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Joe Bloggs

Ecological basic characterization
BD 8429 (Sampling date: 09.02.2021)

Sample:	exemplary analyse "calk"
Sampler:	unknow
Location:	unknow
Climate:	unknow
Crop/Yield:	W Wheat 8 t/ha
Laboratory:	Water & Waste, LabNr. exemplary analyse 2021 /

Result:
Moderately heavy soil, very calcareous, pH values slightly alkaline, fixations possible because of lime content and pH values.
Aggregate stability affected, electrical conductivity low, content and quality of organic matter favorable.
Site moderate in terms of sorption, share of calcium at the sorption complex very high, magnesium and potassium very low. Tendency towards K-fixation.
Lack of plant-available nutrients (phosphorus, nitrogen, sulphur, iron, manganese, copper, zinc, molybdenum, cobalt), surplus of boron.

Measures:
Supply of physiologically acidifying and alkaline fertilizers.
Supply of potassium (K) and magnesium (dolomite) to optimize the conditions at the exchanger. Supply of calcium (dolomite/gypsum/calk) und magnesium (dolomite) to enhance the aggregate stability and meet the plant requirements.
Mobilization of phosphorus, iron and manganese from reserve-pools, supply of nitrogen, sulphur, copper, zinc, molybdenum, cobalt (if necessary with foliar applications).

Vienna, 15.02.2021

SOIL PROPERTIES Sample BD 8429

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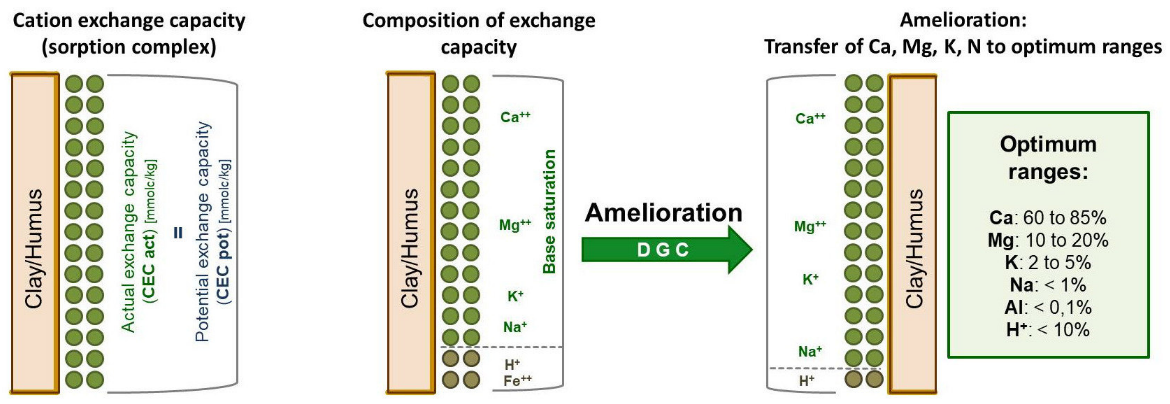
Field name: exemplary analyse "calk"

BASIC CHARACTERISTICS	Dept 0 - 30 cm	Gravel content vol.-%: 0		Sampling date 15.02.2021			
Parameter	**Value**	**very low**	**low**	**favour.**	**high**	**very high**	**Assessment**
Soil texture (KH)	51						moderatly heavy soil
pH value H2O [-log H+]	7,4						slightly alkaline
pH value KCl [-log H+]	7,2						slightly alkaline
Lime content CaCO3 [%]	7,7						fixation possible
Dissolved substances [eL, mS/cm]	0,3						low
Org.matter [%] = Corg * 1,724	2,5						catch crops
C/N ratio of organic matter	12,1						Subseq. delivery of N from org. matter
C/P ratio of organic matter	67,2						subseq. delivery of P from org. matter
C/S ratio of organic matter	50						subseq. delivery of S from org. matter
Stability of organic matter	1						Transform. processes at equilibrium
Aggregate stability	3						high risk of erosion
CATION ECCHANGE CAPACITY (CEC); Total potential = CEC potential; actually used potential = CEC actual							
CEC potential [mmolc/kg]	103						pot moderate sorption
CEC actaul [mmolc/kg]	103						act moderate sorption
CEC act in % CEC pot	100						favorable
Base saturation in % CEC pot	100						limited dynamics
Elements related to **CEC pot**: Ca in % CECpot	90,8						very high
Mg in % CECpot	8,0						very low
K in % CECpot	0,9						very low
Na in % CECpot	0,3						favorable
Al in % CECpot	0,0						favorable
NH4N in % CECpot	0,0						favorable
Fe in % CECpot	0,0						favorable
Mn in % CECpot	0,0						favorable
H in % CECpot	0,0						actual acid low
Pot.acid in % CECpot	0,0						low
Elements related to **CEC akt**: Ca in % CECact	90,8						very high
Mg in % CECact	8,0						very low
K in % CECact	0,9						very low
Na in % CECact	0,3						favorable
Al in % CECact	0,0						favorable
H in % CECact	0,0						actual acid low



AMELIORATION in kg/ha – Measures for improvement / preservation of soil

	Dolomite (mit 40% MgCO3)	**Gyps** (CaSO4 * 2 H2O)	**Lime** (CaCO3)	**Magnesium** (Mg)	**Potassium** (K)
min.	1600 kg/ha	200 kg/ha	200 kg/ha		490 kg/ha
org.	**Perm. humus formation**	catch crops, green manure			

