FertilizationManager

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Example report
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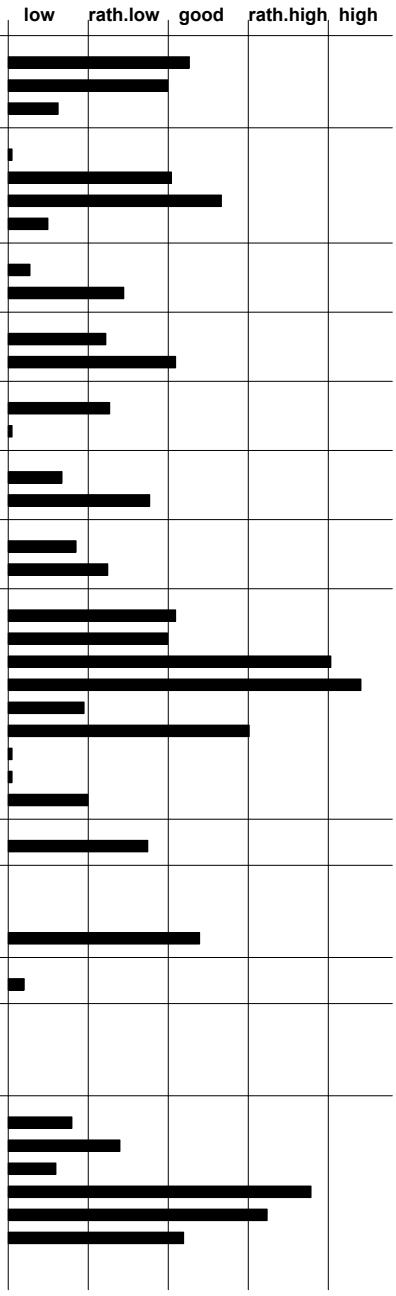
Analysis

Investigation/ordernr:	Date sampling:	Date report:
700469/003709444	01-11-2023	14-11-2023

Results		Unit	Result	Target value
Chemical	Total N stock	kg N/ha	1680	1470 - 2200
	C/N ratio		13	13 - 17
	N-supplying capacity	kg N/ha	25	95 - 145
	S-plant available	kg S/ha	< 2	20 - 30
	Total S stock	kg S/ha	340	320 - 595
	C/S ratio		67	50 - 75
	S-supplying capacity	kg S/ha	5	20 - 30
	P-plant available	kg P/ha	0,7	2,4 - 4,1
	P-soil stock	kg P/ha	130	205 - 265
	K-plant available	kg K/ha	60	95 - 150
	K-soil stock	kg K/ha	100	95 - 150
	Ca-plant available	kg Ca/ha	45	95 - 225
	Ca-soil stock	kg Ca/ha	675	1065 - 1355
	Mg-plant available	kg Mg/ha	45	95 - 150
	Mg-soil stock	kg Mg/ha	90	95 - 150
	Na-plant available	kg Na/ha	9	20 - 41
	Na-soil stock	kg Na/ha	12	22 - 40
	Si-plant available	g Si/ha	10970	8110 - 35130
	Fe-plant available	g Fe/ha	3360	3380 - 6080
	Zn-plant available	g Zn/ha	2160	680 - 1010
	Mn-plant available	g Mn/ha	15980	7840 - 10810
	Cu-plant available	g Cu/ha	30	55 - 90
	Co-plant available	g Co/ha	10	5 - 10
	B-plant available	g B/ha	< 105	215 - 295
	Mo-plant available	g Mo/ha	< 10	140 - 6760
	Se-plant available	g Se/ha	3,4	4,7 - 6,1
Physical	Acidity (pH)		5,3	5,4 - 6,0
	C-organic	%	1,67	
	Organic matter	%	3,4	
	SOC/SOM ratio		0,49	0,45 - 0,55
	Carbonate lime	%	0,2	2,0 - 3,0
	Clay (<2 µm)	%	1	
	Silt (2-50 µm)	%	12	
	Sand (>50 µm)	%	83	
	Clay-humus (CEC)	mmol+/kg	38	> 44
	CEC-saturation	%	86	> 95
	Ca-saturation	%	66	80 - 90
	Mg-saturation	%	14	6,0 - 10
	K-saturation	%	5,0	2,0 - 4,0
	Na-saturation	%	1,1	1,0 - 1,5
	H-saturation	%	0,3	< 1,0
	Al-saturation	%	< 0,1	< 1,0



