

# RAPE – IDEAL UTILISER OF ORGANIC FERTILISER

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Farm fertilisers represent an interesting opportunity to relieve the burden of fertiliser expenditure in the business. It can even be interesting for businesses with few or no animals to source organic fertilisers from livestock husbandry. The relatively high nutrient requirement of rape in autumn makes these plants ideal users of organic fertilisers

Appropriate liquid manure amounts in autumn contribute to sufficient development of the rape before the winter dormancy and in doing so generate a high yield potential. Well-developed crops have approx. 35–45 plants per m<sup>2</sup>, with the individual plants bearing approx. 8–10 leaves. These crops have then taken up around 60–90 kg N/ha. These amounts of nitrogen come from the soil reserves, but can also be made available by organic fertilisers. If the applied amounts are oriented on the plant requirement, the risk of elevated N-storage over winter is very low.

In spring, during the early extension phase (March/April), the nutrient requirement of rape is particularly high. As the soil is still relatively cool during this phase, the conversion of organically bound nitrogen is also low. The N-exploitation of the farm fertilisers by rape is therefore relatively low in spring. To prevent high values of residual nitrate here, it is necessary to carefully measure the amount of liquid manure applied to the rape.

## Contents must be known!

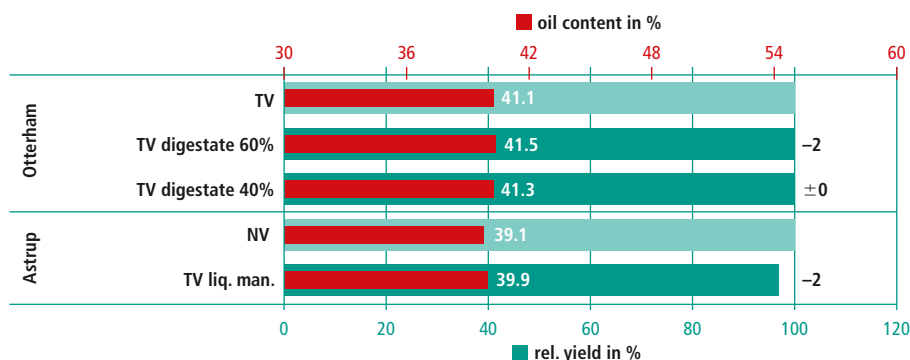
The contents of organic fertilisers can vary considerably. In addition to the animal species, important characteristics are the type and composition of the feed and biogas plant input, the feed style and the added water (cleaning water, rainwater). Here, only regular analysis can shed any light on the matter.

There is often the question of the effectiveness of the nutrients in the fertiliser. Phosphorus in farm fertilisers is organically bound to a large extent. This P-fraction is only available to the plants once mineralisation begins. This is not important in well supplied soils, as the soil deposits are replenished by the applied nutrients. Where the soil P-supply is lower (Level A, B), the P-nutrition should be supplemented by the application of water soluble phosphate.

In contrast, potassium can serve as immediate plant nutrition and is to a large extent not incorporated into the organic compounds of the plants. Potassium is largely found in the sap of the plants and is therefore immediately available to plants even after passing through the stomach of cattle or a biogas plant, and can be assumed as 100 % in the fertilisation plan. Potassium is bound to clay particles in the soil and is therefore protected against migration in the soil. In contrast, very light, low-clay soils are not capable of reliably binding potassium. Therefore, on correspondingly sandy soils, the leaching losses must be taken into consideration when planning fertilisation.

