

Addressing Water Contamination without Using Chemicals



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At a Glance:

HEPIA/EcaVert Vertical Green Biobed for treating agricultural effluents

- Environmental challenge: Reduce contamination of water from pesticides
- Technology solution: Treat effluents, diluted with water, by cycling them through a vertical “biobed” with mixture of soil, organic materials, and plants
- Regional technology dissemination: VG Biobed™ technology and associated know-how
- Transactions: Licensing, sales, joint research and development
- Key players: HEPIA, ecaVert, UNITEC, University of Neuchatel, distributor in Germany
- The technology “Vertical Green Biobed for the efficient degradation of pesticides” is accessible at www.wipo.int/green

The environmental challenge

Farmers and gardeners apply pesticides to their crops. Contaminated waters are released when preparing the solutions and when cleaning the tanks used to hold these chemicals. The resulting run-off contaminates local water supplies and pollutes the environment. As a consequence a range of pesticides may be detected in the water supplies anywhere such chemicals are used.

In response to this environmental hazard, countries such as Switzerland have passed laws requiring that effluents be treated to a specific degree prior to release. However, recent studies indicate that, in Switzerland, during periods in which crops are treated with pesticides, the levels of pesticides in the surface waters regularly exceed the limits prescribed by law. In other words, current methods of treating the effluents are not effective in preventing pollution.

Of growing use is the so-called biobed treatment method. This approach involves cycling effluents that have been diluted with water through a horizontal “bed” of soil. Sometimes the topsoil is covered with turf. Repeated cycling of the solution through the bed breaks down the chemicals and cleans the water; evaporation, together with activity by bacteria and other organisms in the soil, eliminates the effluents. However, this process requires a large space and suffers some drawbacks, and questions have been raised as to its effectiveness. Notably, the efficiency of the degradation process, on the one hand, and the efficiency of the evaporation process, on the other hand, work against each other. In other words, the amount of water needed to maximize the rate of evaporation can cause the horizontal biobed to become water-logged, which compromises the efficiency of the degradation mechanism.

Technology solution developed by HEPIA and EcaVert

A team at HEPIA, a School from the University of Applied Sciences of Western Switzerland, has improved upon the above solution, turning the bed on its side to create a vertical biobed and applying expertise in agronomy to develop a more effective filter. The Vertical Green Biobed (VG Biobed™) is a wall made of a steel structure containing a special substrate which was developed to enhance the biodegradation efficiency of pollutants by microorganisms and the good development of plants, the substrate is the know-how and the base of the VG Biobed system. Plants are grown on all four sides of the wall and the size and shape of the structure varies in accordance with the needs of the user (including volume of pesticides used annually).

Cycling diluted effluent through the soil of the results in degradation of the effluent without the drawbacks of the horizontal mechanism, notably use of space. Moreover, the VG Biobed is more efficient. It relies on “evapotranspiration” of water by plants, rather than simple evaporation, and soil activity, to clean the water; under this approach, efficient evaporation of the water and efficient degradation of effluents are thus no longer in opposition. The resulting process is up to ten times more efficient than treating effluents using a horizontal biobed. The VG Biobed, which is run based on an automated system with specialized software, can be used to treat more than 800 to 1000 litres of effluent per square meter of wall annually. As the VG Biobed does not use any chemicals, it is a “green” way to address the risk posed by pesticides to local water supplies. The VG Biobed is aesthetically pleasing, requiring minimal upkeep, and it could be deployed as fencing or as a garden feature.

The various innovative features of the VG Biobed including the automated monitoring mechanism and software, are IP-protected in Switzerland (trademark, patent). A patent application is pending at the European Patent Office (EPO). HEPIA owns the patents, which are managed by UNITEC, the technology transfer office of the University of Geneva, with which HEPIA is affiliated. The system’s effective functioning relies on the development of an appropriate mixture of minerals and organics compound, plus plants, as well as familiarity with the software that runs the monitoring mechanism. Thus, know-how is critically important to the successful deployment of this technology solution.

ecaVert Sàrl, a Swiss start-up company based near Lausanne, has been granted an exclusive license to the Swiss patent. ecaVert agronomists have engaged for more than 3 years in significant RD in order to refine, improve, and test the effectiveness of the technology, and they continue to carry out internal and collaborative RD on various aspects of the VG Biobed. The company is now beginning to deploy the technology on a commercial basis in Western Switzerland.

Regional technology dissemination

VG Biobed technology has been disseminated in Switzerland based on public-private collaboration. One ecaVert associate was part of the HEPIA team that developed the VG Biobed. His hire by ecaVert led to an initial transfer of know-how from the university to the start-up, alongside the transfer of the structure, software and other physical features under the terms of the UNITEC license. The ecaVert team continues to work closely with university researchers, including at HEPIA and the University of Neuchâtel. One joint research project (with HEPIA) aims to replace the soil mixture in the VG Biobed with readily available mineral and organic compounds like compost. This modification would make the VG Biobed easier to deploy and enhance the degradation of pollutants for each geographic location and type of chemical.

ecaVert is working with Swiss agricultural and wine producers to deploy the VG Biobed, and is in talks to export the technology to Germany. Sale of the VG Biobed in Germany, via a distributor, will constitute an additional transfer of technology and know-how as the VG biobed is deployed with a specially formulated substrate, which needs to be prepared in Germany by specialized companies. UNITEC manages the IP for the VG Biobed and is seeking licensees for the EPO patent (pending), potentially resulting in further dissemination as well as research to adapt and improve the technology.

Outlook for the Vertical Green Biobed

WIPO GREEN is one component of UNITEC’s strategy to support commercialization of this technology solution in Europe, through new licensing transactions and also through marketing it broadly to potential users. UNITEC has uploaded the VG Biobed to WIPO GREEN. In addition, as part of WIPO GREEN, a package of services is available to facilitate and support transactions involving this and other technology solutions.

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