*** Calculation refers to high quality, finely ground products!**

PLANT NUTRITION

Sample BD 8429

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Field name: exemplary analyse "calk" **Crop:** W Wheat **Yield:** 8,0 t/ha

PLANT-AVAILABLE ELEMENTS at date of sampling: 15.02.2021 Dept 0 - 30 cm

Nutrient [kg/ha]	Value	very low	low	favour.	high	very high	Diff. [1]	Assessment
Calcium (Ca)	5220							surplus
Magnesium (Mg)	280							sufficient
Potassium (K)	105						10	sufficient
Phosphorus (P)	5						30	serious deficiency
Nitrogen (N)	18,0						140	serious deficiency
Sulphate (SO4)	23,5						40	serious deficiency
Iron (Fe)	0,1						1,80	serious deficiency
Manganese (Mn)	0,00						0,90	serious deficiency
Copper (Cu)	0,01						0,07	serious deficiency
Zinc (Zn)	0,00						0,70	serious deficiency
Molybdenum (Mo)	0,00						0,05	serious deficiency
Boron (B)	0,49							surplus
Silicon (Si)	38,4							sufficient
Cobalt (Co)	0,000						0,002	serious deficiency

ORGANICALLY BOUND NUTRIENTS [kg/ha] and potential for mineralisation [kg/ha and yearr]

Nutrient	Total organically bound	Assessment	Potential for mineralisation		
org. Carbon (C org)	90350	accumulation	723	bis	1355
org Nitrogen (N org)	7455	high reserves	60	bis	112
org. Phosphorus (P org)	1345	very high reserves	11	bis	20
org. Sulfur (S org)	1790	very high reserves	14	bis	27

POTENTIAL TOXIC SUBSTANCES in soil solution

Aluminium (Al)		risk of contamination
As, Ni, Cr, Pb, Cd		no abnormalties

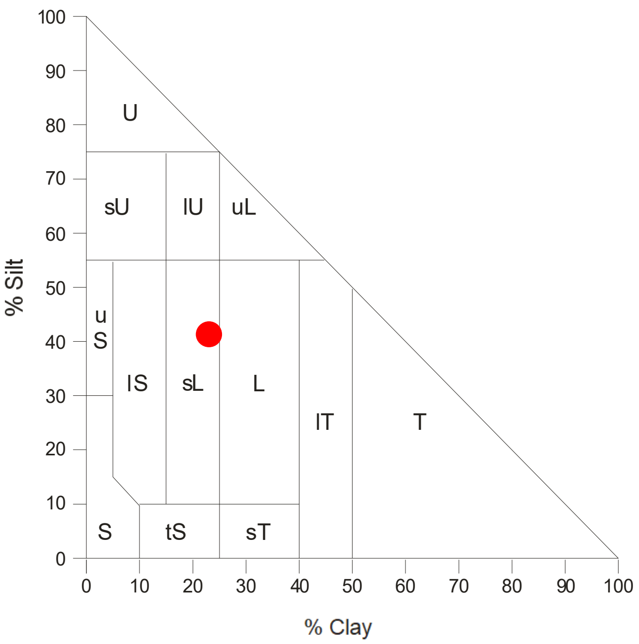
FRACTIONS: water-soluble, exchangeable, reserve

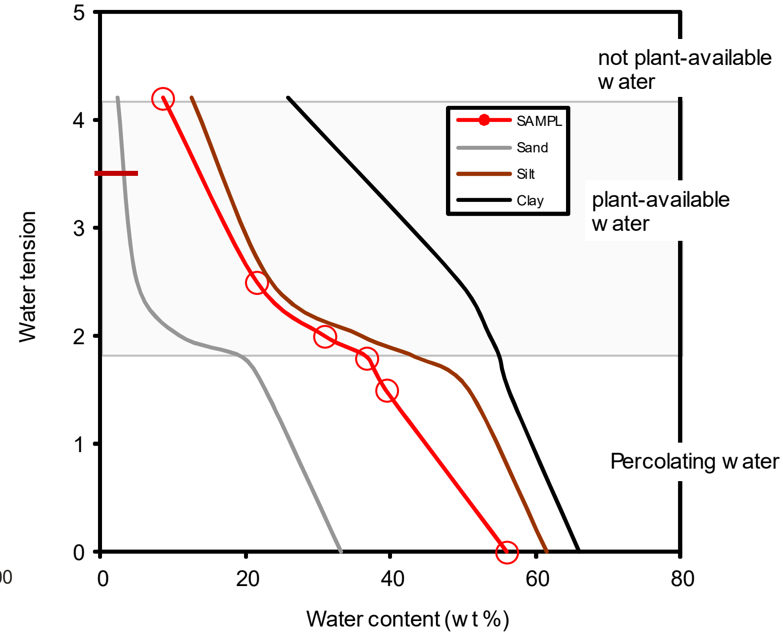
Soil solution [mg/l]		Exchangeable [kg/ha]		Reserve [kg/ha]	
Calcium (Ca)	63,9	Calcium (Ca)	5130	Calcium (Ca)	127100
Magnesium (Mg)	4	Magnesium (Mg)	274	Magnesium (Mg)	27400
Potassium (K)	1,5	Potassium (K)	104	Potassium (K)	3000
Sodium (Na)	3,31	Sodium (Na)	18	Sodium (Na)	200
Ammonium nitrogen (NH4-N)	0,06	Ammonium nitrogen (NH4-N)	0	Nitrogen total (N tot)	7473
Nitrate nirogen (NO3-N)	9,84				
Phosphorus (P)	0,11	Phosphorus (P)	5	Phosphorus min. (P mi	1650
				Phosphorus total (P tot	4657
Sulphate (SO4)	10,59			Sulphur total (S tot)	1798
Chloride (Cl)	7,68				
Aluminium (Al)	0,00	Aluminium (Al)	0,00	Aluminium (Al)	19900
Iron (Fe)	0,08	Iron (Fe)	0,00	Iron (Fe)	11000
Manganese (Mn)	0,00	Manganese (Mn)	0,00	Manganese (Mn)	1970
Born (B)	0,08	Boron (B)	0,38	Boron (B)	15
Zinc (Zn)	0,00	Zinc (Zn)	0,00	Zinc (Zn)	70
Copper (Cu)	0,01	Copper (Cu)	0,00	Copper (Cu)	35
Molybdenum (Mo)	0,00	Molybdän (Mo)	0,00	Molybdenum (Mo)	0