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Results		Unit	Result	Target value	low	rath.low	good	very good
	Soil crumbling	score	10,0	6,0 - 8,0				
	Soil slaking	score	7,7	6,0 - 8,0				
	Risk on wind erosion	score	5,3	6,0 - 8,0				

		Unit	Result	Target value	low	rath.low	good	rath.high	high
	Moisture retention cap.	mm	19						
Biological	Microbial biomass	mg C/kg	413	170 - 510					
	Microbial activity	mg N/kg	55	25 - 41					
	Fungal/bacterial ratio		0,9	0,6 - 0,9					

Fertilisation recommendations
The result is compared with an agricultural target value and is categorized as low, rather low, good, rather high high. This is not an appreciation as meant in ISO 17025 (par. 7.8.6).
Legislation
The fertilisation recommendations aim to achieve an agronomical optimum yield and crop quality. The recommendations do not take any legal restrictions into consideration.

Recommend.

Soil-based recommendation (for the coming 4 years)

	Recommend.	Unit
Phosphate (P_2O_5)	175	kg/ha
Potassium (K_2O)	0	kg/ha
Calcium (CaO)	275	kg/ha
Magnesium (MgO)	0	kg/ha
Lime (nw)	160	kg/ha
Effective OM	2500	kg/ha

When recommendations are high, it is adviced to split the amount during the 4 years, for instance supply half the amount biannially. The soil based recommendation is meant to level the soil stocks of phosphorus, potassium, calcium and magnesium to the required amounts.

The lime gift is based on an optimal pH of 5,7
For every tenth increase in pH a lime gift is required of 40 kg/ha.
The amount of effective organic matter needed is calcutated for a 4 year period. At the organic matter balance the yearly application of organic matter is calculated.

Crop-based recommendation (annual)

in kg/ha

	Crop	Culture	Recommendation
Nitrogen (N)	Sports field		112
Sulphate (SO_3)	Sports field		53
Phosphate (P_2O_5)	Sports field		40
Potassium (K_2O)	Sports field		65
Calcium (CaO)	Sports field		90
Magnesium (MgO)	Sports field		20
Sodium (Na_2O)	Sports field		
Zinc (Zn)	Sports field		0
Manganese (Mn)	-		See the explanation.
Copper (Cu)	Sports field		0,25
Boron (B)	Sports field		0,5

Crop based recommendation
The crop-based recommendation is based upon the crop needs, average yields and climatic conditions and is corrected for soil nutrient stocks and the soil supplying capacity. During the growing season the SoilCropMonitor can be used for fertilization adjustments.

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Explanation

The results and/or the recommendations of this analysis are valid until 2027
For more information please use the following link:
https://www.eurofins-agro.com/en/soil-analysis-explanation

The soil based recommendation aims to maintain the soil nutrient stocks. The K, Ca and Mg recommendation will optimize the balance at the cation-exchange-capacity (CEC). It is adviced to spread the soil based recommendation for nutrients and lime application across a 4 year period. When you have applied the soil based recommendation a new soil based analysis can be used to update the concentration of the nutrient stocks.

The crop based fertilization will feed the crop and improve its quality. Due to higher/lower yields and possible losses (e.g leaching) the amount of plant available nutrients can fluctuate. Therefore, we advise you to carry out a crop based analyis (Culture analysis) to determine the actual amount of available nutrients and to update the fertilization recommendations.

Look carefully at the appreciation of the nutrients on page 1. If the target values indicate that one or more nutrient quantities are very low, consult your advisor to level these quantities.

We have assumed the following yields, when calculating the crop based recommendations:
Sports field -
When your yield differentiates from the above, it is recommended to adjust your fertilization accordingly

Nitrogen:
The N recommendation relates to an annual dose. If possible, we recommend splitting this N dose into several applications. You can use our SoilCheck soil test in season to determine whether subsequent applications are necessary. This test measures the plant-available N (mineral N) in the soil among other things.
In addition to the organic matter content, the advice for nitrogen also takes into account the nitrogen supply capacity and the pH.
The nitrogen advice is based on a normal mowing intensity (150-350 hours) and an average mowing frequency (40-50 x per year).
If the playing intensity or the mowing frequency is more extensive or intensive, adjust the advice according to the table below. If the grass cuttings are removed, increase the N advice by 20 kg N/ha.

