Nutrient Removal

Nutrient removal as kilograms/tonne for major elements and grams/tonne for trace elements.

CROP	MAJOR ELEMENTS KG/T						TRACE ELEMENTS G/T						
	N	P	K	S	Mg	Ca	Zn	Cu	Mn	Fe	B	Co	Mo
Rice (S)	18	4	5	0.15	0.2	1	17	3	20	-	2-5	0.05	-
Maize (S)	20	4	10	2	1.5	2	16	4	6	13	2	0.02	-
Wheat (S)	20	4	5.5	1.5	1.5	0.6	50	5	42	44	4	0.05	-
Tea	32	2.8	16.6	2.4	1.7	4.3	26	17.3	1240	264	15	0.18	0.038
Oats (S)	17	3	5	1.6	1.1	0.5	17	3	40	-	-	-	-
Barley (S)	17	3	6	1	1.3	0.5	19	5	18	22	1.5	0.04	-
Triticale (S)	15	3	5	1.2	1.3	0.4	15	5	20	24	2.4	-	-
Canola (S)	36	7	10	10	2.5	4	22	4	31	-	23	-	-
Cotton (total removal/ tonne of lint)	70	13	25	26	7	5	202	21	37	220	-	-	-
Pasture Grasses (H)	16	2.5	20	2-3	1.2	2-3	25	6	30	100	10	0.3	-
Adzuki Bean	28	3.8	12.5	-	1.3	0.66	50.4	10.9	17.3	49.8	-	-	-
Almonds (EP)	30	4.74	7.28	-	2.75	2.48	33.6	11.1	25.3	42.9	-	-	-
Apple (C)	4	0.77	5.97	-	0.96	-	-	-	-	-	-	-	-
Apple (FR)	0.27	0.07	1.15		0.05	0.07	0.4	0.41	0.45	1.8	-	-	-
Apricot (EF)	-	0.23	2.81	-	-	0.17	-	-	-	5	-	-	-
Asparagus (C)	6.38	1.12	5.46	-	0.38	0.42	14.1	3.86	11.7	16	12.8	-	-
Asparagus (SP)	3.19	0.56	2.73	-	0.18	0.21	4.6	1.76	2.62	6.6	-	-	-
Asparagus fern (average of six Vic. growers)	-	-	-	-	-	-	9.5	2.1	9.1	16.5	6.4	0.2	0.18
Avocado (C)	2.66	0.71	4.42	-	0.4	-	-	-	-	-	-	-	-
Avocado (EF)	-	0.27	4.8	-	0.23	0.14	5	-	-	7	-	-	-
Banana (FF)	3.8	0.58	15.6	0.46	0.98	2.02	10	4	10	18	14	-	-
Banana (RP)	4	0.46	13.2	1	1.52	2.52	84	3.4	240	100	11.4	-	0.03
Banana (C)	7.8	1.04	28.8	1.46	2.5	4.54	94	7.4	250	118	25.4	-	-
Bean pods (trace content, upper range)	-	-	-	-	-	-	28.3	10	5	9.2	2.6	0.01	0.23
Beans (C)	8.6	1.1	8.8	-	1.2	-	-	-	-	-	-	-	-
Beet root	-	-	-	-	-	-	9.2	1.64	22.6	16.4	-	-	0.75
Bermuda grass (H)	18.7	1.9	14	2.19	1.5	3.69	-	13	-	-	-	-	-
Bluegrass (H)	15	2.2	12.5	1.25	1.75	4	20	5	75	-	-	-	-
Butternut (FR)	1.4	0.33	3.52	-	0.34	0.48	1.5	0.72	2.02	7	-	-	-
Cabbage (C)	5.2	0.52	5.7	1.14	0.51	0.7	-	-	-	-	-	-	-
Cabbage (FM)	3	0.5	3	-	0.3	0.7	-	-	-	-	-	-	-
Cabbage (L)	-	-	-	-	-	-	2.2	0.33	2.6	3.3	2.8	0.09	0.008
Capsicum (F)	4	0.51	4.1	-	0.4	0.04	-	-	-	8.8	-	-	-
Capsicum (C)	7.6	1.25	10	-	2.4	-	-	-	-	-	-	-	-

Nutrient Removal

Nutrient removal as kilograms/tonne for major elements and grams/tonne for trace elements.

