

DEEPOT 32.1

Deep deposit fertilisation

Higher yields with 20 percent less fertiliser



"Deep deposit fertilisation is one of the most promising innovations for increasing the efficiency of nitrogen fertilisation and reducing emissions."

Quote: Dr. Markus Mokry , LTZ Augustenberg

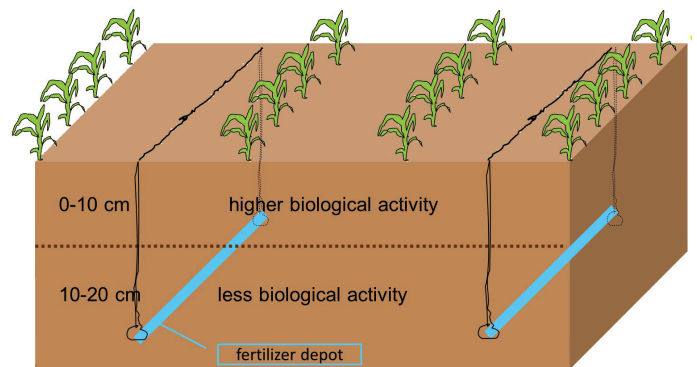
It's high time for new approaches to nitrogen fertilisers

New challenges for professional maize, potato, beet and rapeseed cultivation due to:

- The Fertiliser Ordinance and red areas
- Rapidly increasing prices of nitrogen fertilisers
- Climate change (droughts and heavy rainfall events)
- Climate and environmental protection (waterways, nature)
- Requirements for reducing the use of chemical pesticides and synthetic fertiliser stabilisers
- The problem of the acceptance of nitrogen fertilisers by the broader public
- Increasing demand for food due to a rapidly increasing global population

All of these issues require new, innovative procedures for organic and mineral nitrogen fertilisation. On the one hand, nitrogen emissions into the atmosphere (ammonia, nitrous oxide) and into drinking water (nitrate) must be reduced to a minimum, on the other hand, population growth requires ever-increasing yields.

Deep deposit fertilisation offers a solution to both these challenges. Depositing the fertiliser deep under the soil increases its efficiency by over 20%.



How does deep deposit fertilisation work?

Compared to surface application of nitrogen fertilisers with nutrient losses of up to 50% into the atmosphere, deep deposit fertilisation puts fertiliser in air-tight, hose-shaped deposits at a depth of 20cm. Fertiliser is only worked into every second row. The deep deposit with minimum tillage prevents the fertiliser from washing away during heavy rain. Low biological activity at a depth of 20cm and lack of contact between the deposit and the surface prevents the fertiliser from mobilising after several weeks. This makes it possible to apply all the fertiliser at once, either before, during or after sowing.

Deep deposit fertilisation is based on a solid scientific foundation

The horticultural basis of crop nutrition with deep deposit fertilisation was scientifically developed and proven 20 years ago with Cultan fertilisation. On the homepage CUL-TAN.de, the results can be seen at any time.

Interdisciplinary trials of agricultural practice and research have unanimously proven the advantages of deep deposit fertilisation:

- **Increases the economic efficiency of maize, potato, beet and rapeseed cultivation**

Deposit fertilisation makes nitrogen fertiliser almost completely available for crop nutrition with only a minimum loss of nitrate or ammonia and nitrous oxide.

Application rates can be reduced by a whopping 20% compared to surface fertilisation. The results from trials by the District Administration of Breisgau-Hochschwarzwald are impressive: Despite a 20% reduction in nitrogen application, maize yields increased on average by 8.1% over the seven year mean across all trial plots.

The saving potential presented by deep deposit fertilisation with 20% lower fertilisation costs and 8% better yields compensates for the disadvantage of narrower working widths compared to twin disc spreaders through significantly higher economic efficiency. Savings potential of 100 euros and more compared to surface application are the rule.

