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Application of liquid fertilizer in a future oriented agriculture

Guest comment

of Mr. Michael Fuchs, SKW, LF application research
department

APPLICATION OF LF IN A FUTURE ORIENTATED AGRICULTURE

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The demands of the worldwide markets force the farms to optimize the special intensity, means also lowering costs. One opportunity is the substitution of granulated fertilizer by liquid variances. The advantages are not only based on the cheaper nitrogen price.

LF includes further positive characteristics which contribute to a positive result.

One characteristic is the same but mostly higher efficiency of LF compared to granulate.

But in practice there is still uncertainty about the

uptake via leaves and the risk of scorching. High scorching will lead to lower yield. Therefore the right choice out of the variances of LF is required for a successful fertilizing.

Additionally the right nozzle and application

technology contributes to a positive result.

Impact of LF

In Germany the percentage of LF in relation to the total nitrogen market stayed on average last 10 years at a level of 13 – 15 % constantly. In the same period the granulated KAS dropped down from 61 to 50 %. The most applied LF was a LF with a share of 28 – 30 % nitrogen. This kind of LF is tolerated best by the crops.

Very positive effects can be gained with the new PAISIN-S 25/6 and Alzon Liquid - S25/6 (25% N, 6% S).

The optimum concentration of sulfur is 3 – 5 %, due to crop tolerance. The sulfur in the combined N-/S-LF is available immediately for the crop, as sulfate or ammoniumthiosulfate.

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Uptake via soil (roots) or leaves

Researches of industry and governmental institutes verify the efficiency of LF in comparison to granulated fertilizers. (See table 1) Scientific researches confirm that during a vegetation period the kind of fertilizer used influence on the yields is only marginal, but in the average

a number of years there is no significant difference. But in a dry spring and early summer time periods LF has evident advantages compared to granulated ones.

The reason is related on a higher level of leaves uptake of LF.

The question if the N fertilizer application should be granulated or liquid is secondary. Important is the price-ratio performance and the technical resources of the farm. From the experience there are no big differences between the most common fertilizers

KAS, nitrogen-LF and urea. This is valid if all basic rules and requirements have been fulfilled.

	Cereal	Rapeseed	Corn	Potatoes	Sugar beets	Total
Number of tests	155	15	25	28	21	244
without N	67	73	90	82	94	74
PIASAN® 28	100 (90.1 dt/ha) yield	100 (40.6 dt/ha) yield	100 (97.7 dt/ha) yield	100 (432 dt/ha) yield	100 (677 dt/ha) yield	100
KAS	100	99	99	99	99	100

Table 1: Comparison of yields fertilized without or different types of nitrogene, average of yields 1993 – 2010, 3 different test areas in Saxonia, Niedercunnersdorf, Trossin and Rosenow.

LF quality secures yield

LF is a pressure less fluid which can be applied by conventional plant protection sprayers. Besides the application technology the quality of the LF is important for a successful crop adaption. The risk of scorching is then very low under all conditions, also in very sensitive situations. This is also valid in combination with pesticide application.

Positive experiences enable the farmer to repeat this in the following years. Premium quality LF, like PAISIN® 28 from SKW guarantees beside a precise labeled nitrogen component:

- High surface tension
- pH value close to neutral
- Low level of Biuret content

These quality characteristics are not mentioned in the governmental fertilizer directives but are essential for the successful application of LF.

LF quality essential for crop tolerance

It is well known that upon critical application conditions and sensitive crop situations the quality of LF influences the crop tolerance preferably. Pictures 1 and 2 show the LF application in winter wheat at BBCH stadium 32 – 37, the first with high the other one

with low surface tension. The farmer can easily see this. LF with high surface tension creates big drops on the leaf. With low surface tension there is a complete coverage.

The application technology should be chosen to adapt to different situation. The basic rule is: The more sensitive the crop surface is the use of coarse drops at reduced spraying pressure should be used.



Picture 1: LF application with high surface tension (70 mN/m)



Picture 2: LF application with low surface tension (30 mN/m)



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Risk of lower yields can be eliminated

There have been a lot of field trials made with obvious wrong application features. The application with conventional flat fan nozzles on negative conditions (morning dew, permanent rain before) caused in late stadium in winter wheat leaf necrosis on average of 13 %. The consequences of this necrosis were lower yields of 10 %.

