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Appendix 1. Abbreviations.

Weight

g	gram
mg	milligram
µg	microgram

Concentration

mg/L	milligram per liter
meq/L	milli equivalent per liter

Volume

L	Liter
mL	milliliter

Temperature

°C	degree Celsius

Length

m	meter
cm	centimeter
mm	millimeter

Salt Concentration

dS	decisiemens
mS	millisiemens
µS	microsiemens

$mS\ cm^{-1} = dS\ m^{-1} = S\ m^{-1} \times 10$

$mS\ cm^{-1} \times 0.1 = S\ m^{-1}$

Area

ha	hectare
da	decare
du	Dunums
A	Acre

Miscellaneous

AAS	Atomic absorption spectrophotometer	OM	Organic matter
CEC	Cation exchange capacity	sp gr	Specific gravity
SAR	Sodium adsorption ratio	pH_s	pH of saturated soil paste
EC_e	Electrical conductivity of the saturation extract	ESP	Exchangeable sodium percentage
nm	Wavelength		

Appendix 2. Conversion Factors for SI and Non-SI Units.

To convert Column 1 into Column 2, multiply by:	Column 1 SI Unit	Column 2 non-SI Unit	To convert Colum 2 into Column 1, multiply by:
	Length		
0.621	kilometer, km (10^3 m)	mile, mi	1.609
1.094	meter, m	yard, yd	0.914
3.28	meter, m	foot, ft	0.304
1.0	micrometer, µm (10^{-6} m)	micron	1.0
3.94×10^{-2}	millimeter, mm (10^{-3} m)	inch, in	25.4
10	nanometer, nm (10^{-9} m)	Angstrom, Å	0.1
	Area		
2.47	hectare, ha	acre	0.405
247	square kilometer, km^2 (10^3 m)^2	acre	4.05×10^{-3}
0.386	square kilometer, km^2 (10^3 m)^2	square mile, mi^2	2.590
2.47×10^{-4}	square meter, m^2	acre	4.05×10^3
10.76	square meter, m^2	square foot, ft^2	9.29×10^{-2}
1.55×10^{-3}	square millimeter, mm^2 (10^{-3} m^2)	square inch, in^2	645
	Volume		
9.73×10^{-3}	cubic meter, m^3	acre-inch	102.8
35.3	cubic meter, m^3	cubic foot, ft^3	2.83×10^{-2}
6.10×10^4	cubic meter, m^3	cubic inch, in^3	1.64×10^{-5}
3.53×10^{-2}	liter, L (10^{-3} m^3)	cubic foot, ft^3	28.3
0.265	liter, L (10^{-3} m^3)	gallon	3.78
33.78	liter, L (10^{-3} m^3)	ounce (fluid), oz	2.96×10^{-2}
2.11	liter, L (10^{-3} m^3)	pint (fluid), pt	0.473
	Mass		
2.20×10^{-3}	gram, g (10^{-3} kg)	pound, lb	454
3.52×10^{-2}	gram, g (10^{-3} kg)	ounce (avdp), oz	28.4
2.205	kilogram, kg	pound, lb	0.454
0.01	kilogram, kg	quintal (metric), q	100
1.10×10^{-3}	kilogram, kg	ton (2000 lb), ton	907
1.102	megagram, Mg (tonne)	ton (U.S.), ton	0.907
1.102	tonne, t ton (U.S.), ton	0.907	
	Yield and Rate		
0.893	kilogram per hectare, kg ha^{-1}	pound per acre, lb $acre^{-1}$	1.12
0.107	liter per hectare, L ha^{-1}	gallon per acre	9.35
893	tonnes per hectare, t ha^{-1}	pound per acre, lb $acre^{-1}$	1.12×10^{-3}
893	megagram per hectare, Mg ha-1	pound per acre, lb $acre^{-1}$	1.12×10^{-3}
0.446	megagram per hectare, Mg ha^{-1}	ton (2000 lb) per acre, ton $acre^{-1}$	2.24

(Contd...)

Appendix 2 (Contd...)