MOBILISATION:	**Phosphorus, Iron, Manganese**
SUPPLY:	**Nitrogen, Sulphur, Copper, Zinc, Molybdenum, Cobalt**

[1] **Difference in plant requirements during the entire vegetation period at the time of sampling**

SOIL PHYSICAL DEDUCTIONS SNR.: BD 8429





Austrian texture Triangle OENorm L 1050

Water tension and water content

Source:Stefan Diringer (2010): Gibt es in der Bodenphysik Möglichkeiten Einzelparameter durch einen einzelnen Summenparameter zu charakterisieren? Wissenschaftliche Diplomarbeit. Institut für Geographie und Regionalforschung, Universität Wien

Detailed picture of soil sample

Explanations for the information sheets "Soil Properties", "Plant Nutrition" and "Soil Physical Deductions"

Basic properties (see information sheet "Soil Properties")

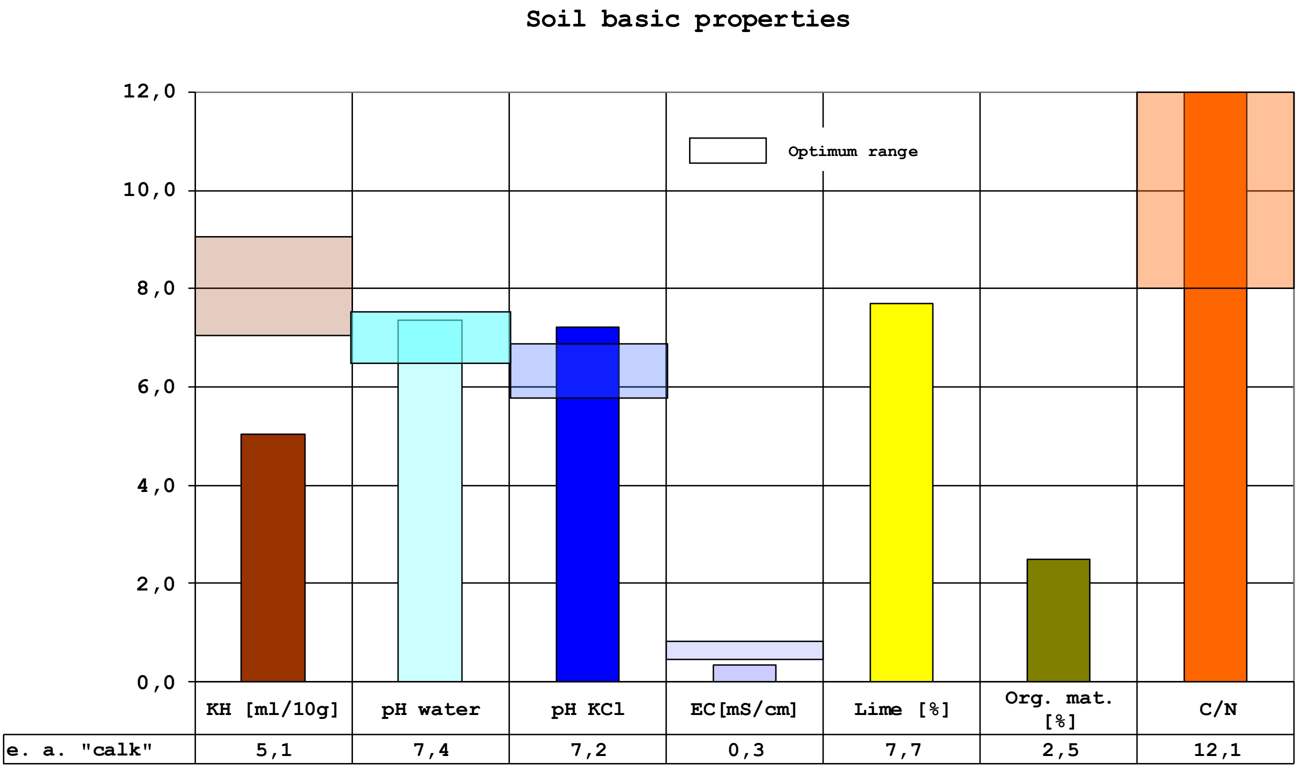


Figure: Soil basic properties

Soil texture/Water balance

The sandy/loamy ***soil type*** results in a **moderately heavy** soil. At full water saturation, the soil can retain ~ 5.1 ml of water per 10 g, this amount is approximately equivalent to a water quantity of 1000 m^3/ha at a depth of 30 cm. At full water saturation in winter/spring, this is sufficient to bridge short dry periods (early summer dryness) unscathed.

