



PHYTOBAC®

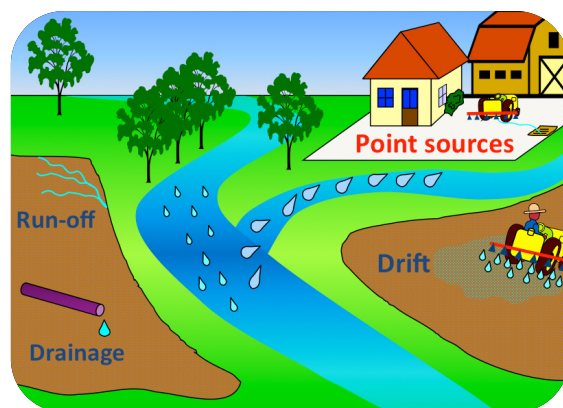
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PHYTOBAC® A MILESTONE IN WATER PROTECTION INTRODUCTION AND OPERATION MANUAL

The Phytobac® system is a filling and cleaning area for plant protection sprayers and fertiliser spreaders. It consists of an impermeable cleaning area, a controlled drain into a buffer tank and a downstream biological treatment.

- Phytobac® is a closed system for the biological degradation of PPPs
- Phytobac® prevents point-source pollution and protects water resources
- Phytobac® as a modular system is customer-oriented and tailor-made



Importance of Water

- Living rivers and lakes, unspoilt groundwater resources, a secured water supply and a functioning sewerage system are the prerequisite for an eco-friendly agricultural and economic development.
- Water is vital. It is unfairly distributed, timewise, and geography-wise.
- The threshold for plant protection products in drinking water basically corresponds to a zero-tolerance.
- To protect the environment, plant protection product residues are also unwanted in surface waters. Observe the conditions of use (e.g. German legislation NW 468 “drain requirements”).
- Point sources continue to pose the greatest risk when it comes to the introduction of plant protection product residues into water bodies. Thus, practice-oriented strategies and approaches for sustainable water management must promptly be developed.



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Sustainable Water Management

- To raise the plant protection product user's awareness for the challenges of water protection, is the first step towards an agriculturally efficient water protection scheme.
- The strategy must always be aligned with the operational processes in practice. A comprehensive water protection concept should consider all the above-mentioned work steps, which take place during the routine use of plant protection products and fertilisers.

Good Technical Practice

- In Germany, the internal and external cleaning of the plant protection sprayer usually takes place in the spray application area. The cleaning of sprayer equipment on an impermeable cleaning area with defined requirements like a wastewater trap and downstream treatment also form part of good technical practice and is thus legally supported.
- The system with the protected brand name Phytobac® as a filling and cleaning area constitutes an important component in water protection. It is a completely closed loop system, which sustainably prevents point-source pollution of surface waters.
- The German federal states action group "cleaning areas" in cooperation with the relevant committee of the National Action Plan „Plant Protection and Water Protection" recommend the following:
 - **The responsible authorities of the federal states are asked to positively assess the creation of cleaning areas with downstream bioremediation.**
- The German Institute for Civil Engineering (Deutsches Institut für Bautechnik DIBt) has classified the Phytobac® system as a system for wastewater treatment, which does not require a permit by the building inspection authority (like e.g. small wastewater treatment plants).
- Phytobac® is the only wastewater treatment plant, which fulfils the criteria and collects and micro-biologically degrades plant protection and fertiliser residues.

The Phytobac® system is a useful addition to competent cleaning when a high- pressure cleaner is used at the farm. The farmers selectively use the farm resources and hence optimize their operational processes.

Functional description

- The plant protection sprayer is filled in the cleaning area. Possible product leakages during filling are collected.
- During the cleaning of plant protection equipment small amounts of technical residues may emerge in the tank and lines. Adherent plant protection products are washed off. This type of wastewater (definition according to §54 (1) of the German Federal Water Act) has a thinning ratio of > 1:1000.
- The rinse water is collected in a sump pit and temporarily buffered in a special Phytobac tank. This "wastewater" is "safe" and cannot pollute waters anymore.
- The construction of a cleaning area requires large investments by the farmer. Thus, it must be possible to clean all agricultural machinery and equipment with the high-pressure cleaner in this cleaning area.
- For a technically secure separation of the different water circuits there is a downstream switch with a distinct display that was solely developed for this purpose by Beutech Agro ([see module 2: switch](#))
- Clean rainwater, oil-containing rinse water from tractors and equipment is led via an oil trap into the sewer, draining ditch or a biotope.



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Degradation of plant protection actives in a microbiologically active substrate

- The impermeable Beutech substrate container is filled with soil from the farmer's arable land. Thus, all the necessary micro-organisms that degrade the plant protection products are naturally present.
- The incorporation of chopped straw increases the biological activity.
- Exchanging the substrate is generally not required; it is an inherent part of the closed system.
- A transparent roof protects the substrate from too much rainwater, but allows the penetration of sunrays, which promotes the photolytical degradation of the plant protection products.
- A humidity sensor in the substrate constantly measures the soil humidity and systematically controls the moistening process.

→ This safeguards constantly good conditions for the micro-organisms.

