

Table A.17. Taro *Colocasia* breeding lines from Solomon Islands.^a

Sample designation	Yield (t/ha)	Moisture %	Energy (kJ/100 g)		Crude protein %	Starch %	Sugar %	Dietary fibre %	Fat %	Ash %	Calcium (mg/100 g)	Iron (mg/100 g)	Trypsin inhibitor (TIU/g)
			E _a	E _b									
		a			b	e	f	g	c	d			
Akalomamale	6.1	66.8	443	538	1.55	23.1	1.29	1.55	0.09	0.72	29.7	0.26	6.8
Luma'abu	10.8	76.6	324	368	0.87	16.7	1.36	1.78	0.11	1.06	59.5	0.46	5.5
Mudi mudi	NA	68.3	463	512	1.03	25.2	0.77	1.09	0.10	1.10	77.5	0.81	6.8
Sasagiha	NA	75.2	331	392	0.66	17.8	0.83	1.34	0.11	1.09	16.2	0.64	3.8
Mean of 4		71.7	390	453	1.03	20.7	1.06	1.44	0.10	0.99	45.7	0.54	5.7
SD		4.9	78	85	0.38	4.4	0.31	0.29	0.01	0.18	27.9	0.24	1.4
PD1 (20)	11.7	89.6	109	142	1.06	4.0	1.26	1.97	0.09	0.67	42.3	0.07	3.5
PD1 (32)	13.1	82.5	189	265	1.71	8.4	0.87	2.55	0.09	1.37	109	0.22	nil
PD11 (5)	11.7	64.5	560	578	2.13	29.6	0.89	1.98	0.17	1.01	20.0	0.21	3.0
PD12 (11)	9.2	86.4	158	197	0.86	6.7	1.62	1.80	0.10	0.78	42.1	0.12	4.0
PD41 (1)	11.6	76.6	331	368	1.35	16.7	1.21	1.62	0.12	0.82	43.0	0.25	26.0
PD41 (4)	10.4	83.1	203	255	0.96	9.8	1.03	1.32	0.08	0.98	37.6	0.14	1.0
PD41 (8)	10.7	76.6	306	368	1.92	14.6	1.30	2.06	0.10	1.22	104	0.18	6.6
PD41 (17)	10.5	87.5	148	178	0.82	5.1	1.34	2.06	0.09	0.67	89.5	0.10	nil
PD51 (9)	8.7	80.6	243	298	1.09	12.1	0.93	1.73	0.11	1.06	33.1	0.38	nil
PD51 (27)	11.7	86.0	134	204	1.08	5.9	0.77	2.78	0.10	1.15	48.0	0.19	4.2
Mean of 14 ^b		78.6	282	333	1.22	14.0	1.11	1.83	0.10	0.98	60.8	0.29	5.1
SD		8.0	150	138	0.45	8.7	0.27	0.46	0.02	0.22	33.1	0.22	6.5

^a Two corms of each cultivar bulked. First four cultivars are common local cultivars, next 10 entries marked PD are first generation back-cross taros. They are resistant to *Phytophthora colocasiae* but the Solomon Islands taste panel described their taste as spongy and they are watery, confirmed by a high moisture content. Cultivars Mudi mudi, and Sasagiha planted 1 March 1984, others planted 11 February 1984, harvested 28 September 1984 at Tenaru, Guadalcanal. Fertiliser 30 kg/ha potassium chloride, 200 kg/ha ammonium sulphate. Low rainfall since June slowed the growth of all taro plants and caused premature senescence. NA = not available.

^b Sum of a + b + c + d + e + f + g = 97.8.

