STABILITY FOR THE FUTURE

Stabilization of liquid manure by acidification with the SyreN system

VOGELSANG – LEADING IN TECHNOLOGY

VOGELSANG

Organic fertilization reimagined

Nitrogen conversion by sulfuric acid for reduced emissions

All around the world, everyone is talking about climate and environmental protection. Consequently, the agricultural sector faces strong pressure to exhaust all options toward reaching this goal. Reducing ammonia emissions is one example. Farmers also increasingly bear the burden of drastic price hikes for mineral fertilizers all around the world. Yet it's actually possible to protect the environment and use less fertilizer while achieving economic efficiency and increased yields. The SyreN liquid manure stabilization system from Vogelsang proves this bold claim.

Regulations governing how much liquid manure can be spread, and when, are intended to make fertilizer use as environmentally-friendly as possible. Moreover, the continuous refinement of spreading techniques makes liquid manure placement more precise than ever before.

In addition to the technical components for efficient liquid manure management, Vogelsang offers another solution: SyreN – a chemical process that achieves dramatically reduced ammonia emissions during liquid manure spreading by adding sulfuric acid. Liquid manure stabilization by acidification is an established procedure in Scandinavia for reducing nitrogen outgassing from liquid manure and increasing the value of the organic fertilizer. SyreN makes it possible to replace additional components of the mineral fertilizer with organic ones. With SyreN, you can save the environment and cut costs, all at once.

"Acidification of liquid manure is one of the most effective measures to reduce ammonia losses in livestock farming and farm fertiliser processing."

Kaupenjohann et al., 2019, in: Expert Reports on Acidification, German Federal Department of the Environment

Advantages of the SyreN system

- Fully automated dosing of sulfuric acid into the liquid manure stream
- Higher yields
- More bioavailable ammonium for plants
- Up to 70 % reduction in nitrogen losses
- Reduced odor nuisance
- Optimized phosphate availability
- Greater flexibility in spreading times
- Maximum safety and user-friendliness
- Simple and safe handling in a closed, self-regulating system
- Easily retrofitted on all common trailing hose and trailing shoe systems

Lower emissions, higher yield

Simplified compliance with limits and regulations – for your benefit

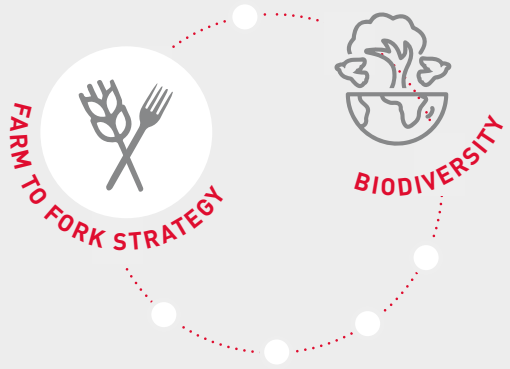
It's now scientific consensus: liquid manure acidification effectively reduces emissions on a huge scale. Accordingly, SyreN is becoming an attractive component for navigating the increasing regulations for liquid manure spreading.

Because of how it works, the SyreN system can achieve decisive optimizations in terms of nutrient utilization, and reduction in nitrogen fertilization. Yet there's no need to compromise on yield. On the contrary: studies by the Lower Saxony Chamber of Agriculture have actually demonstrated increased yield!

This is due to the higher ammonium concentration and improved phosphate bioavailability. In addition, the sulfur contained in the acid also becomes available to the plants as sulfate after spreading. This completely eliminates the need for an additional pass over the field to administer a supplementary sulfur fertilizer, such as ammonium sulphate nitrate (ASA). In times of rapidly rising fertilizer prices, this is an exciting opportunity to optimize costs.