The **pF curve** on the sheet for "Soil Physical Deductions" shows at which water contents in percentage (wt.%) which water tension (pF) prevails. Below pF 1.8, the water is weakly bound (percolating water) and not plant-available. The range of plant-available wate is found from pF 1.8 to 4.2 (= usable field capacity). Above pF 4.2, the water in the soil is already bound so strongly that the forces exhibited by most crops are no longer sufficient to absorb the water from the soil and the plants wither ("wilting point"). The energetic "cracking point" is at pF 3.5. From this water tension onwards, the plant needs more energy to extract water from the soil than can be bound by photosynthesis. If there is a possibility of irrigation, it should be started at the latest at a of pF value of 3.5 (marked in red in the diagram).

In order to determine the current state of the water tension, it is sufficient to take a representative soil sample. This soil sample is weighed in a humid and dry state, the difference in weight corresponds to the water content (gravimetrical determination of water content). With relative reference (water content in %) the water tension can be determined directly via the pF curve of the figure.

Aggregate stability

The ***aggregate stability*** is **affected** as mixing and shaking the sample with distilled water does result in **clouding** of the protruding liquid**.** The resulting turbidity is due to the fact that bridges and bonds between soil particles are destroyed and the fine particles become soluble. On the field, this can mean that **aggregates** are **partially destroyed,** for example, by rain, as well as in the course of tillage or passage of the soil. This leads to problems in the water and air balance. There is a **high risk of erosion.** The stability of the aggregates can be improved by the supply of calcium as a cementing agent between the soil particles.

pH value

The ***pH*** in water lies within the slightly alkaline range (**7.4)**, the ***pH*** measured in KCl is as well slightly alkaline (**7.2)**. The buffer system is within the range of the **carbonate buffer**. The difference between the two pH values allows to draw a conclusion about the biological activity of the soil. Differences between 0.5 and 1.5 pH units have proven to be favorable for microorganism development. In the present sample, a limited microorganism activity is to be expected considering the difference in pH units of 0.2.

Soil solution

The ***electrical conductivity*** indicating the amount of dissolved salts is **0.3 mS/cm** and thus below the favorable range for the vegetation period (0.5 to 0.8 mS/cm). ATTENTION: At the end of vegetation or during the vegetation pause, lower values are more favorable! The dissolved salts (see also water-soluble fraction on the analysis sheet) are important for plant nutrition (via transpiration flow) and for aggregate stability. The site is **currently moderate in terms of sorption,** but in the event of heavy rainfall events, the **leaching** of elements from the soil solution must be anticipated.

The following elements are responsible for electrical conductivity in the soil solution (see water-soluble fraction on the information sheet "Plant Nutrition"):

Table 1: Composition of the soil solution, Concentrations in mg/l

Nutrient	exemplary analyse „calk“
Ca	63,90
Mg	4,00
K	1,51
Na	3,31
NH_4-N	0,06
NO_3-N	9,84
P	0,11
SO_4	10,59
Cl	7,68
Al	0,00
Fe	0,08
Mn	0,00
B	0,08
Zn	0,00
Cu	0,01
Si	4,81

The soil solution is the most important medium for plant nutrition. The roots can only absorb dissolved substances, therefore the soil solution should have an ideal composition of the individual nutrients, since the selectivity of plant uptake of certain nutrients only works optimally from the "ideal solution".

Potassium **(K)** is dissolved in insufficient concentrations in relation to magnesium **(Mg)** and calcium (**Ca**). The phosphorus **(P)** concentration is **below** the **optimum.** The **trace element provision** is sufficient except for manganese (**Mn**) and zinc (**Zn**).

The ratio of **NO_3-N** to **NH_4-N** is shifted in the direction of NO_3-N. This is favorable and indicates adequate ventilation for the nitrogen-oxidizing bacteria.

Organic matter

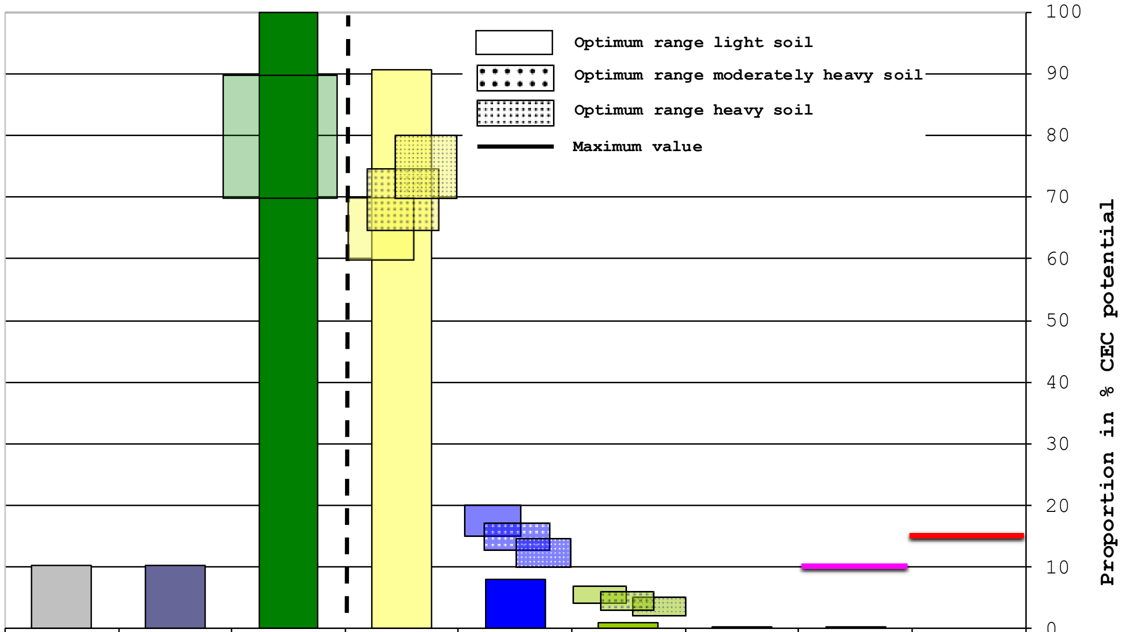
The amount of **organic *matter*** is favorable for this soil type and should be preserved. For this purpose, crop residues should remain on the field (important: straw decomposition!), the regular application of green manure and the cultivation of catch crops is recommended.

