Nutrient Budget:
Measure to Manage

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USDA NRCS

United States Department of Agriculture

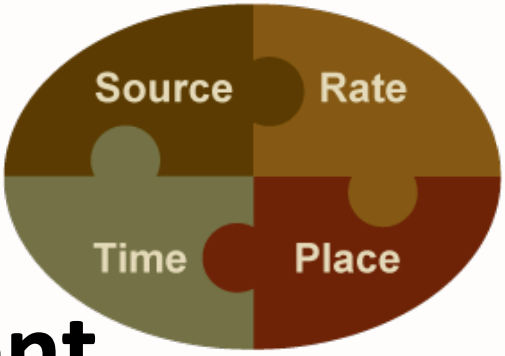
Natural Resources Conservation Service

I will use what I learn in this session to……

- Understand the value of a nutrient budget
- Understand factors that growers must consider when making management decisions
- Help growers prepare a nutrient budget from ranch records and lab analyses of soil, water, crop tissue, yield data, etc.
- Help growers make fertility management decisions (4 R's)

Key Elements for Nutrient Management

- Management by The 4 R's



- Irrigation Water Management

- **Nutrient Budget**

Nutrient Budget Worksheet

1. Identifying Information and Site Characteristics			
1.1 Today's Date	1-Nov-13		
1.2 Field/Ranch Location	Happy Strawberry Ranch		
1.3 Irrigation Method	drip		
1.4 Planned Crop	Strawberry		
1.5 Expected Yield (include units)	6000 trays/A		
1.6 Planting Date for Planned Crop	transplants to be planted November 14		
1.7 Soil type and texture	Arnold loamy sand		
2. Nutrients Available			
2.1 Soil Test Results (date of test)		7-Nov-13	NOTES
2.1.1 Nitrate ppm	69	276	ppm N * 4 is estimate of lbs/A N to 12 inch depth, gray box calculates
2.1.2 P ppm		51	pH equal/greater than 6.0 use Olsen/Sodium Bicarbonate, pH less than 6.0 use Bray value
2.1.3 K ppm		159	Usually listed as NH_4OAc K
2.1.4 % SOM and expected N release	2.3	110.4	See assumptions and calculation in guidance document, gray box calculates
2.2 Irrigation Water Test (date of test)		1-Jun-13	
2.2.1 Irrigation Water NO_3-N (ppm)		14	See notes in guidance if test gives nitrate (NO_3) and not nitrate-nitrogen (NO_3-N)
2.2.2 Acre inches water applied		30	See notes in guidance if not known.
2.2.3 lbs N/A applied with irrigation water		95.3	ppm NO_3-N*0.227=lbs N/acre inch, multiply by acre inches applied for lbs N/A applied with irrigation water, gray box calculates
2.3 Organic soil amendments Date applied:		14-Oct-13	
2.3.3 N from amendments (lbs/A)	90		Carry value over from the Nutrients in Organic Amendments Tab
2.3.4 P_2O_5 from amendments (lbs/A)	36		Carry value over from the Nutrients in Organic Amendments Tab

NRCS

Fundamentals of Nutrient Budget

Fertilizer Applications*

Non-fertilizer Credits and Adjustments*

Crop Requirement

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REPORT NUMBER: 11-255-055 CLIENT NO: 99999

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GROWER:

Graphical Soil Analysis Report

DATE OF REPORT: 09/14/11 LAB NO: 52819 SAMPLE ID: 1 PAGE: 1

Percent Cation Saturation (computed)

Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	2.4	31	132	70	224	534	3141	106	129	2.4	4	17	0.4	0.4	
		LOW	AVERAGE	HIGH											

Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
2.7	20.8	74.3	2.2
		ACIDIC	BASIC

1.3		21.1	L	7.3	
ECe mMho	INCREASING SALINITY →	CEC meq/100g	Ex. Lime	pH	← INCREASING NEED FOR LIME
				Buffer pH:	

Soil Fertility Guidelines

CROP: STRAWBERRIES RATE: lb/acre NOTES:

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	
			500	100		40							0.5	

COMMENTS

SOLUBLE SALTS: Levels above 1.0 mmho/cm (dS/m) need to be reduced before further fertilizing, if aiming for 100% growth potential.

NITROGEN: Use local conditions and experience with variety to determine rates and timing. Allow for nitrate levels in your water source also (ppm NO3 X 0.61 = lb N/ac-ft water). Monitor plant-N.

POTASH applications on soils with more than about 200 ppm K may not show a response. Consider further testing/tissue analysis if in doubt and if report shows less than 2-3% K cation saturation.

BORON: Aim for soil levels above 0.5 ppm to avoid a deficiency. A tissue analysis at the appropriate time will determine more accurately, plant availability. ADD BORON WITH CAUTION.