EU Green Deal – a new umbrella for European climate protection

The EU Green deal is a general strategy to fight against climate change and pollution. It contains these fields of action amongst others:



Both fields have direct impact on organic fertilization and can be realized by the help of SyreN:

- Reduction of nutrient losses by 50 %, without affecting soil fertility
- At least 20 % reduction of mineral fertilizers

Official trials of puplic agricultural institutes confirm acidification has positive effect on yields

In a complex series of experiments conducted at different locations over a period of several years (2018 – 2020), the Lower Saxony Chamber of Agriculture has proven the yield -increasing effect of liquid manure stabilization by precise testing. In the study, the yield of winter grains achieved using various organic fertilizer spreading technologies was determined. The spreading methods examined were the trailing hose, trailing shoe and slot technology; each in a variant with and without acidification. With reference to a mineral incremental scale as an independent comparative value, the use of acidification results in more than a 20 % increase in the efficiency of fertilization of compared to a standard trailing hose method.

Note: Yield results depend on many factors and only serve as evidence of a positive trend.

Increased efficiency of fertilization compared to the trailing shoe method, without acidification	
Trailing shoe	+4 %
Slit equipment	+11 %
Trailing hose, acidified	+21 %
Trailing shoe, acidified	+23 %

Source: Results of a long-term study by the Lower Saxony Chamber of Agriculture

A perfect fit from front to back

The design of the SyreN system

Like all Vogelsang solutions, the SyreN system is as effective as it is user-friendly in terms of use and maintenance. The positioning of the acid tank in the tractor's front hydraulics ensures optimum weight distribution with maximum user-friendliness when it comes to replacing the IBC tank. And, of course, the control offers intuitive operation and can be combined with existing communication elements.

Design

Front unit

The front unit forms the heart of the SyreN system and is divided into various functional areas.

Central mount for IBC tank with sulfuric acid (approx. 850 liters)

- Easy replacement in just five minutes thanks to the integrated pallet fork
- Safe transport
- Non-drip special coupling made of stainless steel for connection to the acid supply system

Side tank for additive

- For the optional addition of nitrification inhibitors, for example, to the liquid manure

Two-chamber side tank with water

- For flushing the system
- Wash water

Optinal camera system for monitoring

- Two side cameras for improved visibility when turning
- Interior camera for correct recording of the IBC tank

Suction arm

- Integrated front suction arm for optimal integration into field logistics
- Pipe routing selectable via mudguard or cabin

Storage compartment for personal protective equipment and accessories

Mixing unit

This is where the chemical process takes place – the acid is injected into the liquid manure stream.

- Integration into the pressurized liquid manure line of the tanker
- Positioning behind the 3-way valve
- Compact installation dimensions (700 mm)

pH sensor box

- Compact integration within a hose line of the linkage
- Real-time pH measurement of the acidified manure

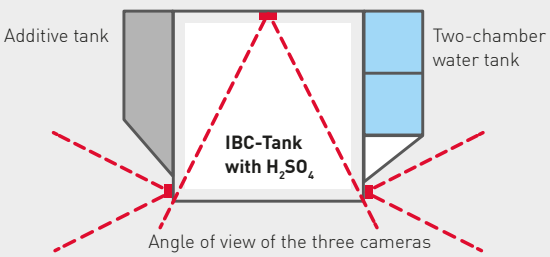
Control unit

Design

- Separate control
- Connection to the on-board electronics via ISOBUS

Optional data acquisition via Exatrek

- Optional communication via GPS/GSM telemetry
- Monitoring of location and work progress in the Exatrek app and web app thanks to Exatrek partnership



Schematic top view

Achieving success with the right pH value

Automatic acid dosing for optimized nutrient utilization

The pH value is the decisive factor in the stabilization of liquid manure by acidification. It defines the existing relationship between ammonium and ammonia and therefore serves to guarantee the success of low-emission liquid manure spreading. To ensure this, an economic optimum for the pH value is usually in the range between 6.0 and 6.5.

The initial pH value fluctuates significantly from farm to farm, and from plant to plant. It depends on many different factors. Digestate from biogas plants tends to have a pH value around 8.0, which is significantly more alkaline than cattle manure (usually around 7.0), for example. This has a significant influence on the quantity of acid to be dosed.