CROP	MAJOR ELEMENTS KG/T						TRACE ELEMENTS G/T						
	N	P	K	S	Mg	Ca	Zn	Cu	Mn	Fe	B	Co	Mo
Carrot (C)	4.16	0.79	5.53	-	0.6	-	-	-	-	-	-	-	-
Carrot (R)	-	-	-	-	-	-	2.6	0.58	1.5	1.9	2	0	0.02
Celery (C)	6.6	1.14	8.3	-	0.5	1.5	3	1	4	-	3	-	-
Celery (EP)	-	0.26	-	-	-	0.36	-	-	-	4.8	-	-	-
Celery (FM)	2	0.3	3.5	-	0.25	1.5	3	1	4	-	3	-	-
Chick Pea (S)	33	3.3	9	2	1.4	1.6	34	8	34	-	-	-	-
Citrus (C)	9	0.86	9.7	1	0.8	-	-	-	-	-	-	-	-
Corn (C)	23.75	4.42	19.7	2.95	5.82	-	-	-	-	-	-	-	-
Cotton (total/t of lint)	74	13	26	20	7.4	5.6	202	21		220	-	-	-
Cottonseed (low-fat)**	69	15.9	17.6	-	7.2	4.7	116	12	21	126	-	-	-
Cucumber (C)	4.6	0.6	7.3	-	1.3	-	-	-	-	-	-	-	-
Custard apple (EF)	-	0.4	-	-	-	0.2	-	-	-	10	-	-	-
Faba Beans (S)	41	4	10	1.5	1.2	1.3	28	10	30	-	-	-	-
Fig (D)	-	0.7	6.82	-	0.6	1.74	4.8	3.4	-	25	-	-	-
French bean (S)	22	4	4	22	1.3	1.7	1.1	36	10	18	70	-	-
Grape (C)	8.5	1.29	9.13	1.5	-	1.8	-	-	-	-	-	-	-
Grape (EFS)	1.0	0.2	1.9	-	0.07	0.11	0.7	1.2	0.71	3.6	-	-	-
Grape Juice (MR)	0.8	0.35	2	0.2	0.2	0.14	2	2	30	20	30	-	-
Kiwi Fruit (EF)	-	0.4	4.5	0.3	0.2	0.51	3.2	3	2	12	3.7	-	-
Legume-Grass (H)	20.8	1.8	13.5	1.5	2.4	15.9	23	6.2	48	134	-	3.7	5
Lentil	40	3.9	8	1.8	0.9	0.7	28	7	14	90	-	-	-
Lettuce (FM)	3	0.5	4	-	0.4	1.2	3	1	4	-	3	-	-
Lettuce (L)	-	0.2	-	-	-	0.19	11.7	1.7	4	5.6	0.26	0	0.005
Linseed (S)	25	6.4	8.1	-	3.9	2.5	43	12	24	57	-	-	-
Lucerne (H)	36	2.5	21	3.9	2	5	18	14	44	55	30	0.09	-
Lucerne (S)	-	7.5	13	3	2.2	1.3	50	6	16	40	16	-	3
Lucerne Hay	-	2.5	21	3.9	2.0	5.5	18	14	44	55	30	0.09	3
Lupine (S)	53	3	8	2.3	1.6	2.2	35	5	18	-	-	-	-
Lupine, sweet (S)	53	3	8	2.3	1.6	2.2	35	5	18	-	-	-	-
Lupine, white (S)	60	3.6	10	2.4	1.4	2	30	5	60	-	-	-	-
Lychee (EF)	-	0.41	-	-	-	0.07	-	-	-	13	-	-	-
Macadamia (C) per tonne of Kernel at 10% moisture	10.5	1.23	9.15	1.32	0.74	0.46	13	12	-	-	7	-	-
Mango (C)	6.6	0.71	6.1	-	3	-	-	-	-	-	-	-	-
Mango (EF)	1	0.13	1.89	0.04	0.14	0.1	2.4	1.6	2.2	4.2	1.8	-	-