To convert Column 1 into Column 2, multiply by:	Column 1 SI Unit	Column 2 non-SI Unit	To convert Colum 2 into Column 1, multiply by:
	Pressure		
9.90	megapascal, MPa (10^6 Pa)	atmosphere	0.101
10	megapascal, MPa (10^6 Pa)	bar	0.1
1.00	megagram per cubic meter, Mg m^{-3}	gram per cubic centimeter, g cm^{-3}	1.00
2.09×10^{-2}	Pascal, Pa	pound per square foot, lb ft^{-2}	47.9
1.45×10^{-4}	Pascal. Pa	pound per square inch, lb in^{-2}	6.90×10^3
	Temperature		
1.00 (K-273)	Kelvin, K	Celsius, °C	1.00 (°C+273)
(9/5 °C) + 32	Celsius, °C	Fahrenheit, °F	5/9 (°F - 32)
	Electrical Conductivity, Electricity, and Magnetism		
10	siemen per meter, S m^{-1}	millimho per centimeter, mmho cm^{-1}	0.1
10^4	tesla, T	Gauss, G	10^{-4}
	Water Measurement		
9.73×10^{-3}	cubic meter, m^3	acre-inches, acre-in	102.8
9.81×10^{-3}	cubic meter per hour, m^3 h^{-1}	cubic feet per second, ft^3 s^{-1}	101.9
4.40	cubic meter per hour, m^3 h^{-1}	U.S. gallons per minute, gal min^{-1}	0.227
8.11	hectare-meter, ha-m	acre-feet, acre-ft	0.123
97.28	hectare-meters, ha-m	acre-inches, acre-in	1.03×10^{-2}
8.1×10^{-2}	hectare-centimeters, ha-cm	acre-feet, acre-ft	12.33
	Concentrations		
1	centimole per kilogram, cmol kg^{-1} (ion exchange capacity)	milliequivalents per 100 grams, meq 100 g^{-1}	1
0.1	gram per kilogram, g kg^{-1}	percent, %	10
1	milligram per kilogram, mg kg^{-1}	parts per million, ppm	1
	Plant Nutrient Conversion		
2.29	P	P_2O_5	0.437
1.20	K	K_2O	0.830
1.39	Ca	CaO	0.715
1.66	Mg	MgO	0.602

Source: Tekalign *et a*l. (1991).

Appendix 3. Symbols, Atomic Number, and Atomic Weights of Elements.

Element	Symbol	Atomic No.	Atomic Weight	Element	Symbol	Atomic No.	Atomic Weight
Actinium	Ac	89	227	**Iodine**	I	53	126.904
Aluminum	Al	13	26.9815	**Iridium**	Ir	77	192.2
Americium	Am	95	243	**Iron**	Fe	26	55.847
Antimony	Sb	51	121.75	**Krypton**	Kr	36	83.8
Argon	Ar	18	39.948	**Lanthanum**	La	57	138.91
Arsenic	As	33	74.9216	**LawrenciumLr**		103	257
Astatine	At	85	210	**Lead**	Pb	82	207.19
Barium	Ba	56	137.34	**Lithium**	Li	3	6.94
Berkeliom	Bk	97	249	**Lutetium**	Lu	71	174.97
Beryllium	Be	4	9.0122	**Magnesium**	Mg	12	24.312
Bismuth	BI	83	208.98	**Manganese**	Mn	25	54.938
Boron	B	5	10.81	**Mendelevium**	Md	101	258
Bromine	Br	35	79.909	**Mercury**	Hg	80	200.59
Cadmium	Cd	48	112.4	**Molybdenum**	Mo	42	95.94
Calcium	Ca	20	40.08	**Neodymium**	Nd	60	144.24
Californium	Cf	98	251	**Neon**	Ne	10	20.183
Carbon	C	6	12.011	**Neptunium**	Np	93	237
Cerium	Ce	58	140.12	**Nickel**	Ni	28	58.71
Cesium	Cs	55	132.905	**Niobium**	Nb	41	92.906
Chlorine	Cl	17	35.453	**Nitrogen**	N	7	14.0067
Chromium	Cr	24	51.996	**Nobelium**	No	102	254
Cobalt	Co	27	58.9332	**Osmium**	Os	76	190.2
Copper	Cu	29	63.54	**Oxygen**	O	8	15.9994
Curium	Cm	96	247	**Palladium**	Pd	46	106.4
Dysprosium	Dy	66	162.5	**Phosphorus**	P	15	30.9738
Einsteinium	Es	99	254	**Platinum**	Pt	78	195.09
Erbium	Er	68	167.26	**Plutonium**	Pu	94	239
Europium	Eu	63	151.96	**Polonium**	Po	84	209
Fermium	Fm	100	25	**Potassium**	K	19	39.102
Fluorine	F	9	18.9984	**Praseodymium**	Pr	59	140.907
Francium	Fr	87	233	**Promethium**	Pm	61	145
Gadolinium	Gd	64	157.25	**Protactinium**	Pa	91	231
Gallium	Ga	31	69.72	**Radium**	Ra	88	226
Germanium	Ge	32	72.59	**Radon**	Rn	86	222
Gold	Au	79	196.967	**Rhenium**	Re	75	186.2
Hafnium	Hf	72	178.49	**Rhodium**	Rh	45	102.905
Helium	He	2	4.0026	**Rubidium**	Rb	37	85.47
Holmium	Ho	67	164.93	**Ruthenium**	Ru	44	101.07
Hydrogen	H	1	1.0079	**Samarium**	Sm	62	150.35
Indium	In	49	114.82	**Scandium**	Sc	21	44.956