The **C/N** ratio of **12.1** is favorable. In the case of optimal climatic conditions (temperature, humidity), the amounts of nitrogen (**N**), phosphorus (**P**) and sulphur (**S**) listed on the information sheet **"Plant Nutrition"** can be mineralized by microbiological processes during the vegetation period. The mineralized nutrients can be absorbed by the plants and represent an important contribution to their nutrition.

Cation exchange capacity (see information sheet "Soil Properties")

The organic matter and clay particles can accumulate nutrients in the soil and protect them against leaching. Since they are charged, they act like "magnets" and are called exchangers or sorption complexes. The strength of the magnets, i.e. the number of charges that can be attached, is called cation exchange capacity (CEC).

Sorption complex potential "magnet"



	CEC pot mmolc/100g	CEC act mmolc/100g	BS % CEC pot	Ca	Mg	K	Na	H + Al	Pot.S.
e. a. "calk"	10,26	10,26	99,99	90,78	7,99	0,94	0,27	0,01	0

Figure: Composition of potential cation exchange capacity (CEC pot)

In the examined soil, the total capacity of the exchanger (**CEC pot**) is **10.3 mmolc/100g** and is attributable to the amount of organic matter and the presence of clay minerals, oxides and hydroxides. Currently **100%** of the capacity is used **(CEC pot = CEC act)**! The soil can currently be described as **moderate in terms of sorption.**

The ***base saturation*** (**BS**), the percentage of the sum of calcium (**Ca**), magnesium (**Mg**), potassium (**K**) and sodium (**Na**) in the CEC pot, is at **100%** and therefore well above the desired range (70-90%). The ability to buffer further acid inputs is very well pronounced. There is **no risk** that the site will **acidify** within a short period of time and thereby **endanger** soil fertility. On the contrary, due to the high lime content, the reaction chains in the system are kept short, as acids are quickly neutralized. The system is very stable, thus limiting the dynamics. In order to stimulate soil dynamics, measures should be used which acidify the soil "in a relapse". This is achieved, for example by the use of acidic fertilizers. This disturbs the steady state, immobile substances are converted (at least in the short term) into a fragile (= plant-available) form and the system is forced to adjust to a dynamic equilibrium again.

The occupancy of the exchanger with nutrients is an important parameter for assessing soil fertility. The following table shows the distribution of nutrients at the exchanger, in which optimal conditions prevail (TARGET).
The TARGET state is contrasted with the current composition of the exchanger of the analyzed soil sample.
The optimum ranges of values depend on various basic parameters.

Table 3: Optimum range compared to actual measured values on the exchanger %

	Ca	Mg	K	Na	(H+Al)
TARGET	**60-75**	**13-18**	**2-5,5**	**< 1**	**< 10**
exemplary analyse „calk“	90,8	8,0	0,9	0,3	0,0

Plant roots and microorganisms find an **unfavorable** distribution of substances in the currently used proportion of the exchanger (**CEC act**). The share of **Ca** is very high, that of **Mg** and **K** is very low.
For soils of this type, the Ca content in the exchanger should be between 60 and 75%, that of Mg between 13 and 18% in order to achieve optimum aggregate stability.

The proportion **of potential acid (**see figure above) is low.

In order to harmonize the conditions at the exchanger and to improve aggregate stability, the supply of the substances indicated in the section **“Amelioration”** of the information sheet "Soil Properties" is recommended. The supply of all substances is important, otherwise the favorable distribution of cations is negatively affected.

The mixture of DGC (dolomite/gypsum/calk) recommended in **"Amelioration"** should be supplied in divided quantities (max. 1300 kg/ha per year) in order to continuously promote aggregate stability, Ca supply and dynamic processes (e.g. the buffer system). After that, the same DGC mixture of about 1200 kg/ha should be applied every 3 years.

Assessment of nutrients (see information sheet "Plant nutrition")

The nutrients calcium (Ca), nitrogen (N), potassium (K), magnesium (Mg) and phosphorus (P) and their pools are described below.

Calcium

Calcium (Ca) is one of the most essential nutrients. Ca stabilizes the plant tissue by acting as a cementing agent of cells and thus allows the absorption of many other nutrients. This function requires that Ca is not mobile in the plant and must therefore be absorbed from the roots over the entire vegetation period. Certain crops such as rapeseed and legumes have a higher requirement for calcium than for potassium. Ca is present in the soil in various bonding forms (carbonaceous e.g. lime, siliceous e.g. feldspar). The subsequent delivery takes place via processes of weathering (acidification). Interchangeable Ca at the sorption complex is in dynamic equilibrium with the Ca in the soil solution.