Nutrient Removal

Nutrient removal as kilograms/tonne for major elements and grams/tonne for trace elements.

CROP	MAJOR ELEMENTS KG/T						TRACE ELEMENTS G/T						
	N	P	K	S	Mg	Ca	Zn	Cu	Mn	Fe	B	Co	Mo
Melons, honeydew (F)	0.64	0.1	2.71	-	0.07	0.06	0.7	0.41	0.18	0.7	-	-	-
Melons, rock of Cantaloupe (F)	1.23	0.07	3.09	-	0.11	0.11	1.6	0.42	0.47	2.1	-	-	-
Melons, rock or Cantaloupe (C)	3.7	0.52	5.5	-	1.4	-	-	-	-	-	-	-	-
Millet	15.4	2.85	1.95	-	1.14	0.08	16.8	7.5	16.3	30.1	-	-	-
Okra (C)	3	0.54	3.7	0.5	1.5	0.81	6	0.94	9.9	8	-	-	-
Okra (F)	2.8	0.63	3.03	-	0.57	0.81	6	0.94	9.9	8	-	-	-
Olive	-	0.16	0.34	-	-	1.06	-	-	-	16	-	-	-
Olive (CF)	1.12	0.03	0.08	-	0.04	0.88	2.2	2.51	0.2	33	-	-	-
Onion (B)	1.54	0.23	1.46	-	0.1	0.27	1.7	0.69	1.6	3.3	2	0.003	0.024
Onion (C)	3.4	0.61	3.79	0.61	0.48	1.5	-	-	-	-	-	-	-
Onion (SO)	2.5	0.37	2.76	-	0.2	0.7	3.9	0.8	1.6	14.8	-	-	-
Orange (EF)	-	0.17	2	-	-	0.11	0.9	0.4	0.5	2	1	-	0.01
Papaw (C)	1.8	0.21	2.16	0.2	0.18	-	-	-	-	-	-	-	-
Papaw (EF)	-	0.12	-	-	-	0.3	-	-	-	1.9	-	-	-
Passion fruit (C)	4	0.43	4.15	0.33	-	0.4	-	-	-	-	-	-	-
Passion fruit (EF)	-	0.48	3.41	-	-	0.2	-	-	-	7	-	-	-
Pea (S)	36	3	10	2.6	1.4	1.1	20	3	8	24	1	-	1.6
Peaches (F)	0.98	0.12	1.97	-	0.07	0.05	1.4	0.68	0.47	1.1	-	-	-
Peanut (nuts)	36	3.76	7.1	2.5	1.68	0.99	32.7	11.4	19.3	45.8	-	-	-
Peanuts(C)	60	4.2	38	4.9	6.2	-	-	-	-	-	-	-	-
Pears (FR)	0.54	0.11	1.25	-	0.06	0.11	1.2	1.13	0.76	2.5	-	-	-
Pecans (E)	12.8	2.8	4.1	-	0.7	1.2	45.3	12	45	25	-	-	-
Pineapple (C)	3.7	0.47	5.81	0.4	-	1.32	-	-	-	-	-	-	-
Plums (F)	1.1	0.1	1.72	-	0.07	0.04	1	0.43	0.49	1	-	-	-
Pomegranate (E)	-	0.7	1.33	-	0.44	0.1	8.2	3.4	7.7	17.9	-	-	-
Pomegranate (FH)	-	11	15.5	-	1.4	3.59	300	10	20	300	-	-	-
Potato (C)	5.3	0.76	9.1	0.45	0.61	0.25	-	-	-	-	-	-	-
Potato (TR)	3.3	0.32	3.5	-	0.13	0.08	3	0.94	2.2	10.1	-	-	-
Potato tuber (D)	-	-	-	-	-	-	16	6	8	41	6	-	0.15
Potato tuber (FM)	3.5	0.4	4.5	0.5	0.3	0.25	2.2	2.2	3.7	-	-	-	-
Pumpkin (FR)	1.4	0.44	3.4	-	0.12	0.21	3.2	1.27	1.25	8	-	-	-
Pumpkin (C)	1.8	0.6	2.6	-	0.48	-	-	-	-	-	-	-	-
Red Clover (H)	20	2.2	16.6	1.4	3.4	13.8	72	8	108	-	-	-	-
Rice (S) Brown long grain	11	3.3	2.2	-	1.43	0.23	20.2	2.7	37	14.7	-	-	-
Rice (S) White long grain	10	1.15	1.15	-	0.25	0.28	10.9	2.2	10.9	8	-	-	-