	Mowing frequency		
Play intensity	**High** (>50 x/year)	**Average** (40-50 x/year)	**Low** (<40 x/year)
Intensive* (>350 hours)	-40 kg N/ha	-15 kg N/ha	+35 kg N/ha
Normal (150-350 hours)	-40 kg N/ha	see advice	+45 kg N/ha
Extensive (<150 hours)	-45 kg N/ha	+20 kg N/ha	+45 kg N/ha

* in case there is a good grass coverage, play intensity “normal” can be used

Sulphur:
Sulphur (S) is released by the degradation (mineralisation) of organic matter or manure. This mineralisation is performed by soil organisms. Soil organisms are not very active under colder conditions, which means not much S is released from the soil early in the spring. Therefore, it is sensible to fertilise with S for many early crops, even if the soil content is good or high.

Phosphate:
P-supplying capacity is 44 . The target range is 17 - 27
The P-buffering capacity indicates whether the P-soil stock is high enough to maintain the level of plant available P. When the buffering capacity (buffering power) is low, the plant available P will not remain on level during the growing season: it will decrease.

Potassium:

Calcium:
Fertilization with calcium may benefit the soil structure.
You can reduce the calcium soil based reccomendation with the amount of calcium applied with the lime.

Manganese:
No Manganese deficiency is to be expected.

Lime:
Give the lime prior to the most lime needing crop.
Note: with liming calcium and magnesium can be added.

Clay-humus (CEC):
You can increase the CEC by applying organic matter and/or increase the pH of your soil.

Soil life:
The biological soil fertility is measured by 3 characteristics, the microbial biomass, the microbial activity, and the fungal/bacterial ratio.
The acknowledgement of the measured results is based upon the amount of organic matter. There is not a recommendation given for the measured characteristics. On the basis of research projects there will be more information available.

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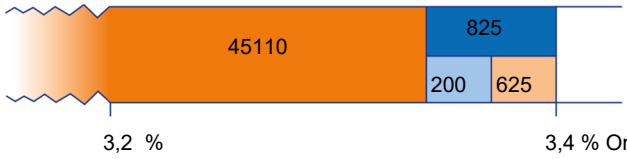
Organic matter

Figure: Organic matter balance



Yearly breakdown rate (percentage) of the total organic matter content (%): 1,8

- Stock of organic matter which will remain after 1 year in the sampled layer if no (effective) organic matter is supplied.
- Total required supply of effective organic matter as a result of the degradation of the organic matter.
- Supply through crop residues (average within provided rotation scheme or crops).
- Remaining to be supplied through e.g. animal manure, green manures and/or compost.

Crop (residue)	Culture:	Input of effective organic matter
Sports field		200
Average input/year		200

For increasing the soil organic matter content by 0.1%: 1350 kg effective organic matter per hectare is needed.

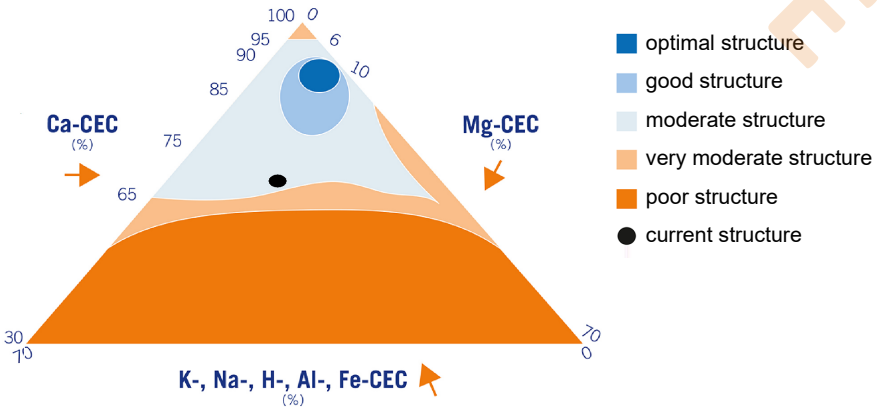
Figure: Quality of the organic matter

Organic matter consists primarily of C, N, P, S. If the organic matter contains relatively high amounts of N and/or S, this makes it attractive to soil organisms. Soil organisms happily eat this organic matter. N and S are released in the process and the amount of organic matter decreases slightly (dynamic organic matter). Organic matter can also contain a lot of C. This is generally less attractive to soil organisms (bacteria). As a result, the organic matter is not consumed as quickly by the soil organisms; making the organic matter more stable. Stable organic matter contributes - among other factors - to the workability of the soil and the looseness. Dynamic organic matter contributes primarily to the release of N and S and is therefore a source of these nutrients for the crop. The quality of the organic matter can be changed (gradually) by paying attention to the properties of soil improvers such as animal manure, compost and crop residues.