(Contd...)

Appendix 3 (Contd...)

Element	Symbol	Atomic No.	Atomic Weight	Element	Symbol	Atomic No.	Atomic Weight
Selenium	Se	34	78.96	**Thulium**	Tm	69	168.934
Silicon	Si	14	28.086	**Tin**	Sn	50	118.69
Silver	Ag	47	107.87	**Titanium**	Ti	22	47.9
Sodium	Na	11	22.9898	**Tungsten**	W	74	183.85
Strontium	Sr	38	87.62	**Uranium**	U	92	238.03
Sulfur	S	16	32.064	**Vanadium**	V	23	50.9412
Tantalum	Ta	73	180.948	**Xenon**	Xe	54	131.3
Technetium	Tc	43	99	**Ytterbium**	Yb	70	173.04
Tellurium	Te	52	127.6	**Yttrium**	Y	39	88.906
Terbium	Tb	65	158.925	**Zinc**	Zn	30	65.37
Thallium	TI	81	204.37	**Zirconium**	Zr	40	91.22
Thorium	Th	90	232.038				

Source: Tekalign *et al*. (1991).

Appendix 4. Solution Concentrations.

System Name	Abbreviation	Definition
Molar	M	gram-molecular weight (mole of solute) per liter of solution.
Molal	M	gram-molecular weight (mole of solute) per kilogram of solvent.
Formal	F	gram-formula weight of solute per liter of solution.
Normal	N	gram-equivalent weight of solute per liter of solution.
Weight per volume, percent	w/v, %	number of grams of solute × 100 per volume of solvent (mL).
Volume percent	Vol % or v/v %	Volume of solute × 100 per volume of solution.
Weight percent	wt % or w/w %	Weight of solute X 100 per weight of solution.
Parts per million	ppm	milligrams of solute or milligrams per liter of solution kilogram.
Parts per billion	ppb	micrograms of solute or micrograms per liter (kilogram) of solution.

Source: Tekalign *et al*. (1991).

Appendix 5. Some Useful Relationships.

1 g = 1000 mg = 1,000,000 µg	ppm = µg/g (solid per liquid)
1 µg = 0.001 mg = 0.000001 g	ppm = µL/L (liquid per liquid)
1 L = 1000 mL	ppm × 2 = 1lbs/A
1 mL = 0.001 L	ppm × 10^{-4} = %
ppm = µg/mL (solid per liquid)	1% = 1 gm/100 ml
ppm = mg/L (solid per liquid)	1% = 10,000 ppm

Appendix 6. Concentration Normality, and Amount of Concentrated Acids and Bases to Make 1-L of 1 *N* Solution.

Acid or Base	Chemical Properties				Solution Needed[1] (mL)
	Specific Gravity	Percent by Weight	Grams per Liter	Approximate Normality *(N)*	
Acetic acid	1.05	99.0	1042.0	17.45	58
Ammonium hydroxide	0.90	28.3	255.0 (NH_3)	15.0	67
Hydrochloric acid	1.19	38.0	451.6	12.4	81
Hydrofluoric acid	1.16	50.0	577.5	28.8	35
Nitric acid	1.42	72.0	1024.0	16.2	62
Phosphoric acid	1.69	85.0	1436.0	44.0	23
Perchloric acid	1.66	70.0	1165.0	11.6	86
Sodium hydroxide	1.53	50.0	762.7	19.0	53
Sulfuric acid	1.84	96.0	1742.0	35.5	28

[1]To make up 1-L of 1 *N*.
Source: Tekalign *et al*. (1991).