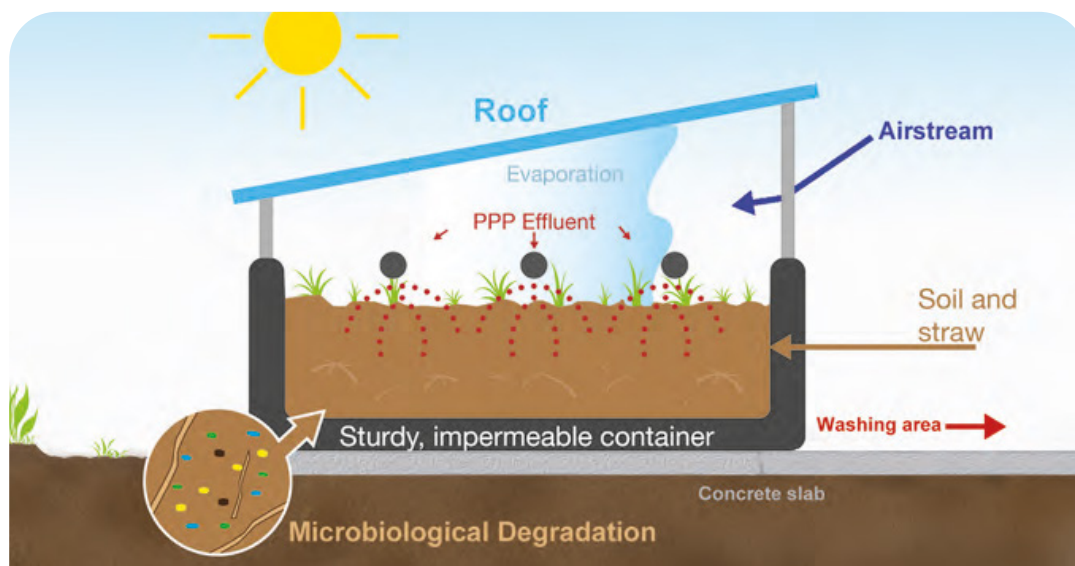
- The water content completely evaporates from the substrate's surface.
- A robust and dense vegetation increases the degree of evaporation thanks to the additional transpiration.

- Ideal conditions (wind, sun, vegetation) allow for an evaporation rate of approx.
- 4000 litres/substrate container/ year = 800l/year/m².

Integration of other relevant operational procedures into the Phytobac® system

- Filling and cleaning of fertiliser spreaders prevents introduction of nitrates, phosphates, etc.
- Sprayer filling with liquid fertiliser like UAN or liquid micro-nutrients.
- Rinsing water from seed treatment facilities, potato planting machines and granule spreaders.
- Rinsing water from beakers/ cans.
- Water from the washing machine for protective garment.
- Possible leakages during storage of plant protection products, micro-nutrients, or fertiliser.
- Connection to farm's own petrol station possible thanks to the system's operating mode.

→ Oil, lubricants, and diesel are also degraded in the closed Phytobac® system see trials of the Faculty of Agriculture in Wageningen, The Netherlands.



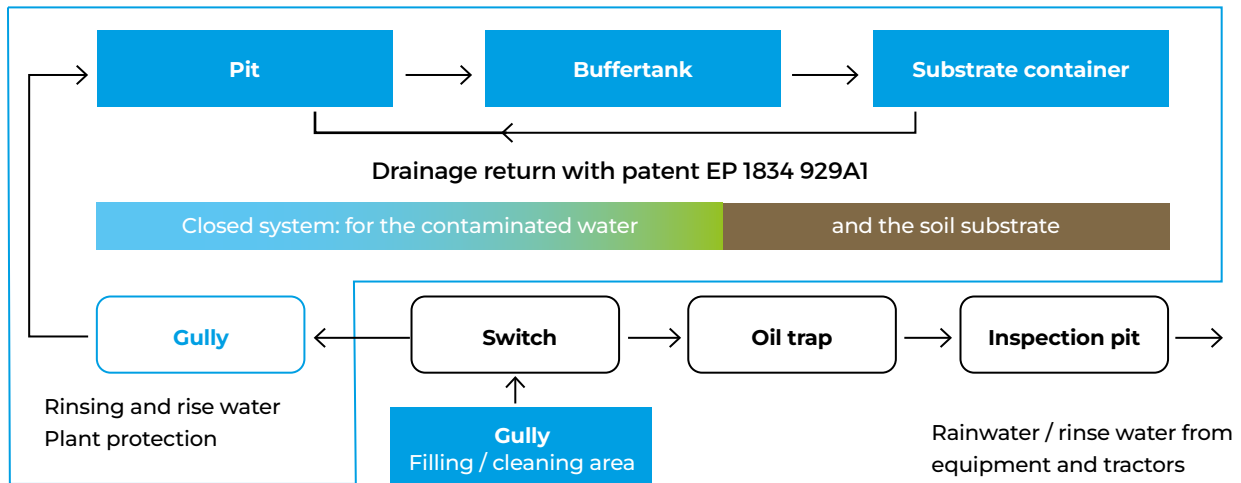


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Flow Chart of Closed Phytobac® Systems



Phytobac® System: modular, farm-specific, and customer-oriented

- The innovative Dutch company Beutech Agro from Steenwijk has further developed the Phytobac® system into a modular system with its agricultural know-how.
- The modules are aligned, constantly further developed, and supplemented according to the practical needs.
- The extremely flexible Phytobac® system offers solutions for both the manifold farm structures as well as the changing needs of the areas arable crops, vegetable and fruit production and viticulture.
- A viticulture project in the German federal state of Rhineland Palatinate was awarded with the Sustainability Award by the Service Centre Rural Areas (Dienstleistungszentrum Ländlicher Raum DLR) in 2016.

→ The modular system allows for special farm-specific solutions, which increases the acceptance levels.

→ Sound technical counselling “on site” contributes to more security, facilitates a swift project realisation, and lowers the costs for the farmer.

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