In the case of *calcareous* soils, the Ca content on the sorption complex is often high. In the course of the soil analysis, a high Ca concentration is often detected in the soil solution. Nevertheless, it can happen that the cultivated crops suffer from Ca deficiency, as soil activity and water conditions play an important role as well. The “flow” of Ca to the root and the subsequent absorption only works with sufficient soil moisture. If it is too dry, less Ca reaches the root surface. There, Ca can "pile up" and accumulate, exceeding the solubility product and, under certain environmental conditions, be precipitated to salt (e.g. gypsum).

In order to ensure the Ca supply of the plants on calcareous soils, the supply of various Ca sources (dolomite, gypsum, finely ground lime) is recommended especially for vegetables, fruit, grassland, rapeseed, legumes and maize.

Nitrogen

The nitrogen supply is deficient at the time of sampling. The nitrogen nutrition of plants can be supported by various measures:

- Biological N-fixation (nodule bacteria, free living N-fixing bacteria)
- Supply of organic matter (N organically bound, mineral N)
- Supply of mineral N fertilizers (ammonium, urea, nitrate, ...)

Which N-forms and which quantities contribute to the best yield depends on the specific conditions of the site (e.g. humidity, temperature, air capacity) and the requirements of the crop. In general, nitrate-containing fertilizers should be avoided, as nitrate strains the energy balance of the plant (nitrate can only be used by the plant after conversion into ammonium) and the risk of nitrate pollution in water bodies is strongly increased.

The potential of mineralization at this site is 60 to 112 kg/ha/year. The mineralization rate depends on the humidity and temperature conditions as well as on the environmental conditions for the microorganisms (acid environment, nutrient supply).

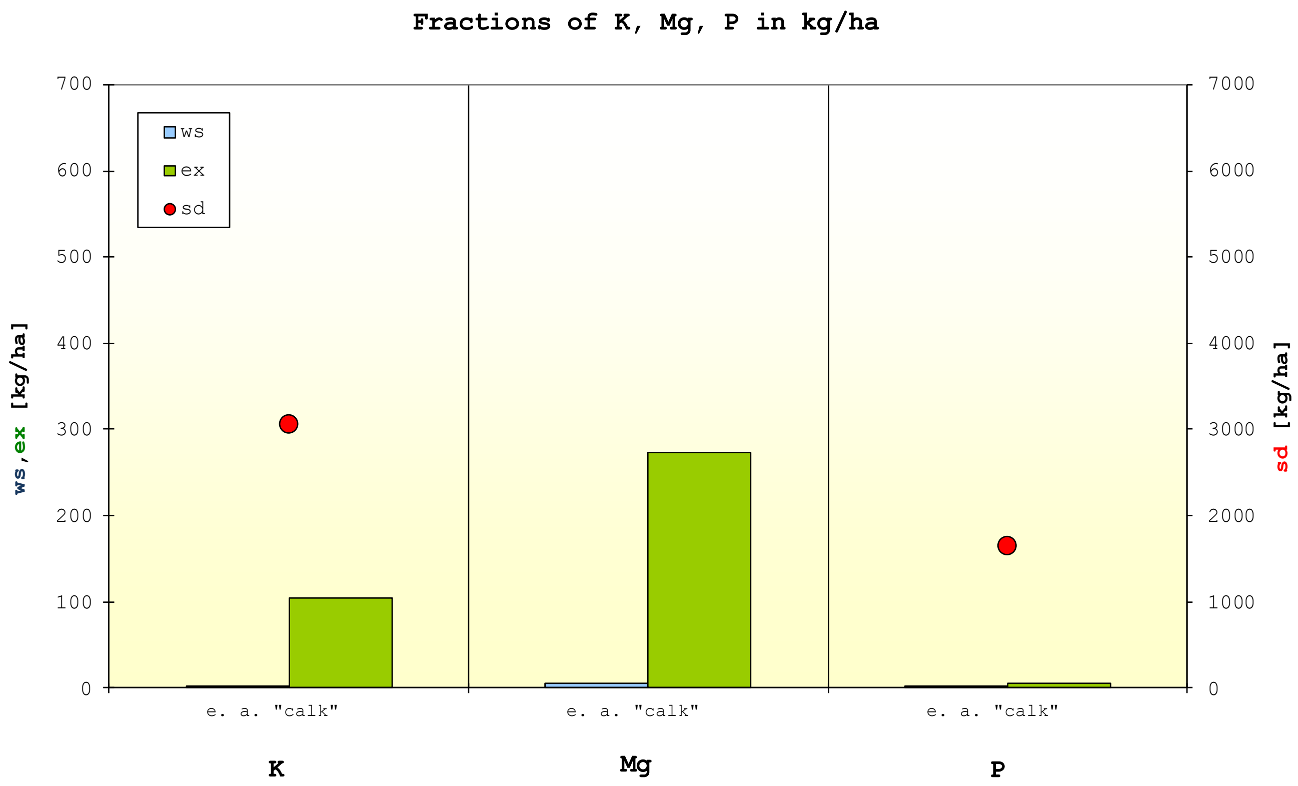


Figure: Fractions of nutrients K, Mg, P (ws=water-soluble, ex=exchangeable, sd= subsequently deliverable). All contents are net values (ex without ws, sd without ex and ws)

The figure above and the following tables show the **plant-available** (= water-soluble + exchangeable) proportions of potassium, magnesium and phosphorus at the moment of **sampling.** The **subsequentially deliverable proportions** can be partially mobilized (= plant available) by various processes during the vegetation period.
In this **analytical snapshot,** it makes no ecological sense that the total amount of nutrients that the listed crop needs at the stated yield level over the entire vegetation period should be present in an easily available form.