Appendix 7. Soil pH Levels and Associated Conditions.

Soil pH	Indications	Associated Conditions
< 5.5	Soil is deficient in Ca and/or Mg, and should be limed	Poor crop growth due to low cation exchange capacity and possible Al^{3+} toxicity.Expect P deficiency.
5.5 - 6.5	Soil is lime-free, should be closely monitored	Satisfactory for most crops
6.5 - 7.5	Ideal range for crop.	Soil cation exchange capacity is production near 100% base saturation.
7.5 - 8.4	Free lime ($CaCO_3$) exists in soil	Usually excellent filtration and percolation of water due to high Ca content of clays. Both P and micronutrients are less available.
>8.4	Invariably indicates sodic soil	Poor physical conditions. Infiltration and percolation of soil water is slow. Possible root deterioration and organic matter dissolution.

Source: Hach Company, USA (1992).

Appendix 8. Summarized Soil Test Methods for Fertility Evaluation of Alkaline Soils.

Parameter	Olsen P	AB-DTPA	NH_4OAc	DTPA	Hot Water
Property/ Nutrient(s)		NO_3-N, , P, K Zn, Cu, Fe, Mn	K, Mg, Na, Ca	Zn, Cu, Fe, Mn	B
Sample size (g)	2.5	10	5	10	10
Volume-extractant (mL)	50	20	25	20	20
Extracting solution	0.5 *M* $NaHCO_3$ at pH 8.5	1 *M* NH_4HCO_3+ 0.005 *M* DTPA (pH7.6)	1*N* NH_4OAc pH 7.0	0.005 *M*DTPA+ 0.01 *M* TEA+ 0.01 *M* $CaCl_2$ (pH7.3)	H_2O
Shake/boil (min.)	30	15	5	120	5
Shaking action and speed: All use reciprocating, 180+ oscillations/min., except for B					
Extraction method	Colorimetry, at 880 nm (Molybde-num blue)	P: Colorimetry ,K: Flame emission Zn, Cu, Fe,Mn: AAS	K&Na: Flame emission Mg & Ca: AAS	AAS	Colorimetry, at 430 nm (Azomethine-H)
Soil nutrient., concentration no dilution; (ppm)	P, 2 - 200	P, 2 - 100; K, 5 - 750; Zn, 0.5 - 35	K, 50 - 1000; Ca, 500 - 2000; Mg, 50 - 500; Na, 10 - 250	Zn, 0.5 - 20	B ,1 -10
Primary reference	Olsen *et al*. (1954)	Soltanpour & Schwab (1977)	Schollenberger & Simon (1945)	Lindsay & Norvell (1978)	Berger & Truog(1939)

AAS=Atomic Absorption Spectrophotometry.
Source: Soil and Plant Analysis Council (1992).

Appendix 9. Generalized Guidelines for Interpretation of Soil Analysis Data.

Measurement	Soil Test	Low	Marginal	Adequate
		---------- % ----------		
Organic matter	Walkley- Black	<0.86%	0.86 - 1.29%	>1.29
		----------ppm----------		
Nitrate	AB-DTPA	<11	11 - 20	>20
Phosphate	$NaHCO_3$	<8	8 - 15	>15
	AB-DTPA	<4	4 - 7	>7
Potassium	NH_4OAc	<100	100-150	>150
	AB-DTPA	<60	60 - 120	>120
Zinc	DTPA	<0.5	0.5 - 1.0	>1.0
	AB-DTPA	<1.0	1.0 - 1.5	>1.5
Copper	DTPA	<0.2	0.2 - 0.5	>0.2
	AB-DTPA	<0.2		>0.5
Iron	DTPA	<4.5		>4.5
	AB-DTPA	<2.0	2.1 - 4.0	>4.0
Manganese	DTPA	<1.0	1.0 - 2.0	>2.0
	AB-DTPA	<1.8		>1.8
Boron	Hot water	<0.5	0.5 - 1.0	>1.0
	HCl	<0.45	0.45 - 1.0	>1.0

DTPA= diethylene triamine pentoacetic acid. AB = ammonium bicarbonate. $NaHCO_3$ = Sodium bicarbonate.