This compared to test variances of LF applied by hose drops or KAS granulates. There was no difference in the level of raw protein. Nevertheless these losses of yield are not acceptable. The relation of yield losses compared to the scorched crop surface is relatively small. Before every application it is important to

identify the right application technology for minimizing scorching on the crop. Picture 3 shows that identical application conditions with the same nozzles the quality of the LF becomes important. The differences between the variances are caused by the quality of LF, in this case the physical characteristic of surface tension. The LF with lower surface

tension scorched much more leaves and the result were lower yield. Before buying the LF the quality characteristics have to be checked.

Application at late stadium in winter grain – no problem

The technical development has helped a lot to eliminate any possible damage during the last nitrogen application in winter grain shortly before the ears are appearing. Orifice nozzles, FD nozzles, hose drop or tube drop systems offer the opportunity to apply

LF also in the late stadium between 32 – 49/51. There is no difference in the level of raw protein or yield of winter wheat fertilized by granulate or LF.

A couple of scientific researches support these facts.

When the ears have appeared the LF should be applied only by hose drop or tube drop systems. A combination with pesticide application is not possible under these conditions.

Precise application on the target

LF offers a positive opportunity to fulfill the ever increasing environmental consciousness of the farmers and directives from society. With extremely precise calibration and distribution a sustainable application in the field, precisely ending at the field border is achieved.

No uncontrolled application can occur outside the boundaries of the field. New technologies with N-sensors or GPS connection realize an application on partial areas demand, this means precision farming. Meanwhile there are nitrogen stabilized LF available which contribute to positive

environmental effects and avoid uncontrolled leaching. FD nozzles are well prepared for partial area application. Changes in the pressure don't influence the droplet size negatively; the extremely coarse drops remain and are excellent for the crop tolerance.

A higher pressure does not affect the impact of the droplets when the droplets touch the leaves. The droplets fall down only by gravity and not by the pressure of the sprayer.

LF and precision farming

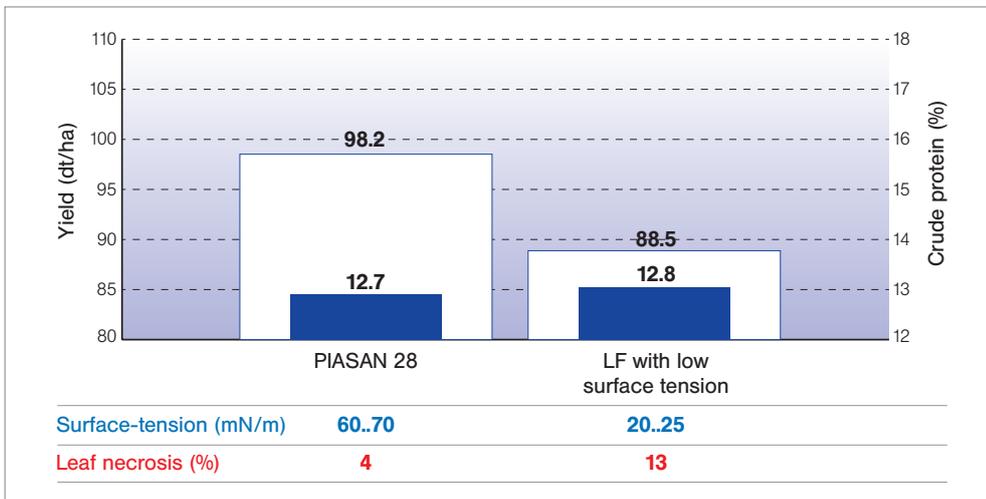
Spreaders for granulate and sprayers for LF are able to apply on partial areas in the field. Sprayers are equipped with valves which can adapt very fast and precise to the crop/GPS map demand. For instance Vario Select is able to add or reduce number of nozzles without modifying the pressure.

This system allows varying the application rate in a range of 500 % and this at a constant low pressure level and precisely within the working width.

Fertilizer systems for the future

Precision farming is the answer to a lot of economical and environmental questions. One integral part of this future agriculture will be new technologies which improve the efficiency of nitrogen fertilizer including precision farming via GPS. Further new variances of N fertilizer with more stabilized components support modern agriculture, means saving costs and preserve the environment. Balanced nutrients reduce not only the pollution of environment.

This means also to utilize full virility of fertilizer and to rescue the fertility of the soil. LF is an excellent tool especially due to precise calibration and application. As there is no significant difference between the fertilizers variances it is not the most important question which N fertilizer should be applied. Much more important is to follow up the different application guide lines and to work on the conditions of best practice.



Picture 3: Relationship between surface extension of LF and the treatment level of the crop, yields and crude protein level, average of 5 tests during 2004 – 2008.