Soil Extraction Comparisons

A NEW Method Following the Mehlich Methods of 1984

March 2021

Methods

Saturated Paste Extract: SPe – Soil Paste Extraction: Saturating the soil with water and subsequent extraction under partial vacuum of the liquid phase for the determination of dissolved salts. In other words, how much of the elements in your soil become available to the plant from the water used in the test. Test water is usually deionized water where your ag water is less a solution for dissolving the elements. Therefore, what happens in the field is likely much less beneficial than what we see in the results of the test. However, it is best practices today although one might consider using their actual source of water(s) for more accurate results. The margin of error in the method is reported to be 8%. The concern is that the additives, if not consumed by the plant, further decrease the pore space in the soil.

Exchangeable AA – Weak: Ammonium acetate (NH4C2H3O2) (AA) is the extractant predominately used to determine exchangeable cations in agricultural soils. It is stated - On calcareous soils containing calcium carbonate (CaCO3), this method over estimates exchangeable calcium (Ca). Exchangeable cations refer to the positively charged ions which are attached to the edge of clay particles or organic matter in the soil. The cations include Calcium, Magnesium, Potassium, Sodium, Hydrogen and Aluminum. With the right water and treatments these may be actually exchangeable and made available to the plant to consume, however that is not the norm. The norm is these Exchangeable Cations continue to increase in the soils hindering the soils pore space an ability to transport and provide available oxygen, water and nutrition on plant demand, thereby causing stress and growth suppression.

Exchangeable Mehlich – Strong: Dr. Adolf Mehlich developed the Mehlich-1, Mehlich-2, and Mehlich-3 series of soil extractants, each one as an improvement over the previous in the sequence. Mehlich-2 failed completely at the outset, Mehlich-1 and Mehlich-3 (in 1984) soil extractants were found effective. Mehlich 1, two dilute acids: 0.05M HCl and 0.0125M H2SO4. Melich 3 acids, 0.2M CH_3COOH, 0.015M NH_4F, 0.013M $HN0_3$, 0.001M EDTA, and 0.25M NH4N03 (acetic acid, ammonium fluoride, nitric, chelant, ammonium nitrate) – Ref. https://edis.ifas.ufl.edu/ss620

NEW Exchangeable – Very Strong: HCl, Nitric and H2O2.

These Soil Analyses

Soil Baseball Field – scalped in preparation of new sod. See report.
Conditions: Unable to get water down. Concern of sod taking and its sustainability. The soil is tiled for flushing and draining.
Location: Nevada – elevation 4,505 – 7.5 inches annual rainfall.

Soil Analyses

Infield

						all ppm														
Ref.	Method	pH	EC	No3-N	NH4-N	P	K	S	Ca	Mg	Na	CO3	HCO3	Cl	B	Fe	Mn	Zn	Cu	Al	SAR
1	Soil Paste Extraction	7.5	0.27	3.9	0.2	4	24	13	16	4.6	26	<10	77	8	0.17	0.87	<0.05				1.5
2	Exchangeable AA - Weak	7.1				39	240	9	883	146	39				0.3	6	<1	0.4	0.2		
3	Exchangeable Mehlich - Strong	7.7				39	225	9	985	204	46				0.3	76	44	1.3	0.5		
4	NEW Exchangeable - Very Strong					410	756		2,420	2410	266					10,270	160	23	7	4,464	

Outfield

						all ppm														
Ref.	Method	pH	EC	No3-N	NH4-N	P	K	S	Ca	Mg	Na	CO3	HCO3	Cl	B	Fe	Mn	Zn	Cu	Al	SAR
1	Soil Paste Extraction	7.3	0.15	2.2	0.2	1	6	3	15	4.5	10	<10	64	3	0.05	0.079	<0.05				0.6
2	Exchangeable AA - Weak	7.1				23	91	2	906	174	18				<0.1	12	<1	0.4	0.3		
3	Exchangeable Mehlich - Strong	7.1				23	108	3	1,090	214	21					118	38	1.3	0.5	<0.1	
4	NEW Exchangeable - Very Strong					480	653		3,070	2,990	305					11,140	178	28	8	5,007	

Water Quality to Soil Conditions

(One soil comparison)

How did this water create these conditions in this soil? Soil is a filter, like filtering water through soil to drink.

Elements	CO3	HCO3	Ca as Ca	Mg as Mg	P	K	Bac T	S	SO4	Fe	Mn	Zn	Na	Cl	B	Cu	NO3	Al
Water	0	64	3	12	0	2	0	3.3	1	0.1	0	0.0	13	13	0.0	0.0	0	
VSA Exch.			3,070	2,990	480	653				11,140	178	28	305	8.0		8		5,007
Traits	Cementation (Bicarbonate & Valence)						Biology (Sulfate Reducing Bacteria - toxic H2S, acid and Iron Bacteria - Biofilms)					Toxicity (+ Ca and Fe & Valence)					Suffocation when acidified	
	Reduced SAR and CEC – Also Perpetuate Anoxic Conditions																	

Note: Conventional modality indicates you can't move the iron or the aluminum without available lime. Keeping lime available through the growth cycle without other factors in play may be some of the main reasons our plants are not at their optimum potential. This was evidenced in A-B studies performed by HCT in Central Valley California in Almonds and Pistachios.

Reference: Filtration Spectrum