Table A.18. Taro *Colocasia* edible and non-edible green leaves from Fiji.^a

Sample designation	Moisture %	Energy (kJ/100 g)		Protein %	Starch %	Sugar %	Dietary fibre %	Fat %	Ash %	Calcium (mg/100 g)	Iron (mg/100 g)
		<i>E_a</i>	<i>E_b</i>								
	<i>a</i>			<i>b</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>c</i>	<i>d</i>		
Dalo ni wai ^c	85.4	128	214	4.32	0.14	1.56	4.38	0.70	1.50	182	0.65
Toakula ^b	86.4	114	197	4.79	0.04	0.52	5.25	0.61	1.55	297	0.64
Tausala ni Mumu ^b	89.5	86	143	2.56	0.09	1.09	3.46	0.58	1.05	157	0.37
Vavai dina ^b	84.5	122	230	4.83	0.04	1.01	4.94	0.61	1.46	114	0.68
Hawaii ^b	83.3	146	216	5.03	0.04	1.81	6.07	0.81	1.52	175	0.68
Samoa hybrid ^d	86.4	89	197	3.86	0.04	0.33	5.29	0.45	1.52	157	0.64
Tausala ni Samoa ^d	82.5	115	265	4.79	0.04	0.66	6.21	0.60	2.11	246	0.79
Vutikoto ^d	84.6	116	228	4.39	0.11	1.29	4.86	0.50	1.83	204	0.61
Samoa ^c	86.0	93	204	3.58	0.04	0.53	4.54	0.64	1.68	126	0.64
Samoa green ^c	85.8	95	208	3.84	0.06	0.40	5.31	0.58	1.59	159	0.52
Mean ^f	85.4	110	210	4.20	0.07	0.92	5.03	0.61	1.58	182	0.62
SD	1.9	19	31	0.76	0.04	0.51	0.81	0.13	0.27	55	0.11

^a Third crop; for details see Table A.14. Six leaves of each cultivar bulked together. No trypsin inhibitor present in leaves from Tausala ni mumu, Tausala ni Samoa and Samoa.

^b Edible leaves.

^c Grown for its leaf.

^d Generally not edible but sometimes eaten.

^e Non-edible leaf.

^f Sum of a + b + c + d + e + f + g = 97.8.

Table A.19. Content of minerals (mg/100 g fresh weight) of taro *Colocasia* corms and leaves from Fiji.

	<i>Ca</i>	<i>P</i>	<i>Mg</i>	<i>Na</i>	<i>K</i>	<i>S</i>	<i>Fe</i>	<i>Cu</i>	<i>Zn</i>	<i>Mn</i>	<i>Al</i>	<i>B</i>
Corms, First Harvest, (Table A.16)												
Samoa green	21.7	55.3	143	0.98	310	10.1	0.63	0.28	1.5	0.42	0.32	0.07
Samoa hybrid	25.3	44.1	132	3.1	354	7.7	0.58	0.23	1.5	0.42	0.39	0.09
Samoa	21.4	27.8	92.4	4.2	315	6.4	0.28	0.10	0.66	0.34	0.26	0.07
Samoa oriori	22.3	100.2	123	0.51	533	8.2	0.30	0.29	3.6	0.32	0.26	0.10
Dalo ni Toga	45.0	100.8	124	0.53	565	14.0	0.37	0.18	5.5	0.25	0.54	0.11
Toakula	27.7	95.2	69.8	2.8	465	7.3	0.85	0.14	3.6	0.51	0.35	0.08
Tausala ni Samoa	25.2	87.7	127	0.92	498	8.7	0.32	0.27	4.5	0.29	0.30	0.11
Tausala ni Mumu	30.2	71.4	125	0.52	506	7.1	0.15	0.24	7.2	0.26	0.34	0.07
Vavai dina	55.9	90.2	101	2.4	488	6.5	0.43	0.18	6.4	0.37	0.69	0.12
Mean	30.5	74.7	115	1.8	448	8.5	0.43	0.21	3.8	0.35	0.38	0.09
SD	12.0	26.7	23	1.4	96	2.4	0.22	0.07	2.3	0.09	0.14	0.02
Corms (Table 4.2)	15.7	33.4	31.7	3.4	328	5.4	0.79	0.20	0.47	0.14	0.31	0.09
Leaves^a	182	61.3	90	7.9	487	23.9	0.62	0.15	0.66	4.5	1.83	0.36
	(55)	(7.8)	(28)	(2.9)	(74)	(2.9)	(0.11)	(0.05)	(0.18)	(1.6)	(0.30)	(0.03)

^a Mean and standard deviations of results from six cultivars from Table A.18.