Nutrient Removal

Nutrient removal as kilograms/tonne for major elements and grams/tonne for trace elements.

CROP	MAJOR ELEMENTS KG/T						TRACE ELEMENTS G/T						
	N	P	K	S	Mg	Ca	Zn	Cu	Mn	Fe	B	Co	Mo
Safflower kernel	22	6.4	6.9	-	3.5	0.8	50	17.5	20	49	-	-	-
Sorghum (S)	17	3.5	6	1	1.9	1.3	36	3	27	33	27	0.14	-
Sugar (cane)	1.4	0.18	2.2	0.35	0.26	0.4	7	1	68	64	0.5	-	-
Sugar Beet	4.4	0.86	5.53	0.78	1.2	-	-	-	-	-	-	-	-
Sunflower (C)	50	8	30	4.6	11.9	-	-	-	-	-	-	-	-
Sunflower kernels	29	7	6.9	-	3.2	0.78	50	17	19.5	52	-	-	-
Sweet corn (ER)	4.48	0.89	2.7	-	0.37	0.02	4.5	0.54	1.61	5.2	-	-	-
Sweet corn (G)	-	-	-	-	-	-	18.5	1.5	5.1	4.4	1.5	0.01	0.22
Sweet Potato (TB)	2.3	0.28	2.04	-	0.1	-	-	-	-	-	-	-	-
Sweet Potato (C)	5.2	0.99	8.64	-	0.59	0.22	2.8	1.69	3.55	5.9	-	-	-
Timothy (H)	12	2.2	15.8	1	1.2	3.6	40	6	62	-	-	-	-
Tobacco	36.0	3.9	47.3	6.0	9.1	37	36	15	272	-	-	-	-
Tomato (C)	2.8	0.56	3.2	0.6	0.3	-	-	-	-	-	-	-	-
Tomato (F)	1.5	0.23	2.6	0.14	-	0.07	1.4	0.65	1.1	3	1.2	0	0.042
Walnuts (E)	21.3	3.46	4.41	-	0.98	1.58	30.9	15.9	34.1	29.1	-	-	-
Watermelon (E)	0.86	0.09	1.16	-	0.11	0.08	0.7	0.32	0.37	1.7	-	-	-

Abbreviations:

S	**Dry seed or grain**	**FR**	**Fruit Removal**	**MR**	**Mid Range Values**	**B**	**Bulbs**
H	**Hay**	**EF**	**Edible Fruit Removal**	**CF**	**Canned Fruit**	**SO**	**Spring Onion**
FM	**Fresh matter**	**FF**	**Fresh Fruit Removal**	**FH**	**Fresh with rind**	**TB**	**Tuber**
D	**Dry matter**	**RP**	**Remaining Plants**	**TR**	**Tuber Removal**	**ER**	**Edible Raw**
C	**Crop Removal**	**F**	**Fruit**	**SP**	**Spears**	**G**	**Grain**
EP	**Edible Portion**	**D**	**Dried Fruit Removal**	**L**	**Leaves**		
E	**Edible Fruit**	**EFS**	**Edible Fruit with skin**	**R**	**Root Removal**		