To ensure users are optimally prepared for success in every situation, SyreN offers two different spreading modes.

pH value fertilization

1. The user selects a target pH value of 6.5, for example. The system then continuously measures the pH value of the acidified liquid manure and regulates the acid dosage depending on the flow rate.

Sulfur fertilization

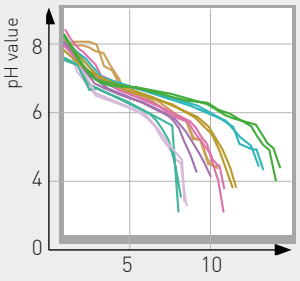
2. The user selects a defined quantity of acid to be dosed per cubic meter of liquid manure. The user can therefore expect a fixed quantity of sulfur to be spread. The system then regulates the process depending on the flow rate. The pH value is documented for information purposes.

Mixing unit: Liquid manure and acid mix together

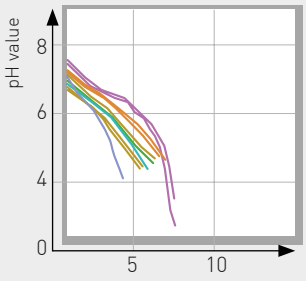
Opened front unit to accommodate the IBC tank

Not all liquid manure is the same: Differences in acidification behavior between different farm manures

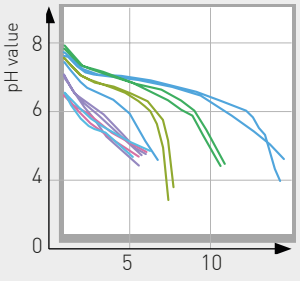
Digestate



Cattle liquid manure



Fattening pig liquid manure



The graphs show the great variation between different types of liquid manure and digestate with regard to acidification behavior

Acidic but safe

Technically mature and systematically safe to use

As the name indicates: sulfuric acid is corrosive and, depending on the acid concentration, it needs to be handled with care.

For maximum handling safety, the individual components of the SyreN system are equipped with intelligent safety features that ensure easy and safe handling of the acid.

Replacement of the IBC tank
To avoid contact with sulfuric acid, SyreN is based on a closed system. To replace the tank, all you have to do is loosen the special, non-drip coupling on the empty tank and reattach it to the new one. The storage compartment integrated in the front unit contains personal protective equipment in the form of gloves, apron and face shield.

Flush and wash
The two-part water tank on the front unit enables the system to be flushed after spreading. The other side of the tank is equipped with a tap for hand washing or rinsing off parts that have come into contact with acid.

Operator training for the SyreN system
Vogelsang expressly recommends that every user receive user training for the SyreN system. This explains how to use the system correctly, including the safe handling of sulfuric acid during use. Remedying potential faults and preventing hazards are also covered.

Proactive risk avoidance

For the benefit of the environment and your own safety, the greatest care must be taken when handling sulfuric acid. Various safety barriers ensure proactive risk avoidance.

Delivery and storage of sulfuric acid

- Qualified personnel with special protective equipment
- Double-walled IBC tanks
- Covered in the user training

Transport to the field

- Stable front unit
- Double-walled IBC tanks
- Covered in the user training

Replacement of IBC tanks

- Personal protective equipment
- Use of special non-drip couplings
- Safety barriers in the control unit
- Covered in the user training

Acidification during spreading

- Safety barriers in the control unit
- Covered in the user training
- Assistance from Vogelsang support in the event of fault messages

What we offer

We provide solutions in the following sectors:
AGRICULTURAL TECHNOLOGY, BIOGAS,
INDUSTRY, TRANSPORTATION, WASTEWATER

Our broad range of products and services

- Consulting and service
- Data management and control technology
- Disintegration technology
- Individually tailored solutions for special applications
- Pumps and pump systems
- Solid matter feeders
- Spreading technology
- Supply and disposal systems for railway, busses and boats
- Wet grinders and solids reduction as well as separation technology

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