Physical

The assessment of soil structure is based on the Ca-CEC, K-CEC, and Mg-CEC ratio. Actual soil structure is - of course - not merely depending on ratio, but also on weather conditions, moisture condition of the soil, and the weight of the machinery.

Figure: Structure triangle



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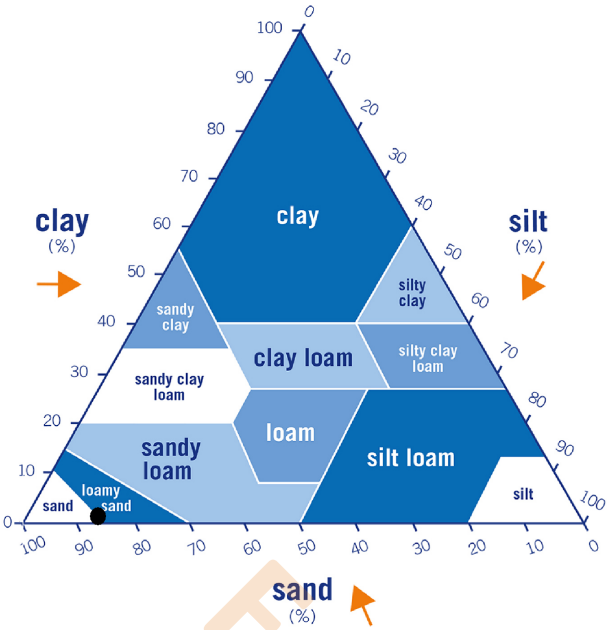
Physical

Figure: Texture triangle



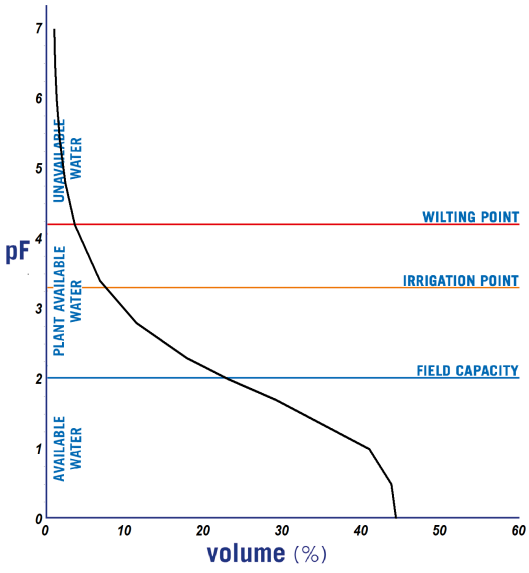
Besides clay, the silt and sand fractions are presented as well. Clay is smaller than 2 micrometer (µm), silt particles are 2-50 µm and sand particles are larger than 50 µm. The relative distribution of soil particles is used to estimate the risk of slaking. Slaking causes the soil pores to be clogged with smaller particles and degrades soil structure. The risk of slaking is greatest at 10-20% clay.

Soil crumbling score is: good, however the evaluation of soil crumbling status is also depending on crop type. Considering the results, the chance of soil slaking is small.

displayed in the mineral parts (granular)

Grain size	Unit	Result	Grain size	Unit	Result
0-2 µm	%	1,9	250-355 µm	%	17,5
2-16 µm	%	2,1	355-500 µm	%	5,1
16-50 µm	%	2,3	500-1000 µm	%	1,9
50-63 µm	%	1,1	1000-2000 µm	%	0,3
63-125 µm	%	8,9	M50 Median	µm	198
125-180 µm	%	29,4	D60/D10	ratio	2,6
180-250 µm	%	29,5			

Figure: Water retention curve



The amount of plant available water in the sampled layer is 19 mm. This is the maximum amount you should irrigate. All excess irrigation will drain off the parcel or will sink to deeper layers.

Field capacity (pF 2,0):	23,2	% moisture
Irrigation point (pF 3,3):	7,6	% moistur e
Wilting point (pF 4,2):	3,8	% moistur e

Crops have difficulties to obtain water when the actual moisture level is below pF 3,3. When you are able to measure the moisture level, start with irrigation if the moisture content of the parcel is at 7,6 % and irrigate 16 mm.

