

Leaching Requirement !

What it is and what it ain't.

By David M. Kopec Ph.D.

University of Arizona

Maricopa Az.



now 1 .25 miles from somewhere !



$$1 \text{ ppm} \\ = 1 \text{ mg/L}$$

$$1 \text{ dS/M} \\ = 1 \text{ mmhos/cm}$$

Convert dS/m or (mmhos/cm)
to
ppm or (mg/L)



640 ppm to
1 dS/m



Salinity Hazard of Water

HAZARD	TDS ppm or mg/L	EC(w) dS/m or mmhos/cm	LEACH REQT.
Low	160	0.25	Normally occurs with regular irrigations
Medium	160-480	0.25-0.75	Moderate amount
High	480-1,440	0.75-2.25	Moderate plus good drainage
Very High	> 1,440	>2.25	Excess leaching and excellent drainage

HIGH E.C. WATER



What is the problem...?

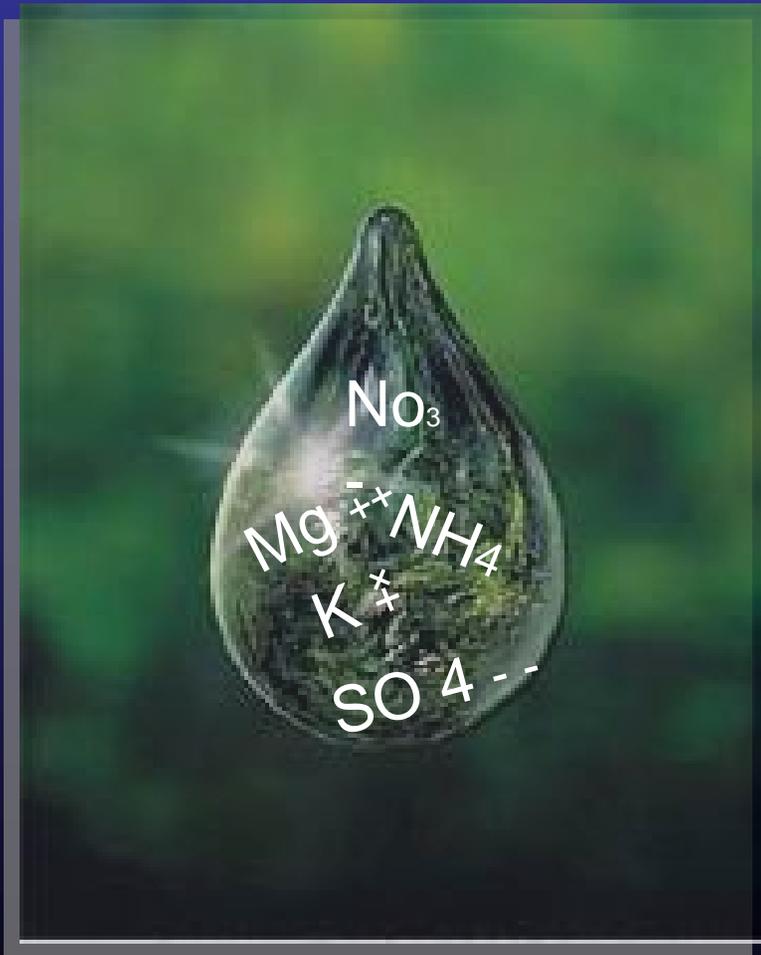


SALINITY



NEED MORE OF THE SAME
SALTY WATER TO PREVENT
THE SALTS FROM GETTING TO
HIGH AROUND THE ROOTS !

TWO THINGS TO CONSIDER.....



2.4.2 Salinity Control by Leaching: (FAO)

(1) When the build-up of soluble salts in the soil becomes or is expected to become excessive, the salts can be leached by applying more water than that needed by the crop during the growing season.

2.4.2 Salinity Control by Leaching: (FAO)

(2) This extra water moves at least a portion of the salts below the root zone by deep percolation (leaching).

(3) Leaching is the key factor in controlling soluble salts brought in by the irrigation water.

2.4.2 Salinity Control by Leaching: (FAO)

(3) Over time, salt removal by leaching must equal or exceed the salt additions from the applied water or salts will build up and eventually reach damaging concentrations.

(4) The questions that arise are how much water should be used for leaching ?

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LEACHING REQUIREMENT :

(L. R.) =



EC (irr-water)

$$[5 \times EC \text{ (soil salinity tolerance)}] - EC \text{ (irr-water)}$$



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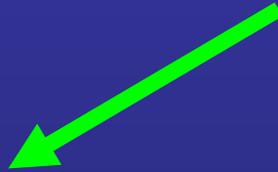
Description:

Water Complete Irrigation

Test	ppm	meq/l	lb/ac-ft water
Cations			
Sodium	112	4.87	300
Calcium	44	2.19	120
Magnesium	23	1.92	63
Potassium	15	0.38	41
Anions			
Carbonate	0	0.00	0.00
Bicarbonate	250	4.10	680
Chloride	131	3.70	360
Sulfate-S	11	0.70	30
Nitrate-N	4.1	0.27	11
Phosphate	3.8	0.14	10
Boron	0.26	0.00	0.71
Total Salts	590	18.26	1,600
* pH 8.0 SU			
* ECw 0.8 mmho 			
* Cation/Anion Ratio 1.05			
SAR 3.40			
Adj RNa 3.79			
Hardness (Calculated) 205 mg equiv. CaCO3/L			
Leaching Requirement 3% (% additional irrigation for leaching salts)			
Sulfuric Acid Requirement 33.4 (~gallons conc. Sulfuric Acid / ac-ft to lower pH to 5.5)			
USDA Classification C3-S1			

This water should be used only on soils with no restricting layers so the leaching of salts can be accomplished. Tolerance such as citrus should be avoided in the higher ranges of C3.

EC (soil tolerance).



Bermuda	100% 6.9	90% 8.5	75 % 11	50% 15	No growth 23
Perennial ryegrass	5.6	6.9	8.9	12.0	19



LEACHING REQUIREMENT :

For bermudagrass.....

Description:

Water Complete Irrigation

Test	µm	meq/l	lb/ac-ft water
Cations			
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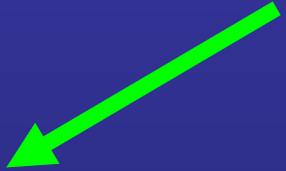
pH 8.0 SU
EC (irr) 1.6 mmhos

*

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Adj RNa	3.79
Hardness (Calculated)	205 mg equiv. CaCO3/L
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LEACHING REQUIREMENT :

(L. R.) =

EC (irr-water) 1.6

[5 X EC (e) 6.9] - EC (irr-water) 1.6

LEACHING REQUIREMENT :

$$(L. R.) =$$

1.6

$$[34.5] - 1.6$$

LEACHING REQUIREMENT :

$$(L. R.) =$$

1.6

32.9

= 0.048

= 4.8 % L.R.

LEACHING REQUIREMENT :

For perennial ryegrass.....

Description:

Water Complete Irrigation

Test	µm	meq/l	lb/ac-ft water
Cations			
Sodium	112	4.87	300
Calcium	44	2.19	120
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pH 8.0 SU
EC (irr) 1.6 mmhos

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SAR	3.40
Adj RNa	3.79
Hardness (Calculated)	205 mg equiv. CaCO3/L
Leaching Requirement	3% (% additional irrigation for leaching salts)
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LEACHING REQUIREMENT :

(L. R.) =

EC (irr-water) 1.6

[5 X EC (e) 5.6] - EC (irr-water) 1.6

ryegrass

LEACHING REQUIREMENT :

$$(L. R.) =$$

1.6

$$[28] - 1.6$$

LEACHING REQUIREMENT :

(L. R.) =

1.6

26.4

= 0.060

= 6.0 % L.R.

LEACHING REQUIRMENT :

For bermudagrass.....

More salt please....



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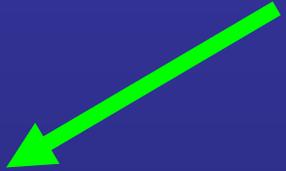
pH 8.0 SU
EC (irr) 2.9 mmhos

*

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Adj RNa	3.79
Hardness (Calculated)	205 mg equiv. CaCO3/L
Leaching Requirement	3% (% additional irrigation for leaching salts)
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LEACHING REQUIREMENT :

(L. R.) =

EC (irr-water) 2.9

[5 X EC (e) 6.9] - EC (irr-water) 2.9

LEACHING REQUIREMENT :

(L. R.) =

2.9

[34.5] - 2.9

LEACHING REQUIREMENT :

(L. R.) =

2.9

3.16

= 0.092

= 9.2 % L.R.

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ADJUSTED WATER AMOUNT: A.W.



How much water you need to apply over the “target amount.



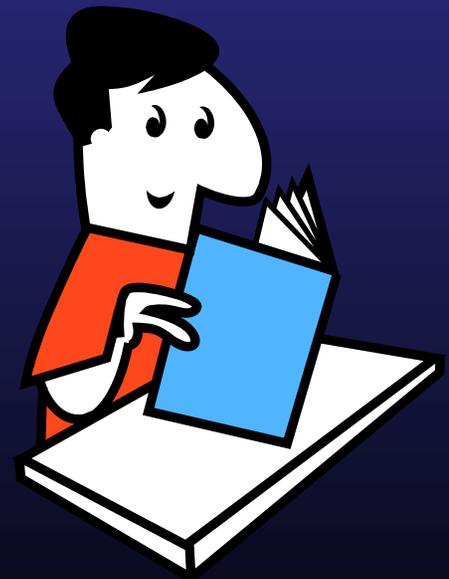
A.W. =

Target amount “

1 – L.R.

Want to apply 3/8" with
water that has leaching
requirement of 9%

L.R. = 0.09%



A.W. =

Target amount “

1 – L.R.

0.375 “

1 - .09

0.375

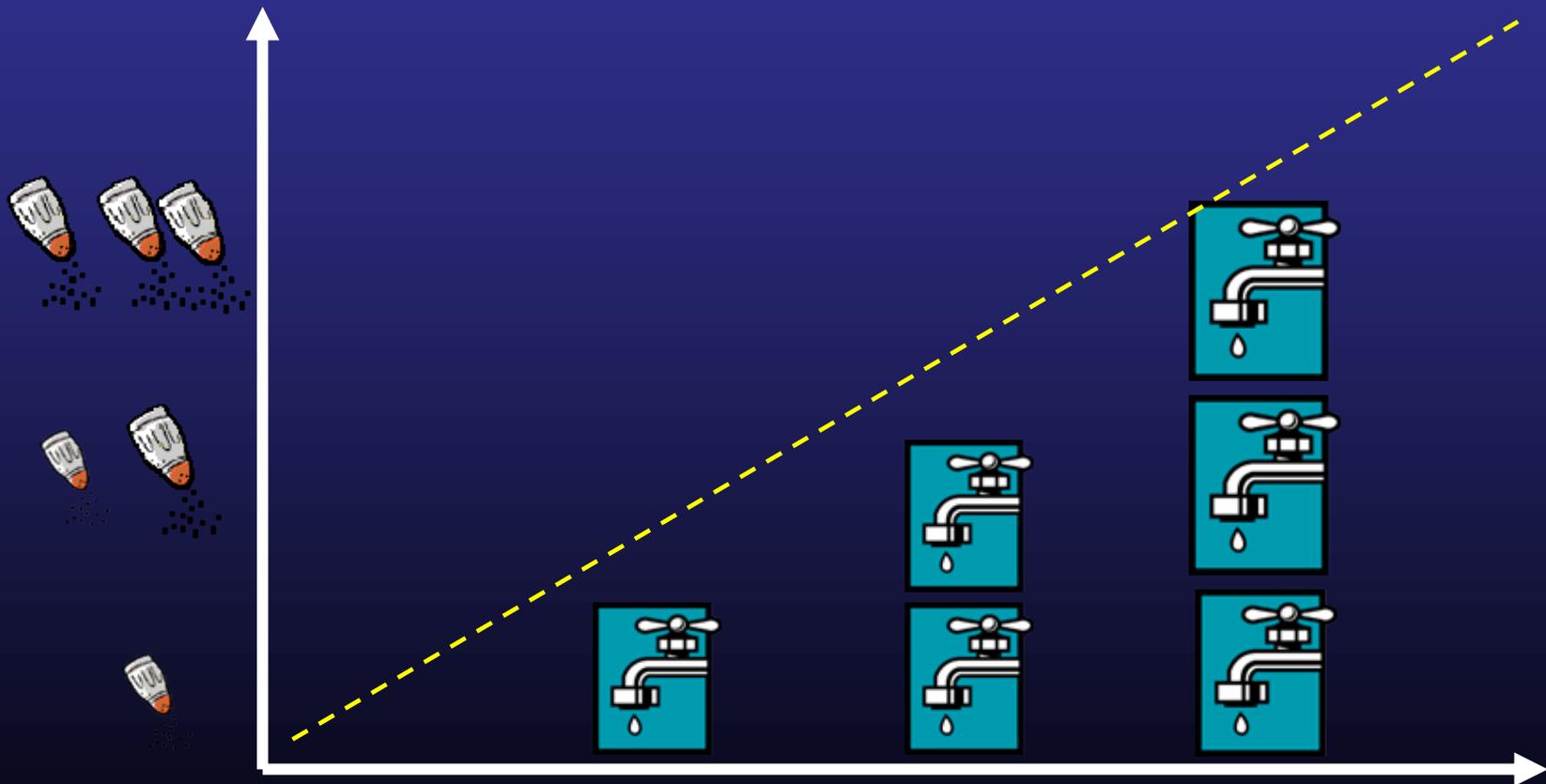
0.91

A.W. =

$$\frac{0.375''}{0.91} = 0.421''$$

Have to apply 0.42 " of salty water (EC of 2.9 dS/m) so the turf can get 3/8" of water in the plant to meet its ET requirement.

- Higher salinity of water
- Higher L.R. value becomes
- Higher applied water amount becomes.....



WHAT it ain't.....

Anything else but
that !

<i>Salinity</i>	<i>TDS</i>		<i>bermuda</i>	<i>ryegrass</i>
<i>dS/m</i>	<i>ppm</i>		<i>L.R.</i>	<i>L.R.</i>
<i>mmhos/cm</i>	<i>mg/L</i>			
1.6	998		4.7	5.9
1.7	1082		5.1	6.4
1.8	1165		5.5	7.0
2.0	1249		5.9	7.5
2.2	1416		6.7	8.6
2.9	1833		8.9	11.4
4.2	2668		13.5	17.5
5.5	3502		18.5	24.3
6.8	4337		24.0	31.9
8.1	5171		30.0	40.6
9.4	6006		36.6	50.4
10.7	6840		44.0	61.7
12.0	7675		52.1	74.9
13.3	8509		61.3	90.4
14.6	9344		71.6	109.0
dS/M	ppm TDS		%	%

Range of Leaching Requirements (L.R.)

for turf at various irrigation salinity levels.



Full year	L.R. %	L.R. %	
Turf	8.90%	11.40%	
	bermuda	ryegrass	
L.R. of blend	Month (inch)	L.R. grass/month	Applied Irr. Reqt. (A.W.)
Jan	1.7	0.114	1.92
Feb	2.4	0.114	2.71
Mar	4	0.114	4.51
Apr	5.9	0.114	6.66
May	7.3	0.114	8.24
June	7.4	0.089	8.12
July	7.7	0.089	8.45
Aug	7.3	0.089	8.01
Sep	5.6	0.089	6.15
Oct	4.2	0.114	4.74
Nov	2.5	0.114	2.82
Dec	1.6	0.114	1.81
			64.14
Add 15% for for efficiency loss			75.5
			inches

L.R. & A.W. amounts for bermuda and ryegrass for Phoenix using irrigation water with EC (w) of **2.9 dS/M.**

SALT TOLERANCE

Poa annua

KBG

Rye

Tall Fescue

Creeping Bentgrass

ALKALAI SALTGRASS *****

(Fults or Salty) varieties

Gramma grass

Bermuda *

Hybrid bermuda **

Paspalum ***

Distichlis *****



**TURF IS
YOUR
BUSINESS**