Table A.20. Vitamin content of taro *Colocasia* corms (mg/100 g fresh weight).^a

	<i>Source of taro</i>			<i>Mean</i>
	<i>Fiji</i>	<i>Solomon Islands</i>	<i>Western Samoa</i>	
Vitamin A (ret. + β -carotene/6) ^b	0.007 (0.002)	0.007 (0.001)	—	0.007
Thiamin	0.035 (0.013)	0.037 (0.022)	0.025 (0.006)	0.032 (0.006)
Riboflavin	0.034 (0.007)	0.017 (0.006)	0.025 (0.006)	0.025 (0.009)
Nicotinic acid (Nic.acid)	0.92 (0.27)	0.68 (0.37)	0.67 (0.21)	0.76 (0.14)
Pot. Nic. Acid = Trp/60 ^b	—	0.22 (0.05)	0.16 (0.05)	0.19 (0.04)
Ascorbic acid (AA)	6.9	—	—	—
Dehydroascorbic acid (DAA)	8.2	—	—	—
Total vitamin C = AA + DAA	15.1 (11-20)	—	—	—

^a Mean values of 3-4 cultivars given with standard deviation in parentheses (range given for vitamin C), no vitamin D₂ present (see Bradbury and Singh 1986 a,b; Singh and Bradbury 1988).

^b See section 2.17.

Table A.21. Amino acid analyses (mg amino acid/g N sample) and amino acid scores for taro *Colocasia* from Fiji and Western Samoa.

Amino acid	Samoa green ^a	Samoa ^a	Toakulu ^a	Samoa hybrid ^b	Samoa oriori ^b	Tausala ni mumu ^b	Vavai dina ^c	Tausala ni Samoa ^c	Manua	Pa'epa'e	Niue	Fu'ele'ele	Mean	SD
Alanine	257	370	446	340	574	511	342	333	376	367	291	276	—	—
Arginine	297	356	430	232	287	531	263	433	350	426	434	355	—	—
Aspartic acid	559	692	750	553	733	1041	739	794	763	849	724	681	—	—
Cystine (Cys)	126	175	161	70	234	251	74	87	186	210	156	376	—	—
Glutamic acid	603	779	857	808	970	988	928	923	809	740	855	940	—	—
Glycine	211	274	277	233	219	309	282	286	231	297	296	271	—	—
Histidine	97	172	253	89	370	204	105	212	95	117	169	105	—	—
Isoleucine	132	211	189	133	137	150	138	174	193	212	213	243	—	—
Leucine	303	425	402	211	433	529	561	343	343	514	522	422	—	—
Lysine	119	206	350	147	285	385	179	427	165	190	163	274	—	—
Methionine (Met)	48	80	75	43	84	88	50	52	63	54	55	60	—	—
Phenylalanine (Phe)	241	328	352	193	202	395	267	297	317	337	347	273	—	—
Proline	169	252	220	217	314	275	181	262	207	241	190	204	—	—
Serine	211	276	313	224	269	347	275	319	243	309	305	268	—	—
Threonine	133	174	195	118	318	255	223	206	233	221	182	142	—	—
Tryptophan	—	50	97	—	—	85	100	—	—	—	56	125	—	—
Tyrosine (Tyr)	113	171	159	140	131	203	105	120	132	235	151	151	—	—
Valine	199	265	271	196	256	247	195	251	265	289	305	262	—	—
Amino Acid Scores														
Histidine	82	145	213	75	311	171	88	178	80	98	142	88	139	71
S containing (Cys + Met)	112	163	151	72	204	217	79	89	160	169	135	279	153	61
Isoleucine	75	120	107	76	78	85	78	99	110	120	121	138	101	22
Leucine	73	103	97	51	105	128	136	82	83	124	126	102	101	24
Lysine	33	57	96	40	79	106	49	120	45	52	45	75	66	28
Aromatic (Phe + Tyr)	90	127	130	85	87	152	94	106	114	145	126	108	114	23
Threonine	62	82	92	55	149	120	105	97	109	104	85	67	94	26
Tryptophan	—	83	162	—	—	142	167	—	—	—	93	208	143	47
Valine	91	121	124	89	117	113	89	115	121	132	139	120	114	16
% Recovery of N	52	68	77	54	76	83	66	81	64	74	72	68	67	16

^a Mean of two results from the first and second harvests, see Table A.14.

