, for home consumption or for resale. This is a shame. Surely the most magnificent science is not the most complicated and impenetrable, but the one which, despite its complexity, has been made simple—and affordable—to the man and woman in the street, in the field, in the backyard and—increasingly—on the rooftop. We should be making hydroponics more accessible, and more acceptable. It is everyone's right to grow, grow, grow!

To know more:
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