On the information sheet "Plant Nutrition", **nutrients** and potentially **toxic substances** are tabulated in different fractions (water-soluble, exchangeable, reserve).

Potassium

Table 4: Different K-pools in the soil, exemplary analyse "calk"

Element	Availability	Amount kg/ha	Comment
K	water-soluble	2,1	deficiency
K	exchangeable	104	sufficient
K	subsequently deliverable	3050	very high reserves

The specific site tends to K-fixation.

Magnesium

Table 5: Different Mg-pools in the soil, exemplary analyse "calk"

Element	Availability	Amount kg/ha	Comment
Mg	water-soluble	5,6	sufficient
Mg	exchangeable	274	supply for amelioration
Mg	subsequently deliverable	27400	very high reserves

Phosphorus

Table 6: Different P-pools in the soil, exemplary analyse "calk"

Element	Availability	Concentration mg/l	Amount kg/ha	Amount in % P total	Comment
P	water-soluble	0,11	0,2	0,01	deficiency
P	exchangeable		5	0	deficiency
P	subsequently deliverable		1650	35	min. reserves very high
P	organic		1345	29	org. reserves very high
P	total		4657		Total contents very high

The P-concentration in the ***soil solution*** is **0.11 m*g/l*** and thus under the limit of the range for proper plant development. In total, approx. **5 kg/ha** P are present in a ***plant-available*** form. This quantity is not sufficient for the entire vegetation period. However, it can be expected that depending on the temperature and humidity conditions, P is continuously mobilized from the reserve fractions by microbiological and chemical processes.

The ***acid-soluble reserve pool*** with approx. **1650 kg/ha** is very well replenished, the organic ***reserves*** are very high with at about **1350 kg/ha.** In order to ensure the sustainable security of P-supply, measures should be taken that sustainably mobilize P from the **reserve pools.** Several strategies are suitable for this purpose, such as:

- An interplay of physiologically acidic and basic fertilizers
- Promoting microbial activity (e.g. improvement of ventilation, supply of trace elements, green fertilizers, intermediate crops, leaving straw on the field)
- Ion competition (e.g. silicates)
- Cultivation of P-solubilizing plants (e.g. buckwheat, white lupine, phacelia)
- Supply of P-solubilizing bacteria (megaterium phosphaticum)

Trace elements and useful elements

Trace elements are essential for plant nutrition and are present in plants in very small amounts. Useful elements can cause benefits in certain cultures in terms of vitality, the defense against harmful organisms or the binding/mobilization of nutrients.

Iron (**Fe**) is usually present as a mineral reserve in large quantities in the soil (org. reserve mostly insignificant => absolute deficiency on highly organic soils such as those commonly found in upland moors, **frequent levels** in soil **5.000 to 40.000 mg/kg**). The **content** in **plants** is between **50 and 1.000 mg/kg DM**. Fe is involved in redox reactions, photosynthesis and breathing.

Manganese (**Mn**) is contained in the soil in many minerals and can be partly fixed by humus (common **contents** in soil **200 to 400 mg/kg).** The **content** in **plants** varies between **20 and 200 mg/kg DM**. Manganese activates enzymes and is involved in redox reactions.

Zinc (**Zn**) is contained in various minerals and can be partially precipitated or fixed in the humus (common **contents** in soil range from **10 to 300 mg/kg).** The **contents** in **plants** are between **10 and 100 mg/kg DM**. Zinc activates enzymes, is involved in photosynthesis and promotes the production of growth substances.

Copper (**Cu**) is contained in various minerals and ores, can be precipitated as a secondary mineral or fixed in the humus (common **contents** in soil **5 to 100 mg/kg**). The contents in plants are between **2 and 15 mg/kg DM**. Copper is a component of redox systems (photosynthesis).

Boron (**B**) is contained in the mineral tourmaline, as well as in mica, often precipitated as a secondary mineral (common **levels** in soil **5 to 100 mg/kg).** The contents in **plants** are between **2 and 100 mg/kg DM**. Boron is a component of the cell wall and involved in the formation of growth substances.

Molybdenum (**Mo**) is present in silicates such as olivines and iron oxides, after weathering often precipitates again (common **levels** in soil **0.5 to 5 mg/kg).** The contents in **plants** range from **0.2 to 3 mg/kg DM**. Molybdenum is a component of enzymes (nitrate reductase, nitrogenase, phosphatase).

Silicon (**Si**) is the main component of many soils (30%), but very immobile. The **content** in **plants** is high (**1.000 to 10.000 mg/kg DM**) and is roughly equivalent to the phosphorus content. Silicon strengthens the cell walls and the supporting tissue, promotes vitality and strengthens the defense against harmful organisms.

Cobalt (**Co**) is strongly related to the iron content. **Common levels** in soil are **1 to 10 mg/kg**. Cobalt is not essential for plant nutrition but is absolutely necessary for all bacteria and animals as well as humans (vitamin B12). The **contents** in **plants** are between **0.03 and 0.3 mg/kg DM**.