Mike Buttress, CPAg
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ORGANIC FERTILIZER REPORT

PAGE: 1

SAMPLE ID	REPORT OF ANALYSIS IN PERCENT									REPORT OF ANALYSIS IN PARTS PER MILLION						
	Nitrogen N	Phosphorus P	Phosphate P_2O_5	Potassium K	Potash K_2O	Sulfur S	Magnesium Mg	Calcium Ca	Sodium Na	Iron Fe	Aluminum Al	Manganese Mn	Copper Cu	Zinc Zn		
JLEEM	2.06	0.43	0.99	1.870	2.253											

SAMPLE ID	POUNDS OF NUTRIENTS / TON															
	Nitrogen N	Phosphorus P	Phosphate P_2O_5	Potassium K	Potash K_2O	Sulfur S	Magnesium Mg	Calcium Ca	Sodium Na	Iron Fe	Aluminum Al	Manganese Mn	Copper Cu	Zinc Zn		
JLEEM	41.2	8.6	19.7	37.4	45.1											

☐ Reported on an as-received basis Moisture =

☒ Reported on a dry basis Moisture = 38.37%

Remarks: To convert to pounds of nutrients/ton as received, multiply pounds of nutrients/ton as reported by (100 - moisture %)/100.

This report applies only to the sample(s) tested. Samples are retained a maximum of thirty days after testing.

Robert Butterfield
A & L WESTERN LABORATORIES, INC.

ANALYTICAL CHEMISTS and BACTERIOLOGISTS Approved by State of California

SOIL CONTROL LAB

42 HANGAR WAY WATSONVILLE CALIFORNIA 95076 USA

TEL: 831-724-5422
FAX: 831-724-3188

Account Number: 2090016-1-4818

Alba
P.O. Box 6264
Salinas, CA 93912
Attn: Mike Oliver

Reporting Date: September 13, 2012

Date Received: Water samples received 09/04/12
Sample Identification: Alba Ag Well, collected 09/04/12 12:25
Report: Quantitative chemical analysis with results reported in mg/L (ppm) unless otherwise stated.
Laboratory #: 2090016-1/1

		Degree of Restriction on Irrigation Use	
		Surface	Sprinkler
pH value (pH units)	7.5	Normal Range 6.5 to 8.4	
Conductivity (millimhos/cm)	0.91	Moderate	Moderate
Carbonate Alkalinity (as CO_3)	less than 5	-	-
Bicarbonate Alkalinity (as HCO_3)	190	-	Moderate
Total Dissolved Solids	590	Moderate	Moderate
Nitrate (as NO3)	100	Moderate	Moderate
Chloride (as Cl)	120	None	Moderate
Sulfate (as SO4)	54	-	-
Phosphate (PO4)	less than 1	-	-
Boron (B)	less than 0.1	None	None
Calcium (Ca)	67	-	-
Magnesium (Mg)	29	-	-
Potassium (K)	3.1	-	-
Sodium (Na)	60	None	None
Iron (Fe)	less than 0.05	None	-
Manganese (Mn)	less than 0.02	None	-
Adjusted Rna	1.7	None	None
Sodium Absorption Ratio (SAR)	1.5	-	-
Adjusted SAR	3.2	-	-
	lbs/acre ft of water		
Nitrogen (as N)	62		
Phosphorus (as P_2O_5)	less than 2.1		
Potassium (as K_2O)	10		

Iron in excess of 0.30 ppm or Manganese in excess of 0.05 ppm can cause blockages with drip irrigation.

Mike Galloway

Table 5. Examples of crop N uptake vs. N removed in harvested product. N harvest index is N removed in harvest divided by N uptake, expressed as %. (The values shown here are to illustrate the concept, and it should not be assumed that they are representative.)

	N uptake, lb/acre	N removed in harvest, lb/acre	N uptake minus harvest, lb/acre	N harvest index, %
Corn, grain	240	120	120	50%
Corn, silage	250	225	25	90%
Cotton	250	140	110	56%
Processing tomato	240	150	90	63%
Lettuce	140	70	70	50%
Strawberry	190	90	100	47%
Almond	224	204	20	91%

Also see: Crop Nitrogen Uptake and Partitioning. Available online at:
http://apps.cdfa.ca.gov/frep/docs/N_Uptake.html

From: CCA Training Course Materials, available online:
http://ciwr.ucanr.edu/NitrogenManagement/Training_Modules/
This table found on page 13 of *Module 5: Nitrogen budgeting "cheat sheet" with definitions and formulas (handout)*

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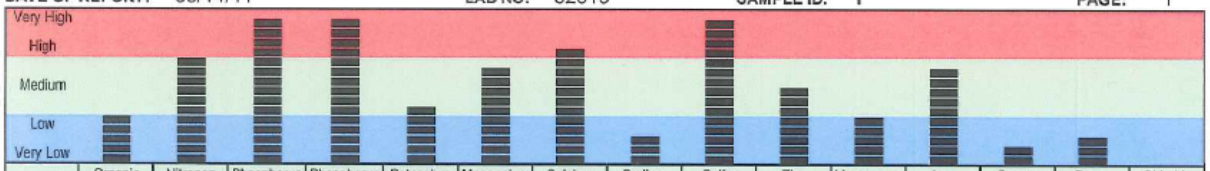

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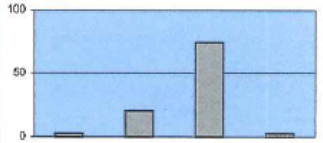

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Why Measure to Manage?

- **Plan** management
- **Evaluate** outcomes
- **Optimize** crop yield and quality
- **Avoid** problems

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