^b From first harvest.

^c From second harvest.

Table A.22. Amino acid analyses (mg amino acid/g N sample) and amino acid scores for taro *Colocasia* leaves from Fiji (see Table A.18).

<i>Amino acid</i>	<i>Vavai dina</i>	<i>Hawaii</i>	<i>Samoa</i>	<i>Mean</i>	<i>SD</i>
Alanine	182	173	109	—	—
Arginine	212	122	361	—	—
Aspartic acid	620	654	465	—	—
Cystine (Cys)	136	146	177	—	—
Glutamic acid	1933	1418	1094	—	—
Glycine	219	203	60	—	—
Histidine	126	103	76	—	—
Isoleucine	123	121	160	—	—
Leucine	244	251	206	—	—
Lysine	254	227	193	—	—
Methionine (Met)	60	53	36	—	—
Phenylalanine (Phe)	334	202	348	—	—
Proline	148	167	109	—	—
Serine	129	145	115	—	—
Threonine	180	178	146	—	—
Tryptophan	83	—	97	—	—
Tyrosine (Tyr)	107	140	147	—	—
Valine	219	150	193	—	—
Amino Acid Scores					
Histidine	106	86	64	85	21
S-containing (Cys + Met)	126	128	137	130	6
Isoleucine	70	69	91	77	12
Leucine	59	61	50	57	6
Lysine	70	63	53	62	9
Aromatic (Phe + Tyr)	112	87	126	108	20
Threonine	85	84	68	79	10
Tryptophan	138	—	162	150	17
Valine	100	68	88	85	16
% recovery of N	62	53	48	54	7

Table A.23. Content of organic acid anions, calcium oxalate and calcium (mg/100 g fresh weight) in taro *Colocasia* corms, suckers and leaves from Fiji (third harvest).

Sample	Total oxalate	Soluble oxalate	Calcium oxalate (CaOx) ^a	Total calcium	Calcium not combined as CaOx ^b	Malate	Citrate	Succinate
Corms								
Samoa hybrid	54	34	29	17	8	124	117	204
Samoa green	38	29	13	19	15	58	52	—
Samoa	78	39	57	23	5	131	102	—
Tausala ni Samoa	70	37	48	28	13	114	135	—
Toakulu	84	38	67	29	8	110	103	132
Mean of 5	65 (19)	35 (4)	43 (22)	23 (5)	10 (4)	107 (29)	102 (31)	168 (51)
Suckers								
Samoa hybrid	61	—	—	15	—	0	0	0
Samoa	59	—	—	13	—	0	0	0
Mean of 2	60 (1)	—	—	14 (1)	—	0	0	0
Leaves								
Dalo ni wai ^c	368	—	—	182	—	760	670	—
Hawaii ^d	374	72	439	175	38	700	98	239
Vavai dina ^d	350	132	317	114	15	619	107	317
Toakulu ^d	574	—	—	297	—	480	160	—
Tausala ni mumu ^d	278	—	—	157	—	600	110	—
Samoa hybrid ^e	483	177	445	157	18	451	188	193
Tausala ni Samoa ^e	532	—	—	246	—	680	170	—
Vutikoto ^e	552	—	—	204	—	960	110	—
Samoa green ^f	324	—	—	159	—	390	120	—
Mean of leaves	426 (110)	127 (53)	400 (72)	182 (55)	24 (13)	627 (175)	193 (182)	249 (63)

^a Calcium oxalate = (total oxalate - soluble oxalate) 128/88.

^b Calcium not combined as calcium oxalate = total Ca - (40 CaOx/128) = free calcium.

^c Grown for its leaf.

^d Edible leaves.

^e Generally not edible but sometimes eaten.

^f Nonedible leaf.