Economic consideration of the depot fertilization to grain maize in comparison to broad-surface fertilization on 28 practice fields 2017-2019

Mean value of 28 locations (field nos. <50-89) 2017 - 2019	N conventional (100% N)	N Depot (83% N)	Difference Depot vs. conv.
Grain yield dt / ha (86% TS)	109	117	9
Nitrogen fertilisation level kg N / ha *	150	125	-25
Yield EURO / ha (15 EURO / dt)	1.628	1.755	128
Nitrogen fertiliser costs EURO / ha:			
Urea without urease inhibitor (0,69 EURO / kg N)	-104	-86	18
Urea with urease inhibitor (0,77 EURO / kg N)	-116		
Alzom 46 (0,82 EURO / kg N)	-122		
Entec 26 (1,17 EURO / kg N)	-176		
Distribution (agricultural contractor) EURO / ha	-20	-60	40
Yield (N free of charge) EURO / ha			
Urea without urease inhibitor (0,69 EURO / kg N)	1.504	1.609	106
Urea without urease inhibitor	1.492	1.609	118
Alzom 46	1.486	1.609	124
Entec 26	1.432	1.609	178

* calculated with Nmin measured value according to Fertiliser Ordinance 2017

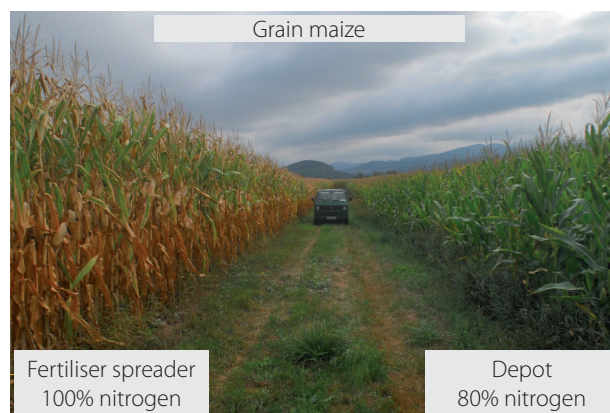
- **High precision application and high application rates right to the field boundaries**

RAUCH DEEPOT spreads valuable fertiliser right to the field boundaries with the precision of a pneumatic fertiliser spreader. With DEEPOT, underfertilisation of the field boundaries is a thing of the past.

DEEPOT uses the hydraulically driven metering wheels from the RAUCH AERO pneumatic fertiliser spreader. The high-performance metering unit permits an application rate of 400 kg/ha at 10 km/h (4-row machine).

- **Increases drought resistance by up to three weeks**

The deep deposit of the fertiliser in every second row means that roots grow deep and to the sides to reach the fertiliser. The positive effect: Root volumes increase by 50% compared to surface fertilisation. This increases crop resistance to drought by up to three weeks during dry spells.



- **Fertiliser doesn't wash away in heavy rain, and degassing loss is a minimum**

Even during the heaviest rains, the valuable fertiliser is safe in its depot under the earth. Minimum soil tillage due to extra-narrow injection blades and the airtight closure of the drills means emissions into the ground and surface water as well as the atmosphere are reduced to a minimum. Deep deposit trials by the InnoVAR project have shown that ammonia and nitrous oxide emissions are reduced by 95%.

- **Deep deposit fertilisation compared to injection wheel and underfoot fertilisation**

Cultan liquid fertilisation with an injector wheel (injection depth of 5 to 10cm) or underfoot fertilisation when sowing result in significantly higher nutrient losses due to the shallow placement of fertiliser compared to deep deposit fertilisation. Reducing the application without reducing yield does not make sense when using injection wheels or underfoot fertilisation method for maize.

- **High acceptance of deep deposit fertilisation by the wider public**

The immediate working in of fertiliser granulate means that no traces of fertiliser are left on the field or on paths. This removes a point of tension with local residents.

- **Less weed pressure**

The deep deposit in every second row means that weeds do not have access to valuable fertiliser.

A new level of nitrogen fertilisation

Deep fertiliser deposits – high fertiliser efficiency

The new DEEPOT deep deposit fertilisation machine from RAUCH increases both the efficiency of nitrogen fertiliser as well as the economic efficiency compared to twin disc spreaders, underfoot fertilisation or liquid fertilisation with an injection wheel.

Depositing fertiliser granulate deep in the ground and sealing the holes airtight reduces losses from degassing or washing out to a minimum. Saving potential of 100 euros or more per hectare compared to surface application with twin disc spreaders is the rule.