Sources: FAO (1980); Soltanpour (1985); Ludwick (1995); Martens and Lindsay (1990); Johnson and Fixen (1990); Soil and Plant Analysis Council (1992); Matar *et al*. (1992).

Appendix 10. Suggested Plant Tissue Sampling Procedures for Selected Dryland Crops[1].

Growth Stage	Plant Part to Sample	Plants Sampled
	Wheat and Barley	
Seeding stage (< 30 cm tall)	All the aboveground portion	50 - 100
Before head emergence	Flag leaf	25 - 50
	Corn	
Seedling stage (< 30 cm tall)	All the aboveground shoot. The entire	20 - 30
Prior to tasselling	leaf fully developed below the whorl	15
From tasselling to silking	The entire leaf at the ear node (or immediately above or below it)	15 - 25
	Sorghum	
Prior to or at heading	Second or 3rd leaf from top of plant	15 - 25
	Soybean or other Beans	
Seedling stage (<30 cm tall)	All the above-ground portion	20 - 30
Prior to or during initial flowering	Two or three fully developed Leaves at the top of the plant	20 - 30
	Peanut	
Maximum tillering	Recently matured leaflets	25
	Alfalfa, Clover and other Legumes	
Prior to or at 1/10th bloom stage	Mature leaf blades taken about One-third of the way down the plant	40 - 50
	Food Legumes including Chickpea and Lentil	
Vegetative growth stage	Whole shoots	40 - 50
Bloom initiation	Recently matured leaf	50 - 200

[1]When specific guidelines are unknown, the general *rule of the thumb* is to sample *upper mature* leaves at flower initiation.

Sources: Jones *et al.* (1971, 1991); Reuter and Robinson (1986); Tandon (1993).

Appendix 11. Generalized Interpretation of Cereal Tissue Analysis Data.

	Nutrient Concentration in Dry Tissue			
Nutrient	**Deficient**	**Low**	**Sufficient**	**High**
	----------%----------			
Nitrogen				
(winter grains)	<1.25	1.25 - 1.74	1.75 - 3.00	>3.00
(spring grains)	<1.50	1.50 - 1.99	2.00 - 3.00	>3.00
Phosphorus	<0.15	0.15 - 0.19	0.20 - 0.50	>0.50
Potassium	<1.25	1.25 - 1.49	1.50 - 3.00	>3.00
Calcium				
(wheat, oats)		<0.20	0.20 - 0.50	>0.50
(barley)		<0.30	0.30 - 1.20	>1.20
Magnesium		<0.15	0.15 - 0.50	>0.50
Sulfur		<0.15	0.15 - 0.40	>0.40
	----------ppm----------			
Manganese	<5	5 - 24	25 - 100	>100
Zinc		<15	15 - 70	> 70
Copper		<5	5 - 25	> 25

Source: Walsh and Beaton (1973).

Appendix 12. Classification Criteria for Salt-Affected Soils.

Soil	ECe[1]	Exchangeable Sodium Percentage (ESP)	Sodium Adsorption Ratio (SAR)
	--dS/m--		
Normal	<4	<15	<15
Saline	≥4	<15	<15
Sodic	<4	≥15	≥15
Saline-Sodic	≥4	≥15	≥15

[1]EC in saturated paste extract.
Source: Bohn *et al*. (1985).

Appendix 13. Soil Salinity Classification.

Soil Texture	Degree of Salinity (Electrical Conductivity)[1]				
	None	Slight	Moderate	Strong	Very Strong
	---------- dS/m ----------				
Coarse sand to sandy loam	<1.2	1.2 - 2.4	2.5 - 4.4	4.5 - 8.9	>9.0
Loamy fine sand to loam	<1.3	1.3 - 2.4	2.5 - 4.7	4.8 - 9.4	>9.5
Silt loam to clay loam	<1.4	1.4 - 2.5	2.6 - 5.0	5.1 - 10.0	>10.1
Silty clay loam to clay	<1.5	1.5 - 2.8	2.9 - 5.7	5.8 - 11.4	>11.5

[1]EC in 1:1 soil/water suspension.
Source: Hach Company (1992).