Table A.24. Effect of cooking (boiling and baking) on vitamin content of taro *Colocasia* (mg/100 g fresh weight).^a

<i>Time of treatment (minutes)</i>	<i>Thiamin</i>	<i>Riboflavin</i>	<i>Nicotinic acid</i>
Boiling			
0	0.042	0.018	1.06
10 ^b	0.030	0.015	0.66
10 ^c	0.036	0.015	0.90
20 ^b	0.018	0.012	0.59
20 ^c	0.030	0.015	0.85
30 ^b	0.012	0.009	0.47
30 ^c	0.027	0.012	0.73
Baking			
0	0.042	0.018	1.06
15	0.033	0.015	0.85
30	0.027	0.015	0.82
45	0.027	0.012	0.69

^a Taro from Koronivia Research Station, Fiji, cultivar Samoa hybrid, yield 12.6 t/ha, second harvest; see Table A.14. Taro samples were properly cooked after 20 min boiling or 30 min baking.

^b Water discarded.

^c Water retained.

Table A.25. Taro (*X. sagittifolium*): three popular cultivars from Tonga.^a

		<i>Futuna</i> cv	<i>Maheleuli</i> cv	<i>Tea</i> cv	Mean ^b
Moisture %	a	72.6 (3.1)	65.4 (3.5)	66.3 (1.5)	68.1 (3.9)
Energy kJ/100 g					
E _a		399	516	514	476 (72)
E _b		437	562	547	515 (68)
Protein %	b	1.37 (0.19)	1.30 (0.23)	1.65 (0.26)	1.44 (0.19)
Starch %	e	21.1 (3.6)	28.4 (3.4)	27.8 (1.7)	25.7 (4.3)
Sugar %	f	0.73 (0.17)	0.48 (0.08)	0.51 (0.20)	0.57 (0.14)
Dietary fibre %	g	1.20 (0.24)	1.12 (0.21)	1.13 (0.24)	1.15 (0.04)
Fat %	c	0.11 (0.02)	0.13 (0.03)	0.12 (0.03)	0.12 (0.01)
Ash %	d	1.20 (0.09)	1.10 (0.10)	1.06 (0.12)	1.12 (0.07)
Minerals (mg/100 g)					
Ca		5.3 (1.6)	7.1 (1.6)	5.2 (1.2)	5.9 (1.1)
P		44.1 (3.2)	52.0 (6.5)	62.3 (5.4)	52.8 (9.1)
Mg		23.8 (1.6)	27.5 (4.1)	30.2 (1.4)	27.2 (3.2)
Na		6.6 (0.6)	7.8 (0.2)	5.4 (1.2)	6.6 (1.2)
K		548 (82)	546 (19)	504 (52)	533 (25)
S		6.6 (0.5)	8.3 (1.8)	8.9 (0.5)	7.9 (1.2)
Fe		0.43 (0.13)	0.39 (0.04)	0.58 (0.18)	0.47 (0.10)
Cu		0.19 (0.04)	0.19 (0.07)	0.19 (0.01)	0.19
Zn		0.48 (0.10)	0.53 (0.08)	0.54 (0.04)	0.52 (0.03)
Mn		0.13 (0.04)	0.18 (0.03)	0.19 (0.09)	0.17 (0.03)
Al		0.48 (0.17)	0.75 (0.16)	0.37 (0.08)	0.53 (0.20)
B		0.09 (0.03)	0.08 (0.02)	0.10 (0.02)	0.09 (0.01)
Vitamins (mg/100 g)^c					
Vitamin A (ret. + β -car/6)					0.005 (0.003)
Thiamin		0.028	0.029	0.014	0.024 (0.008)
Riboflavin		0.036	0.036	0.024	0.032 (0.006)
Nicotinic acid		0.61	0.71	1.08	0.80 (0.25)
Pot. Nic. acid = Trp/60		0.34		0.31	0.33 (0.02)
Ascorbic acid (AA)		2.8	5.0	7.2	5.0 (2.2)
Dehydroascorbic acid (DAA)		6.6	12.8	6.5	8.6 (3.7)
Total vitamin C = AA + DAA		9.4	17.8	13.7	13.6 (4.2)
Total oxalate (mg/100 g)		41 (10)	44 (3)	94 (36)	60 (30)
Soluble oxalate (mg/100 g)		35 (12)	28 (3)	69 (37)	44 (22)
Calcium oxalate (CaOx) ^d , mg/100 g		9	23	36	23 (14)
Calcium not combined as CaOx ^e , mg/100g		3	0	-6	-1 (5)
Malate (mg/100 g)		330 (55)	212 (18)	92 (70)	211 (119)
Citrate (mg/100 g)		318 (15)	355 (38)	270 (34)	314 (43)
Succinate (mg/100 g)		337 (121)	526 (74)	654 (300)	506 (159)
Trypsin inhibitor (TIU/g) ^f		0.6	nil	0.3	0.3 (0.3)