High impact and precise application

The DEEPOT hopper has a large volume of 2,200 litres (with an optional expansion to 3,200 litres), making it very powerful. The durable powder coating, stable frame construction with high-quality components and high proportion of stainless steel means that the machinery is built to last. The hydraulically-driven metering units from the AERO GT pneumatic fertiliser spreader permit precise application rates up to 400 kg/ha at a working speed of 10 km/h.

Flexible use with maize, potatoes, beet and rapeseed

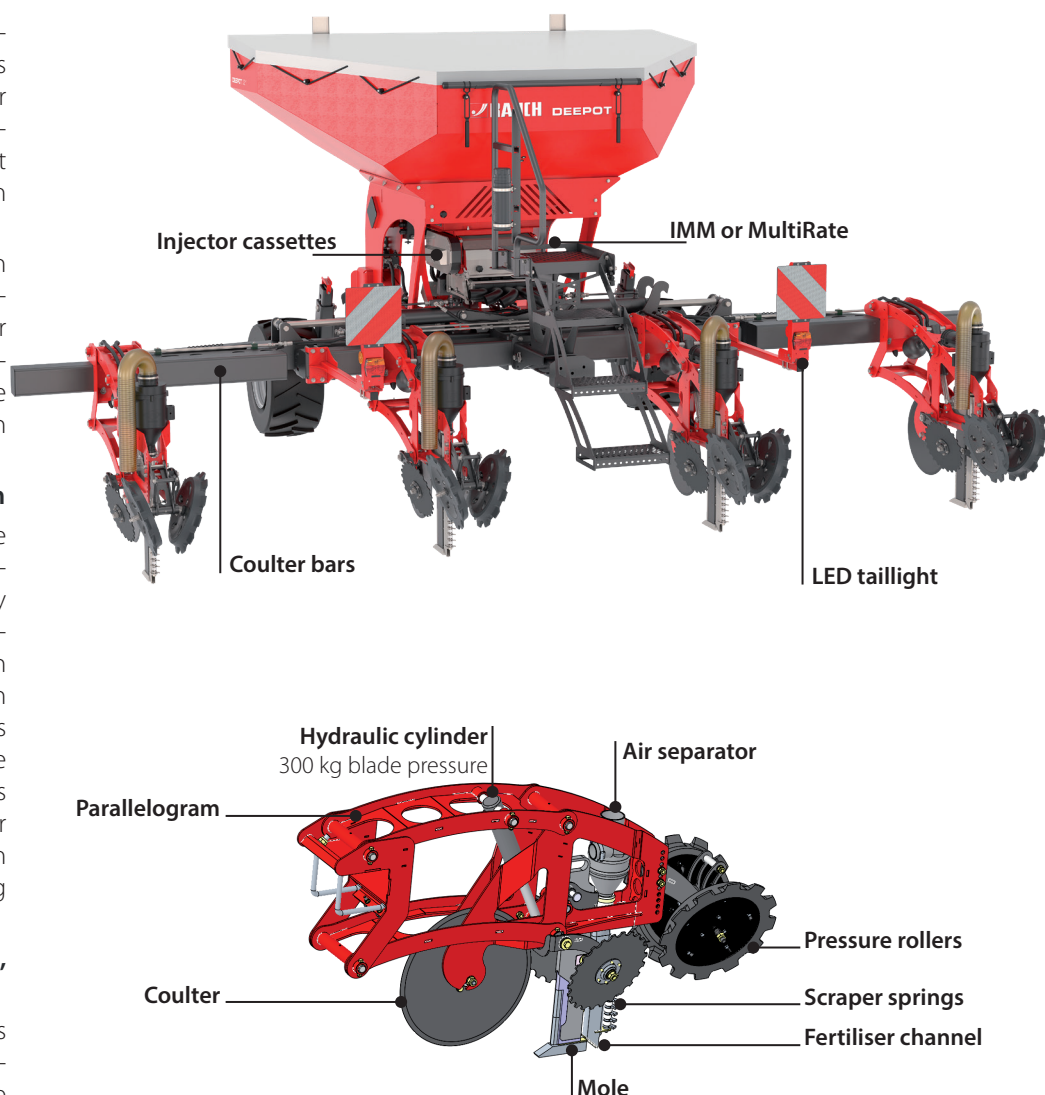
The hydraulically foldable coulters permit precise incorporation of fertiliser granules in 2, 3, 4 or 6 rows. The spacing between rows is adjustable between 1.5m and 0.75m. As fertiliser is only deposited in every second row, DEEPOT is particularly well-suited to row crops such as maize, potato, rapeseed and beet.

