Floating Lettuce

Green vegetables thrive in water

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Refining horticultural techniques for green vegetables enabling an increase in production seems to have reached the end of the line a few years ago. Until an "outside-the-box" idea came up. If you cannot use land more efficiently, make use of an alternative water. It has already proven to be highly advantageous for other products. Most Dutch tulip flowers are grown on water and the same goes for crops. But for a long time it was out of reach for the outdoor growing of green vegetables.

Innovation

Improving cultivation techniques is an important part of the research carried out by Proefuin Zwaaiglijk, an agricultural research center carrying out practical research in the Netherlands. Both internal and external researchers come with innovative ideas, and Proefuin Zwaaiglijk (literally translated 'trial garden') in the Dutch village of Zwaaiglijk tests whether they are applicable and sustainable.

"In 2007, Proefuin Zwaaiglijk started growing vegetables in outdoor gutters, but that was not a success. Crops, such as Chinese cabbage, that produce a huge mass of roots, tend to block the gutters. Suddenly, parts of the plants are left without water. Moreover, the wind is a harmful factor of importance", explains Johan Koo, managing director of Proefuin Zwaaiglijk. "Together with Wageningen University and Research center, we started three years ago growing lettuce using the so-called Deep Flow Technique (2011). So far, with satisfactory results."

Deep Flow Technique makes use of water basins. Young plants are placed in a styrofoam board that floats in a 35 cm deep water basin. The roots drift freely in the water. The water contains the necessary nutrients. "During the past three years, it has never been necessary to refill the water, only the minerals the plants had used had to be replenished", adds Johan Koo. The system has been successfully tested with lettuce, iceberg lettuce, endives, Chinese cabbage, pak choi, Florence fennel, radicchio, parsley and blanched celery. Trials with cauliflower, broccoli, spinach and leek look promising, as do some flowers and perennials. Some vegetables can even germinate while floating on the water, such as lamb's lettuce and wild rocket.

Growers

The production increase in water basins is a huge leap forward for growers. "Take lettuce for instance: we can yield seven to eight times per year. For cauliflower, the yield is tripled. In soil, 25-30% of the iceberg lettuce plants do not reach maturity, whilst that is only 10% in water."

Another positive effect is that diseases are rare. "Mildew rarely occurs as the plants dry far more quickly on water than in soil. Furthermore, growing in water basins has the advantage that the quality of the soil and the weather conditions have become irrelevant. The plants do not have to compete with weeds, while the water forms a barrier for snails and slugs which they cannot bridge. And, of course, the plants stay cleaner as there are no mud sputters." However, it has no influence on other pests. Whether grown on water or in soil, aphids, catterpillars, cabbage root flies and flea beetles can attack the plants. It is also no safeguard against diseases such as Botrytis and Scelorchina.

On the other hand, it is far easier to automate the process of growing and harvesting than with a culture in soil. The plants are mobile and can float wherever they are pushed or pulled. For instance, to a shed where workers can harvest the plants in comfortable, dry circumstances. "And, of course, it is beneficial for the environment, as there are no fertilizers added to the soil."

One of the growers in the area has started a large-scale trial. Peter-Broens has six basins of 900 m² each to grow lettuce. And successfully! In 2011, Peter-Broens started as the first Dutch company with the production of various types of lettuce in outdoor water basins. Dick Peter believes water basins are the future. According to him, this method of growing is highly manageable and sustainable. It saves on labour, needs less plant protection chemicals and fertilizers, the CO₂-emission is reduced, the use of water is limited, as superfluous rain water can be stored to be used in dryer periods, and last, but not least, the working environment is dramatically improved.

Selection

The technique is also a valuable tool for seed companies as it makes selection easier. "The plants grow far more evenly and, moreover, they come up much quicker. Furthermore, diseases are relatively rare."

But it also offers a new breeding goal. Not every variety grows as well in soil as in water. Johan Koo: "Especially in endives and cabbages; there are significant differences between varieties, but we have noticed it in other crops as well. Some varieties definitely have a far better start than others. The growing speed, evenness and yield percentage vary. Developing varieties adapted to floating in water might be a future breeding goal."