Appendix 14. Relative Salt-Tolerance Limits of Crops.

ECe[1] -dS/m-	Crop	ECe[1] -dS/m-	Crop
	FORGE CROPS		
22.0	Kallar grass (*Leptochloa fusca*)	14.4	Sudangrass (*Sorghum sudanense*)
15.0	Bermuda grass (*Cynodon dactylon*)	9.0	Alfalfa (*Medicago sativa*)
13.5	Barley, hay (*Hordeum vulgare*)	10.3	Berseem *(Trifolium alexandrium*)
14.0	Mustard (*Brassia campestris, Glauca group*)	7.0	Cowpea (*Vigna unguiculata*)
	FIELD CROPS		
18.0	Barley, grain (*Hordeum vulgare*)	9.0	Sesbania (*Sesbania aculeata)*
15.0	Sugar beet (*Beta vulgaris*)	10.0	Sugarcane (*Saccharum officnarum)*
16.0	Cotton (*Gossypium hirsutum*)	8.0	Rice, paddy (*Oryza sativa*)
12.0	Safflower (*Carthamus tinctorius*)	6.0	Maize (*Zea mays)*
14.0	Sunflower (*Helianthus annuus*)	6.5	Flax (*Linum usitatissimum*)
13.0	Wheat (*Triticum aestivum*)	9.1	Cowpea (*Vigna unguiculata*)
10.0	Sorghum (*Sorghum bicolor*)	4.9	Groundnut (*Arachis hypogaea*)
8.0	Soybean (*Glycine max*)		
	VEGETABLE CROPS		
9.6	Beet, garden (*Beta vulgaris*)	5.0	Lettuce (*Lactuca sativa*)
8.0	Spinach (*Spinacia oleracea*)	5.0	Bell pepper (*Capsicum annuum*)
8.0	Tomato (*Lycopersicon esculentum*)	4.0	Onion (*Allium cepa*)
7.0	Cabbage (*Brassica oleracea*)	4.5	Carrot (*Daucus carota*)
6.0	Cauliflower (*Brassica oleracea*)	3.5	French or green bean *(Phaseolus vulgaris)*
6.0	Potato (*Solanum tuberosum)*	5.0	Radish (*Raphanus sativus*)
6.0	Sweet corn (maize) (*Zea mays*)	6.3	Cucumber (*Cucumis sativus*)
6.0	Sweet potato (*Ipomoea batatas*)	6.5	Turnip (*Brassica rapa)*
	FRUIT CROPS		
18.0	Date (*Phoenix dactylifera*)	8.4	Olive (*Olea europaea*)
6.7	Grape (*Vitis spp*.)	4.8	Lemon (*Citrus limon*)
4.9	Grapefruit (*Citrus paradisi*)	4.8	Apple (*Malus sylvestris*)
4.8	Orange (*Citrus sinensis*)	4.8	Pear (*Prunus communis*)
4.1	Peach (*Prunus persica*)	2.5	Strawberry (*Fragaria spp*.)
3.7	Apricot (*Prunus armeniaca*)	8.4	Pomegranate (*Punica granatum*)
4.3	Plum and prune (*Prunus domestica*)	4.8	Walnut (*Juglans regia*)
4.1	Almond (*Prunus dulcis*)		

[1]EC corresponding to or causing 50% crop yields reduction.

Source: California Fertilizer Association (1980), Ayers and Westcot (1985).

Appendix 15. Relative Tolerance of Species to Boron Toxicity.