Sulphur is also applied to the plants with organic fertilisers. As a rough guide, the sulphur content is often around +/- 10 % of the N-content. Here own analyses provide the precise bases for planning. Sulphur in farm fertilisers is organically bound to a large extent. This S-fraction is there-

**Fig. 1: Effects of organic fertilisers types on winter rape yield**  
N-fertiliser trial Winter rape 2014, N-type – organic fertiliser



	Astrup				Otterham					
	TV		TV liq.man		TV		TV digestate 60 %		TV digestate 40 %	
	amount	type	amount	type	amount	type	amount	type	amount	type
Autumn					40	KAS 27	40	KAS 27	40	KAS 27
1st date	110	Piamon 33 S	100	pig slurry	110	Piamon 33 S	180	Piamon 33 S (80) digestate (100)	180	Piamon 33 S (80) digestate (100)
2nd date	70	urea 46	80	Piamon 33 S	70	urea 46				
N <sub>min</sub> spring	20		20		49		49		49	
N-offer	200		200		229		229		229	

Source: Lüder Cordes, LWK Lower Saxony District Office, Nienburg

TV = target value

fore only available to the plants once mineralisation begins, and thus the release of the sulphur is also temperature-dependent. Therefore, it is essential that the rape sulphur requirement of approx. 40 kg S/ha is covered using mineral fertilisers at the start of the growing period.

The nitrogen in the organic fertiliser can make an important contribution towards plant growth, but it can also pollute the environment. In cattle slurry around 50–60 % of the nitrogen is in the form of ammonium. In pig slurry or digestates, the proportion of fast-acting NH<sub>4</sub>-N is 60–70 %. Ammonium-N can be directly taken up by the plants, but it is also quickly nitrified to NO<sub>3</sub>-N at higher temperatures. Nitrate is easily moved in the soil and can be taken up by the plant roots with the soil water, but can also be leached out of the root layer when there is excess water

Trial results also show that the exploitation of nitrogen in organic nutrient carriers is not always optimal. Due to its early and relatively high nitrogen requirement, rape is less able to exploit the additional N-supply from the organic fertiliser. Therefore, it makes sense to apply the organic fertiliser as early as possible. The mineral supple-

ment must also not be applied too late if it is to be effective. If pig slurry is applied early under optimal conditions, this can account for around 70 % of the total nitrogen content. If cattle slurry or digestates are used, this can provide around 60 % of the total nitrogen. On plots without many years of organic fertilisation the exploitation of digestates is often only 50 %. In the trial with digestates in Otterham (Fig. 1), the yields tended to be below the target fertilisation with a calculation of 60 % total nitrogen. If only 40 % of the total nitrogen was taken into consideration, the yields increased slightly.

## Limit liquid manure

Due to the early, relatively high nitrogen requirement and the delayed effect of the organically bound nitrogen it makes sense to limit the proportion of organically bound nitrogen. Optimal nutrition of the rape can be expected if no more than 50 % of the total fertiliser nitrogen is given as organic fertiliser, such as slurry or digestates. In this way, the nitrogen content of the soil, which has a tendency to be high, is not considerably increased after the rape harvest.

In very lush crops, as were often seen in spring 2015, it would be possible, for example, to apply slurry or digestate at the start of the vegetation period and supplement it for example with 1.5–2.0 dt SSA/ha.

At the start of the extension phase, the nitrogen still required could be applied in the form of mineral fertiliser. With very early fertilisation, particularly with a fertiliser containing nitrogen, the growth of the highly developed rape plants is stimulated, and with it the sensitivity to late frost increases.

If fertilisation is basically performed using ammonium-N or urea based materials, like for example with slurry / digestates, but also SSA, urea, Piamon, then there is less growth stimulation and the frost resistance is reduced to a lesser extent. In poorly developed crops together with mid to heavy soils, the mineral supplementation should also be applied at the start of the vegetation period.

## Summary

Rape can utilise appropriate amounts of organic fertiliser in autumn when it is available in the ideal form. Rape is characterised in spring by its very high and very early nitrogen requirement. To be able to guarantee an optimal supply even during the first growth phase, the proportion of N-supply from organic fertilisers should be limited to around 50 % of the entire fertilisation requirement. Slurry or digestates should be applied at the start of the vegetation period if possible. Under good conditions, pig slurry is calculated to be 70 % of a mineral equivalent, cattle slurry and digestates can be used to 60 %.



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