Table 7: Trace elements in different pools, exemplary analyse "calk"

Element	Plant-available kg/ha	Reserve pool kg/ha	Recommended addition via soil kg/ha
Fe	0,1	11000	1,80
Mn	0,00	1970	0,90
Cu	0,01	35,0	0,07
Zn	0,00	70,0	0,70
Mo	0,00	0,00	0,05
B	0,49	15,00	none
Si	38,0	10140	none
Co	0,000	18,9	0,002

*) Difference in plant requirements during the entire vegetation period at the moment of sampling.

Attention: Surplus of B!

** The reserve contents of iron (**Fe**) and manganese (**Mn**) are high. Fe and Mn are mobilized in the soil mainly by reductive conditions (=air deficiency) and acidity. After precipitation events and in humid conditions, many soil pores are filled with water, Fe and Mn are sufficiently mobilized. In dry phases, Fe and Mn are strongly bound. Some plants, such as e.g. sunflowers, develop special roots (proteoid roots) in case of Fe deficiency in order to mobilize more Fe from the soil. If a Fe and Mn deficiency actually occurs, the application via the leaf is recommended.

Toxic elements

No abnormalities.

With best regards

Univ.Lek. DI. Hans Unterfrauner

Note: The interpretation and the recommended measures refer to the received soil sample. No liability is assumed for the accuracy of the sampling and the quality of the soil sample.

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Adresse:	Erdbergstraße 10/33	Bezeichnung:	8178 Boden
	1030 Wien	Kulturart:	W Weizen
Standortbezeichnung:	UK8185	Tiefe:	0-30cm Ertrag: 8t
Probenahmedatum:			

PARAMETER	SYMBOL	EINHEIT	WERT
Bindig.Schwere	KH	-	50,5
Leitfähigkeit	eL	mS/cm	0,346
Kalkgehalt*	$CaCO_3$	%	7,7
Wassergehalt	WGF	%	8,63
Reaktion (w)	pH-H_2O	-	7,35
Reaktion (n)	pH-$CaCl_2$	-	
Reaktion (a)	pH-KCl	-	7,22
Austauschkap. (T)	CEC_p	mmolc/100g	10,26
Basensättigung	BS	% CECp	100,00
aktiver T-Ant.	Ta/Tp		
Ca- Anteil an T	Ca%	% CECp	90,77
Mg- Anteil an T	Mg%	% CECp	7,98
K- Anteil an T	K%	% CECp	0,94
Na- Anteil an T	Na%	% CECp	0,27
NH_4-N- Anteil an T	NH_4-N%	% CECp	0,01
H^+- Anteil an T	H^+	% CECp	<0,01
Al- Anteil an T	Al%	% CECp	<0,01
Ba- Anteil an T	Ba%	% CECp	0,02
Pot.Säureanteil	Sp%	% CECp	<0,01
Abb.org.Substanz	AOS	%	3,55
Org. Kohlenstoff	C_{org}	%	2,06
Ges. Stickstoff	N_t	mg/kg	1700
Org. Stickstoff	N_{org}	mg/kg	1695
Min. Stickstoff	N_{min}	mg/kg	5,2
H_2O-lösl.Stickstoff	N_l	mg/kg	5,0
Ges. Schwefel	S_t	mg/kg	410,0
Ges. Phosphor	P_t	mg/kg	1062
Org. Phosphor	P_{org}	mg/kg	306,7
Min. Phosphor	P_{min}	mg/kg	755,3
C/P-Verhältnis	C/P	m/m	67,2
C/S-Verhältnis	C/S	m/m	50,3
C/N-Verhältnis	C/N	m/m	12,1
Rel.H_2O-Kapaz.	RWK	%Gew.	
Feuchtdichte	FDICHTE	g/l	
Trockendichte	TDICHTE	g/l	
Extrverh. I	EXI	l/kg	0,50
Extrverh. II	EXII	l/kg	9,91
Färbung/Trübung	FT		13

PARAMETER	I H_2O	II Ausb	III Nachl	IV Gesamt
mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Ca	32,27	1866	28982	
Mg	2,02	99,56	6248	
K	0,76	37,85	692,09	
Na	1,67	6,41	51,49	
NH_4-N	0,03	0,18		
H	<0,01	0,01		
Al	0,0010	<0,1784	4539	
Ba	0,0070	1,15	64,34	
PO_4	0,17	3,56	1527	
P	0,06	1,16	498,10	
NO_3-N	4,97			
SO_4	5,35			
Cl	3,88			
HCO_3	68,15			
SiO_3	6,58	31,29	6264	
BO_3	0,22	0,74	19,35	
Ag	<0,0035	<0,0396	<2,00	
Fe	0,04	<0,4757	2501	
Mn	0,0013	<0,0040	449,70	
Cu	0,0049	<0,0406	7,50	
Zn	<0,0101	<0,0496	15,57	
Co	<0,0007	<0,0168	4,30	
Mo	<0,0020	<0,0396	<0,0700	
B	0,04	0,14	3,56	
Sn	<0,0035	<0,0694	<0,70	
Se	<0,0303	<1,1892	<3,60	
As	<0,0182	<0,7928	<0,2200	
Ni	<0,0025	<0,0357	9,75	
Cr	0,0018	0,05	4,10	
Pb	<0,0050	<0,0991	11,81	
Cd	<0,0003	<0,0109	0,20	
Hg				
Tl	<0,0303	<0,9910	<4,00	
V	0,0013	<0,0089	8,29	

* Summe der Carbonate, berechnet als $CaCO_3$

Ausfertigung: 10.09.20

Probeneingang: 21.08.20
Anmerkung: