

# UC Nursery and Floriculture Alliance

## Fertilizers & Plant Nutrition Workshop

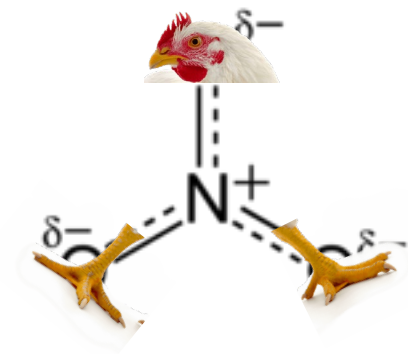
*Measuring Nitrate in Water*



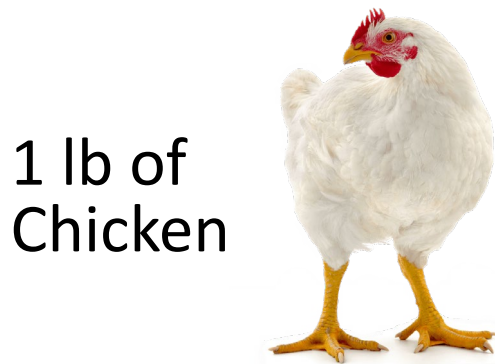
7/12/2022 Gerry Spinelli

# Units of nitrate concentration

- ppm and mg/L are (almost) the same
- You'll find two units for nitrate:



1 lb of	Nitrate	=	0.22 lb of	Nitrate-nitrogen
	$\text{NO}_3^-$			Nitrate-N
4.43 lbs of		=	1 lb of	$\text{NO}_3^-$ -N
				Nitrate expressed as nitrogen



1 lb of  
Chicken

=

0.22 lb of Chicken meat  
Chicken-M  
Chicken expressed as meat



4.43 lb of Chicken = 1 lb of Chicken meat



# Hands-on activity! 3 minutes



Test with strips using different units and compare with your colleagues. Try the Horiba too!

# Other methods to measure nitrate



HI98728  
**Nitrate-Nitrogen Portable Photometer**

★★★★☆ 7 Reviews

\$355.00

Kit \*

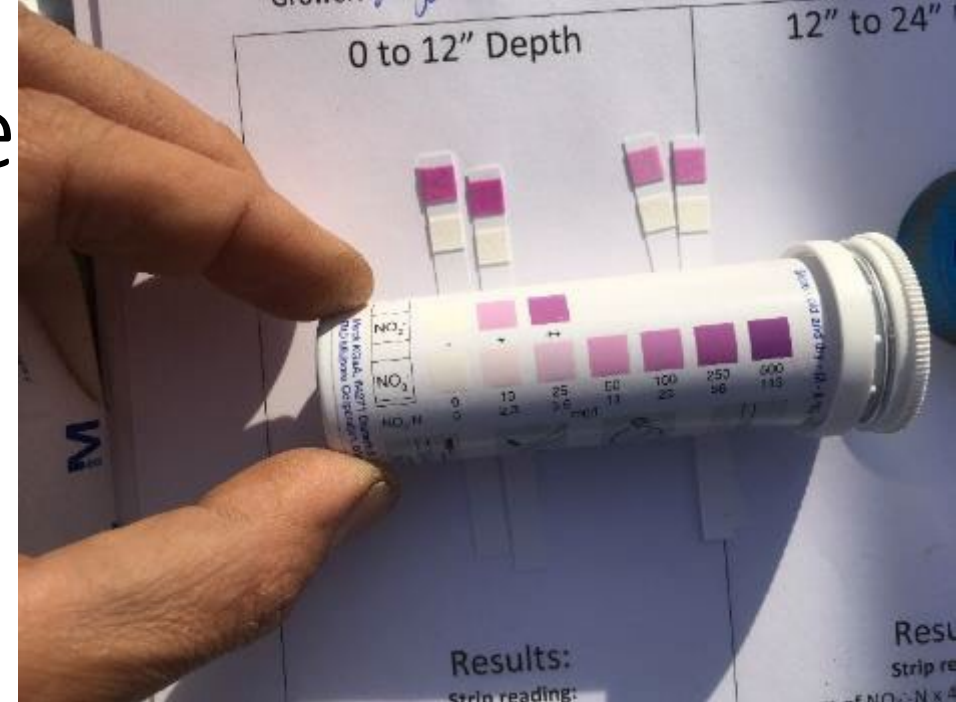
Choose Option ▼

Qty: 1

+ -

CHOOSE OPTIONS

Note: Limited Quantities Available, While Supplies Last



StripScan Reference Card (\$70)

These are more accurate than the Horiba, particularly if high  $\text{Cl}^-$  in the sample

Reflectometer (\$1000)





	Fertilizer formula - Formula del fertilizante	Fertilizer amount in stock solution - Cantidad de fertilizante en la solución concentrada	Water in stock solution - Agua en la solución concentrada	Dilution factor - Factor de dilución	Conversion factor- Factor de conversion	Amount of nutrients in stock solution - Cantidad de nitrógeno en la solución concentrada		Concentration of N in stock solution - Concentración de nitrógeno en la solución concentrada		Final concentration of N in irrigation water - Concentración final de nitrógeno en el agua de riego	
		lbs	gal	1		lbs	grams	lbs/gal	grams/liter	oz/gal	milligrams/liter or ppm
N	17	1	1	:	1	0.170	77	0.170	20	0.027	204
P	5	grams	liters	100	0.436	0.022	10	0.022	3	0.003	26
K	17	454	3.79		0.83	0.141	64	0.141	17	0.023	169



In most cases, woody species should receive adequate nutrition from a liquid feed containing 50 mg N/l, 20 mg P/l, and 50 mg K/l.

Most herbaceous species require about 100-150 mg N/l, 20 mg P/l, and 120-150 mg K/l.

Richard Evans and Linda Dodge FREP project  
Final Report, 2007

<https://plantmarvel.com/>

## Feeding in PPM through a proportioner

### Ounces of Fertilizer Required Per Gallon of Water to Achieve 100 PPM

Select the percentage of fertilizer element in the left hand column and the ratio of the injector across the top of the chart. Where they meet is the amount of fertilizer required per gallon of concentrate solution to achieve 100 Parts Per Million.

For other PPM concentrations multiply the required amount by desired PPM and divide by 100.

Example: To feed at 400 PPM Nitrogen

	1:15	1:50	1:100	1:150	1:200	1:250	1:300	1:350	1:400	1:500
3%	6.66	22.21	44.43	66.64	88.85	111.07	133.28	155.49	177.71	0.05
4%	5	16.66	33.32	49.98	66.64	83.3	99.96	116.62	133.28	0.07
5%	4	13.33	26.66	39.98	53.31	66.64	79.97	93.3	106.62	0.08
6%	3.33	11.11	22.21	33.32	44.43	55.53	66.64	77.75	88.85	0.1
7%	2.86	9.52	19.04	28.56	38.08	47.6	57.12	66.64	76.16	0.12
8%	2.5	8.33	16.66	24.99	33.32	41.65	49.98	58.31	66.64	0.13
9%	2.22	7.4	14.81	22.21	29.62	37.02	44.43	51.83	59.24	0.15
10%	2	6.66	13.33	19.99	26.66	33.32	39.98	46.65	53.31	0.17
11%	1.82	6.06	12.12	18.17	24.23	30.29	36.35	42.41	48.47	0.18
12%	1.67	5.55	11.11	16.66	22.21	27.77	33.32	38.87	44.43	0.2
13%	1.54	5.13	10.25	15.38	20.5	25.63	30.76	35.88	41.01	0.22
14%	1.43	4.76	9.52	14.28	19.04	23.8	28.56	33.32	38.08	0.23
15%	1.33	4.44	8.89	13.33	17.77	22.21	26.66	31.1	35.54	0.25
16%	1.25	4.17	8.33	12.5	16.66	20.83	24.99	29.16	33.32	0.27
17%	1.18	3.92	7.84	11.76	15.68	19.6	23.52	27.44	31.36	0.28
18%	1.11	3.7	7.4	11.11	14.81	18.51	22.21	25.92	29.62	0.3
19%	1.05	3.51	7.01	10.52	14.03	17.54	21.04	24.55	28.06	0.32
20%	1	3.33	6.66	10	13.33	16.66	19.99	23.32	26.66	0.33
21%	0.95	3.17	6.35	9.52	12.69	15.87	19.04	22.21	25.39	0.35
22%	0.91	3.03	6.06	9.09	12.12	15.15	18.17	21.2	24.23	0.37
23%	0.87	2.9	5.79	8.69	11.59	14.49	17.38	20.28	23.18	0.38
24%	0.83	2.78	5.55	8.33	11.11	13.88	16.66	19.44	22.21	0.4
25%	0.8	2.67	5.33	8	10.66	13.33	15.99	18.66	21.32	0.42
26%	0.77	2.56	5.13	7.69	10.25	12.82	15.38	17.94	20.5	0.43
27%	0.74	2.47	4.94	7.4	9.87	12.34	14.81	17.28	19.75	0.45
28%	0.71	2.38	4.76	7.14	9.52	11.9	14.28	16.66	19.04	0.47
29%	0.69	2.3	4.6	6.89	9.19	11.49	13.79	16.09	18.38	0.48
30%	0.67	2.22	4.44	6.66	8.89	11.11	13.33	15.55	17.77	0.5

## Nutriculture Conductivity Chart

### Formulations and Conductivity in Millimhos (mmhos)

PPM NITROGEN CONCENTRATION							
FORMULA	50	100	150	200	300	400	
4-25-35	1.30	2.60	3.90	5.20	7.80	10.40	13.00
5-40-17	1.43	2.85	4.28	5.70	8.55	11.40	14.25
7-40-17	.60	1.20	1.80	2.40	3.60	4.80	6.00
10-20-30	.50	.99	1.50	1.99	2.99	3.98	4.79
10-30-20	.48	.96	1.44	1.92	2.88	3.84	4.95
12-4-12	.17	.35	1.07	1.43	2.14	2.86	3.58
12-31-14	.42	.84	1.25	1.67	2.51	3.34	4.18
12-45-10	.36	.71	1.07	1.42	2.13	2.84	3.55
13-0-44	.48	.95	1.41	1.88	2.83	3.77	4.73
13-2-13	.37	.75	1.12	1.50	2.25	3.00	3.75
14-0-14	.37	.75	1.12	1.50	2.25	3.00	3.75
14-3-20	.35	.71	1.06	1.42	2.12	2.83	3.55
15-0-15	.34	.69	1.03	1.38	2.06	2.75	3.44
15-0-30	.36	.71	1.07	1.49	2.14	2.85	3.55
15-3-18	.35	.71	1.06	1.42	2.12	2.83	3.54
15-3-20	.35	.70	1.05	1.40	2.10	2.80	3.50
15-5-15	.36	.73	1.09	1.45	2.18	2.90	3.63
15-5-25	.38	.76	1.14	1.52	2.28	3.04	3.80
15-5-30	.37	.74	1.11	1.47	2.21	2.95	3.68
15-10-30	.35	.71	1.06	1.42	2.12	2.83	3.54
15-20-25	.33	.66	1.00	1.37	2.05	2.74	3.42
15-30-15	.32	.64	.96	1.28	1.93	2.57	3.21
16-4-12	.33	.68	1.01	1.35	2.04	2.70	3.37
17-0-17	.35	.70	1.05	1.40	2.10	2.80	3.50
17-5-17	.34	.68	1.01	1.37	2.04	2.70	3.40
17-17-17	.27	.54	.80	1.07	1.61	2.14	2.68
18-3-18	.34	.68	1.01	1.37	2.04	2.74	3.40
18-6-18	.34	.68	1.01	1.37	2.04	2.74	3.40
19-26-14	.21	.42	.63	.84	1.25	1.67	2.09
20-0-20	.21	.41	.62	.82	1.23	1.64	2.05
20-5-20	.33	.65	.98	1.30	1.96	2.62	3.25
20-5-30	.23	.47	.70	.93	1.39	1.86	2.33
20-7-19	.30	.60	.90	1.20	1.80	2.40	3.00
20-7-20	.33	.65	.99	1.30	1.95	2.60	3.25
20-10-20	.31	.62	.94	1.25	1.88	2.50	3.13
20-20-20	.21	.41	.62	.82	1.23	1.64	2.05
21-7-7 A	.31	.61	.92	1.22	1.83	2.44	3.05
21-7-7 N	.18	.36	.54	.72	1.07	1.43	1.80
21-8-18	.32	.64	.96	1.28	1.92	2.56	3.20
24-8-16	.21	.42	.63	.85	1.27	1.70	2.12
25-0-25	.15	.30	.45	.61	.92	1.22	1.52
25-5-20	.14	.30	.42	.61	.90	1.20	1.50
25-10-20	.16	.32	.49	.65	.98	1.30	1.63
25-15-10	.15	.31	.46	.62	.92	1.23	1.55
28-18-8	.10	.20	.30	.40	.60	.80	1.00
30-10-10	.11	.22	.33	.43	.66	.85	1.10

This chart has been developed as a reference to verify the accuracy of fertilizer injectors. The chart is designed to be used in the following manner:

1. Determine the conductivity of your clear irrigation water.
2. Determine the conductivity of your fertilizer solution after it has been proportioned (at the emitter as it is applied to the plants).
3. Subtract the value of 1. (clear water) from 2. (fertilizer solution).
4. Compare this answer with the values on the chart to determine the parts per million of nitrogen being injected.

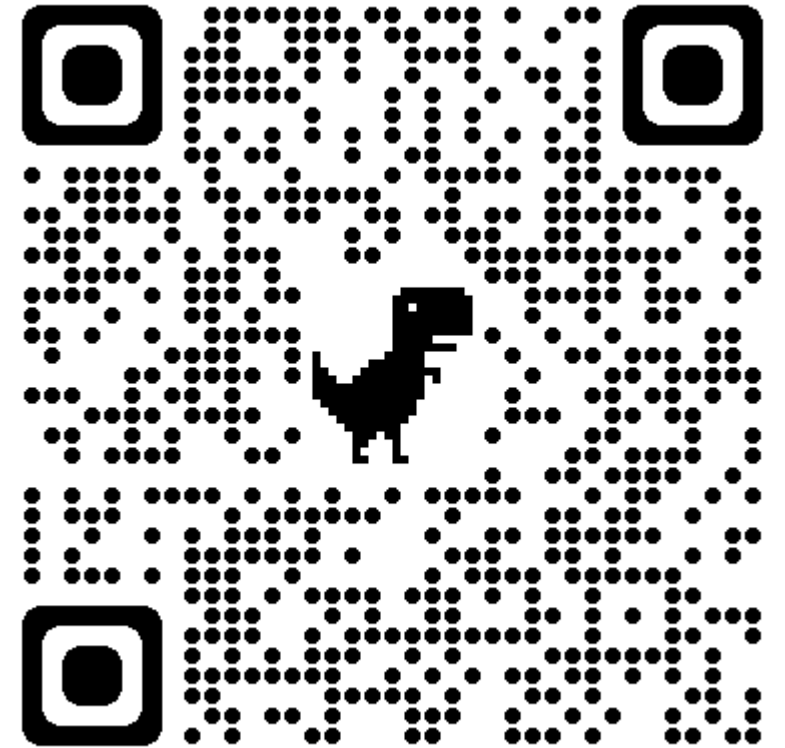
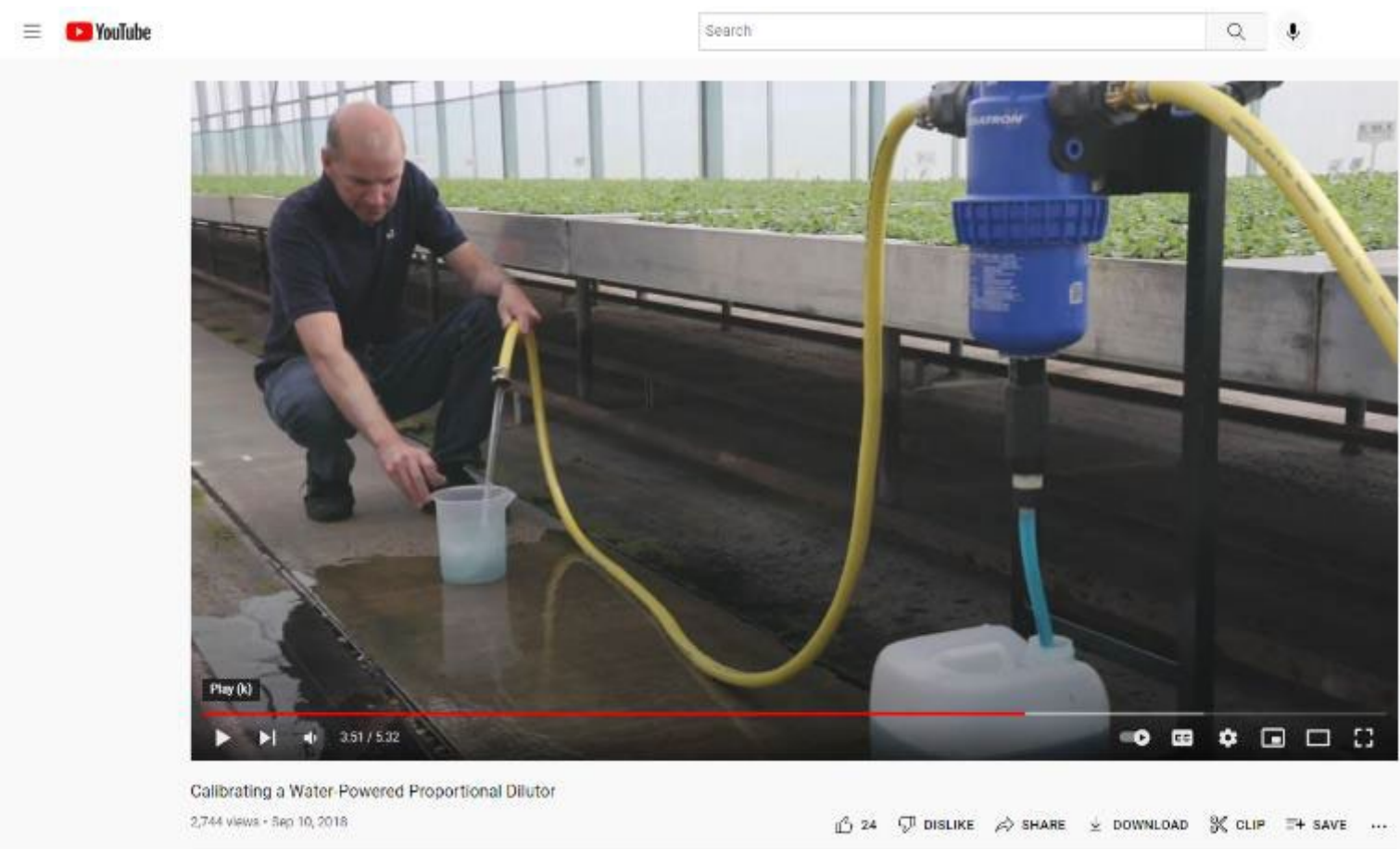
An Example:

If a reading of irrigation water has a value of .2 mmhos and a value of 1.0 mmhos is obtained from the fertilizer-injected water using 20-20-20, the corrected value would be 1.0 - .2 = .80. A look at the chart indicates a value of .82 for 20-20-20 being injected at 200 PPM. With an allowance of + or - 10% this is well within range. To convert millimhos (mmhos) to micromhos (umhos) multiply by 1000.

The values on this chart were obtained under laboratory conditions using distilled water. The values obtained by the grower under field conditions could therefore, vary slightly (±10%) from values listed here. This chart is to be used with Plant Marvel's Nutriculture formulations. Other brands may be composed of different raw materials which would give different values, even though they are the same analysis.



# Calibrate your Dosatron!



# Thank you!

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Please complete the evaluation!

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