Fertiliser is pneumatically transferred from the metering units to the blades by means of a hydraulically driven blower.

Simple and refined setting

The blade pressure can be set up remotely to a maximum of 300 kg with the hydraulic cylinders in every parallelogram suspension of the blades. The depth of the incorporation can be simply and quickly adjusted between 10 and 25 cm using an ergonomic handle.

The large disc coulters open the drill and cut harvest residue. The extra thin blade with downpipe deposits the fer-



tiliser at the desired depth. The gentle opening of the drill keeps soil tillage to a minimum. The tempered torpedo tip gives the fertiliser deposit its final shape. Additional exchangeable and cured protective elements reduce wear on the blade.

Patented scraper springs finely crumble the edges of the slit. These allow the airtight closure of the injection slit with two V-shaped pressure rollers that function in the same manner as a zipper. This reduces degassing to a minimum.

Modern, future-proof ISOBUS electronics

DEEPOT is fitted with an ISOBUS job computer as standard, which is compatible with conventional ISOBUS

tractor terminals. RAUCH also offers a CCI 1200 or CCI 800 ISOBUS terminal, the latest tablet technology with a touchscreen. DEEPOT can be set and operated conveniently on a large, high-resolution display.

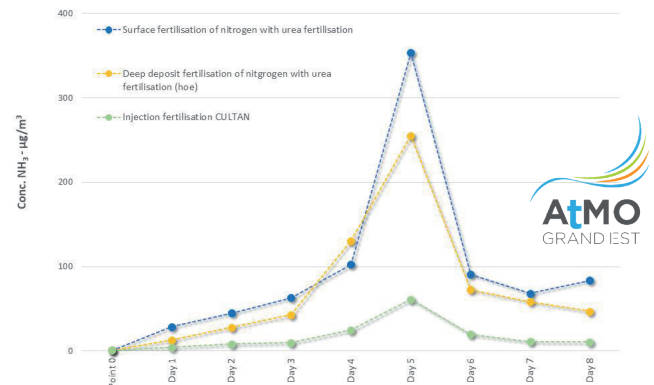
Hydraulic folding coulters and the standard illuminated LED warning signs permit the machine to be transported safely.

Technical data

Tank volume	2000 l to 3000 l
Number of rows	2/3/4/6
Row spacing*	1500 mm/1000 mm/750 mm
Blade pressure	300 kg per blade
Metering	Individual manifold metering/ MultiRate (hydr./electric)
Blower	up to 400 kg/ha at 10 km/h
Feeler wheels	Turbo S (hydr.)
Equipment extension	Adjustable track widths
Weight	1000 - 1500 kg**
Power supply	3 double-acting control units and return flow
Transport width	2.55 m**
Work area	10 cm to 20 cm
Pull force required	150 HP**
Transport dimensions L x W x H	(3.5 x 2.55 x 2.15)m**

* Corresponds to double crop row spacing,
e.g. 1500 mm x 750 mm crop row spacing

** Information without guarantee



Mean concentrations of ammonia within 24 hours during the first eight days after spreading across three maize plots in Schirrhein (67) (with different spreading technology).

Unit: $\mu\text{g}/\text{m}^3$

Clear advantages of the DEEPOT at a glance

- Astonishing economic and fertilisation efficiency: 20% less fertiliser with 8% higher yields
- High spreading precision right up to the field boundaries
- 50% more root volume means higher drought resistance and protection from the risks of climate change
- Avoid ammonia emissions that affect the climate
- Protection from nitrogen export after heavy rain
- Improvement of crop health through long-term ammonium nutrition
- Less weed pressure
- High acceptance of deep deposit fertilisation by the public
- Increasing interest from farmers



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aufgrund eines Beschlusses
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Projekträger Bundesanstalt
für Landwirtschaft und Ernährung

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