The actual moisture level can be measured by using a soil moisture sensor, or collect soil from ten spots in the parcel. Measure the weight of the moist soil and the weight after 24 h drying. The difference between moist and dry soil is an indication of the moisture level of the parcel.

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Contact & info

Soil layer:	0 - 10 cm
Sample was taken by:	Eurofins Agro, Monsternemer
Contact sample taking:	Klantenservice Agro: 0888761010
Sampling method:	W-pattern, at least 40 sub samples, according to Eurofins Agro standard MIN 1000

If the following information is shown in the reports, this information may have been provided by the client and may affect the valuation, advice and/or analysis result:
sampling depth, crop, culture.

Method		Result	Unit	Method	RvA
Results analyses	Total nitrogen stock	1240	mg N/kg	Em: NIRS	Q
	S-plant available	< 1,1	mg S/kg	Em: CCL3 (Gw NEN 17294-2)	
	Total sulphur stock	250	mg S/kg	Em: NIRS	Q
	P-plant available	0,5	mg P/kg	Em: CCL3 (Gw NEN 15923-1)	Q
	P-soil stock	22	mg P_2O_5/100 g	PAL1: Gw NEN 5793	Q
	P-soil stock	10	mg P/100 g	PAL1: Gw NEN 5793	Q
	K-plant available	43	mg K/kg	Em: CCL3 (Gw NEN 17294-2)	
	K-soil stock	1,9	mmol+/kg	Em: NIRS	
	Ca-plant available	0,4	mmol Ca/l	Em: NIRS	
	Ca-soil stock	26	mmol+/kg	Em: NIRS	
	Mg-plant available	35	mg Mg/kg	Em: CCL3 (Gw NEN 17294-2)	
	Mg-soil stock	5,4	mmol+/kg	Em: NIRS	
	Na-plant available	7	mg Na/kg	Em: CCL3 (Gw NEN 17294-2)	
	Na-soil stock	0,4	mmol+/kg	Em: NIRS	
	Si-plant available	8120	µg Si/kg	Em: CCL3 (Gw NEN 17294-2)	
	Fe-plant available	2490	µg Fe/kg	Em: CCL3 (Gw NEN 17294-2)	
	Zn-plant available	1600	µg Zn/kg	Em: CCL3 (Gw NEN 17294-2)	
	Mn-plant available	11830	µg Mn/kg	Em: CCL3 (Gw NEN 17294-2)	
	Cu-plant available	24	µg Cu/kg	Em: CCL3 (Gw NEN 17294-2)	Q
	Co-plant available	8,2	µg Co/kg	Em: CCL3 (Gw NEN 17294-2)	Q
	B-plant available	< 76	µg B/kg	Em: CCL3 (Gw NEN 17294-2)	
	Mo-plant available	< 4	µg Mo/kg	Em: CCL3 (Gw NEN 17294-2)	
	Se-plant available	2,5	µg Se/kg	Em: CCL3 (Gw NEN 17294-2)	
	Acidity (pH)	5,3		Em: NIRS	
	C-organic	1,67	%	Em: NIRS	Q
	Organic matter	3,4	%	Em: NIRS	Q
	C-inorganic	0,03	%	Em: NIRS	
	Carbonate lime	0,2	%	Em: NIRS	
	Clay (<2 µm)	1	%	Em: NIRS	
	Silt (2-50 µm)	12	%	Em: NIRS	
	Sand (>50 µm)	83	%	Em: NIRS	
	Clay-humus (CEC)	38	mmol+/kg	Em: NIRS	
	Microbial biomass	413	mg C/kg	Em: NIRS	
	Microbial activity	55	mg N/kg	Em: NIRS	
	Fungal biomass	141	mg C/kg	Em: NIRS	
	Bacterial biomass	157	mg C/kg	Em: NIRS	
	Granulair			GKL1: Gw NEN 5753	Q
	Bulk density	1351	kg/m^3	Em: NIRS	

The values stated on page 1 and 2 under 'Result' are calculated from the above mentioned analysis results.

Q Method accredited by RvA
Em: Method Eurofins Agro, Gw: Equivalent of, Cf: In conformity with

Results are reported in dry soil.
The analyses were done at Eurofins Agro, Wageningen (NL).
The results relate exclusively to the sample taken and received by Eurofins Agro, and to the material processed on 02-11-2023, and therefore to the sample analysed. For a detailed description of the sampling and analysis methods used, visit www.eurofins-agro.com