Crop species	Threshold Concentration -- mol B/m³ --	Crop Species	Threshold Concentration --mol B/m³--
SENSITIVE CROPS			
Lemon (*Citrus limon*)	0.028	Pea (*Pisum sativum*)	
Lima bean (*Phaseolus lunatus)*		Carrot *(Daucus carota*)	0.093
Blackberry (*Rubus sp.*)		Potato (*Solanum tuberosum*)	
Avocado (*Persea americana*)		Cucumber (*Cucumis sativus*)	
Orange (*Citrus sinensis*)		Lettuce (*Lactuca sativa*)	
Grapefruit (*Citrus paradise*)		Cabbage (*Brassica oleracea*)	
Apricot (*Prunus armeniaca*)		Celery (*Cepium graveolens*)	
Peach (*Prunus persica*)		Turnip (*Brassica rapa*)	
Cherry (*Prunus avium*)		Barley (*Hordeum vulgare*)	
Plum (*Prunus domestica*)		Corn (*Zea mays*)	
Persimmon (*Diosysos kaki*)		Artichoke (*Cynara scolymus*)	
Fig (*Ficus carica*)		Radish (*Raphanus sativus*)	
Grape (*Vitis vinifera*)		Tobacco (*Nicotiana tabacum*)	
Walnut (*Juglans regia*)		Sweet clover (*Melilotus indica*)	
Pecan (*Carya illinoensis*)		Squash (*Cucurbita pepo*)	
Cowpea (*Vigna sinensis*)		Muskmelon (*Cucumis melo*)	
Onion (*Allium cepa*)			
Garlic (*Allium sativum*)		**TOLERANT CROPS**	
Sweet potato (*Ipomoea batatas*)		Sorghum (*Sorghum bicolor*)	
Wheat (*Triticum aestvium*)		Alfalfa (*Medicago sativa*)	
Mung bean (*Phaseolus aureux*)	0.046	Purple vetch (*Vicia benghlensis)*	0.19
Strawberry (*Fragaria sp*.)	0.074	Oat *(Avena vulgare)*	0.37
Kindney bean (*Phaseolus vulgaris*)		Parsley (*Petroselium crispum*)	
		Red beet (*Beta vulgaris*)	
SEMI-TOLERANT CROPS		Tomato (*Lycopersicum esculentum*)	
Sesame (Sesamum indicum)		Sugarbeet (Beta vulgaris)	0.56
Red pepper (Capsicum annum)		Cotton (Gossypium hirsutum)	0.56 - 0.93
	0.093	Asparagus (Asparagus officinalis)	0.93 - 1.39

Source: Keren and Bingham (1985).

Appendix 16. Mesh Sizes of Standard Wire Sieves.

Sieve Opening	Standard Mesh Number		
(mm)	US	British	French
2.00	10	8	34
1.00	18	16	31
0.500	35	30	28
0.420	40	36	-
0.250	60	60	25
0.210	70	72	-
0.149	100	-	-
0.125	120	120	22
0.063	230	240	19
0.053	270	300	-

Source: Tekalign *et al*. (1991).

Appendix 17. Equivalent Weights.

Symbol/Formula	Equivalent Weight- ---g----	Common Name
Ions		
Ca^{++}	20.04	Calcium ion
Mg^{++}	12.16	Magnesium ion
Na^{+}	23.00	Sodium ion
K^{+}	39.10	Potassium ion
Cl^{-}	35.46	Chloride ion
SO_4^{--}	48.03	Sulfate ion
CO_3^{--}	30.00	Carbonate ion
HCO_3^{-}	61.01	Bicarbonate ion
PO_4^{---}	31.65	Phosphate ion
NO_3^{-}	62.01	Nitrate ion
Salts		
$CaCl_2$	55.50	Calcium chloride
$CaSO_4$	68.07	Calcium sulfate
$CaSO_4 \cdot 2H_2O$	86.09	Gypsum
$CaCO_3$	50.04	Calcium carbonate
$MgCl_2$	47.62	Magnesium chloride
$MgSO_4$	60.19	Magnesium sulfate
$MgCO_3$	42.16	Magnesium carbonate
NaCl	58.45	Sodium chloride
Na_2SO_4	71.03	Sodium sulfate
Na_2CO_3	53.00	Sodium carbonate
$NaHCO_3$	84.01	Sodium bicarbonate
KCl	74.56	Potassium chloride
K_2SO_4	87.13	Potassium sulfate
K_2CO_3	69.10	Potassium carbonate
$KHCO_3$	100.11	Potassium bicarbonate
Chemical Amendments		
S	16.03	Sulfur
H_2SO_4	49.04	Sulfuric acid
$Al_2(SO_4)_3 \cdot 18H_2O$	111.07	Aluminium sulfate
$FeSO_4 \cdot 7H_2O$	139.01	Ion sulfate (ferrous)

Conversion of milliequivalents per liter to parts per million:
ppm = milliequivalents/liter × equivalent weight.