*Compiled using the following references:
1. Russell's Soil Conditions & Plant Growth 11th. Edition. Edited by Alan Wild. 1988 ISBN 0-582-44677-5.
2. Animal Nutrition 4th Edition. McDonald, Edwards and Greenhalgh. 1988 ISBN 0-470-20791-4.
3. Plant Analysis, Reuter and Robinson 1986 ISBN 0 909605 41 6.
4. Growth and mineral nutrition of field crops. Fageria, Baligar and Jones. 1991.
5. Australian Sugarcane Nutrition manual by DV Calcino (SRDC)
6. Potash a product of nature. Kemmler and Hobt.
7. Viticulture Vol 2 Practices. Coombe and Dry [Editors] 1992 ISBN 1 875130 01 2.
8. FAO fertiliser and plant nutrition bulletin 9. 1984
9. WF Bennett (1993). Nutrient deficiencies and toxicities in crop plants. APS Press. ISBN 0-89054-151-5
10. D Huett (1991). Australian Vegetables growing handbook. NSW Agriculture.
11. GRDC. Grain Legume Handbook.
12. Nassery H. Unpublished result of samples analysed by Waite Analytical Services.
13. IPNI Nutrient Removal Calculator (NRC) / https://www.ipni.net/ipniweb/app/calc.nsf/0/A61C3B302297268E85257DD2000924A3
14. US National Research Council. Mineral and vitamin content of major cereal grains, 1966
15. US Department of Agriculture Nutrient database release 14
16. Alberta Feed analysis
17. Rochester et al National Cotton Council of America.
18. Texas A&M B6053 0401
19. Nutrient management guidelines for some major food crops. Chapter 8 pages 235-261 FAO public.
20. Handbook of tropical food, Edit H T Chan Jr 1983 ISBN 0-8247-1880-1
21. Handbook of fruit science and technology Edit D K Salunkhe & S J Kadam 1995 ISBN 0-8247-9643-8
22. Practical Handbook of Agricultural Science. Edit A A Hanson. 1990 CRC Press ISBN 0-8493-3706-2
23. Trace elements in soils and plants. 2nd edition Alina Kabata-Pendias and Henryk Pendias CRC Press 1992 ISBN 0-8493-6643-7
24. Hamilton R P and Coombe B G (1992) Harvesting of Winegrapes In: Viticulture Volume 2 Practices Editos B G Coombe and P R Dry. Winetitles ISBN 1 875130 01 2
25. Banana Nutrition E Lahava and DW Turner International Potash Institute Bulletin No.7
26. Dr. Vinod Kulkarni kindly supplied figures for Mango grown in Darwin, the flesh values on dry weight basis were converted to fresh weight basis assuming 80% water content in flesh
27. RA Stephenson (2000). The macadamia production challenge. Australian Nutgrower June-August 2000 Pages 36-39
28. US Department of Agriculture Nutrient database release 13
29. National Nutrient Database for Standard Reference, Release 27, 2014.
30. Trace Elements in Norwegian and Polish Tea Infusions Anne Ingelill Engvik Kronborg, 2013 Teacher Education with Master of Science.
31. Z.A. Liu, J.P. Yang*, Z.C. Yang Using a chlorophyll meter to estimate tea leaf chlorophyll and nitrogen contents. Journal of Soil Science and Plant Nutrition, 2012, 12 (2), 339-348
32. Principles of Plant Nutrition. edited by Konrad Mengel, Ernest A. Kirkby, 5th Edition 1978.