^a Unless stated otherwise, results are the average of analyses on nine separate edible cormels of each cultivar; the mother corms are not eaten and were not analysed. Futuna is the most popular cultivar, Maheleuli second and Tea the third most popular *Xanthosoma* cultivar grown in Tonga. Planted in same field at Vaini Research Station, Tongatapu, 13 September 1983 and harvested 30 November 1984.

^b Sum of a + b + c + d + e + f + g = 98.2.

^c Mean of duplicate analyses on one corm of each cultivar.

^d Calcium oxalate = (total oxalate - soluble oxalate) 128/88.

^e Calcium not combined as CaOx = total Ca - (40 CaOx/128) = free calcium.

^f There was no detectable amount of chymotrypsin inhibitor present.

Table A.26. Taro (*X. sagittifolium*): two cultivars from PNG.^a

		Cv 1	Cv 2	Mean ^b	SD
Moisture %	a	67.1 (3.2)	64.8 (4.4)	66.0	1.6
Energy kJ/100 g					
E _a		546	525	536	15
E _b		533	573	553	28
Protein %	b	1.72 (0.57)	1.60 (0.52)	1.66	0.08
Starch %	e	29.9 (3.4)	28.8 (4.3)	29.4	0.8
Sugar %	f	0.26 (0.07)	0.28 (0.09)	0.27	0.01
Dietary fibre %	g	0.85 (0.16)	0.79 (0.09)	0.82	0.04
Fat %	c	0.10 (0.04)	0.10 (0.02)	0.10	0.00
Ash %	d	0.99 (0.18)	0.92 (0.25)	0.96	0.05
Ca (mg/100 g)		9.7 (0.7)	12.5 (3.2)	11.1	2.0
Fe (mg/100 g)		0.35 (0.08)	0.31 (0.06)	0.33	0.03

^a Results are the mean of five analyses on five separate corms of each cultivar obtained from Finschhafen, PNG, March 1987. The mother corm was not analysed.

^b Sum of a + b + c + d + e + f + g = 99.2.

Table A.27. Amino acid analyses (mg amino acid/g N sample) and amino acid scores for popular taro (*X. sagittifolium*) cultivars from Tonga.^a

Amino acid	Futuna 1	Futuna 2	Tea 3	Tea 6	Mean	SD
Alanine	337	395	353	207	—	—
Arginine	483	440	334	233	—	—
Aspartic acid	801	726	727	454	—	—
Cystine	252	253	290	225	—	—
Glutamic acid	939	745	721	483	—	—
Glycine	376	334	284	186	—	—
Histidine	82	129	54	58	—	—
Isoleucine	188	172	152	88	—	—
Leucine	484	343	327	181	—	—
Lysine	292	193	202	138	—	—
Methionine	45	66	39	20	—	—
Phenylalanine	336	389	264	130	—	—
Proline	230	203	184	136	—	—
Serine	394	356	363	212	—	—
Threonine	273	228	196	96	—	—
Tryptophan	—	93	—	71	—	—
Tyrosine	115	235	93	66	—	—
Valine	351	329	288	177	—	—
Amino Acid Scores						
S containing (Cys + Met)	190	204	211	157	191	24
Isoleucine	107	98	87	57	86	25
Leucine	117	83	79	44	81	30
Lysine	80	53	56	38	57	17
Aromatic (Phe + Tyr)	114	158	91	50	103	44
Threonine	128	107	92	45	93	35
Tryptophan	—	155	—	118	137	26
Valine	160	150	132	81	131	35
% Recovery of N	88	74	61	40	66	20

^a Duplicate analyses were made on two different corms of each cultivar.

Table A.28. Composition of giant taro (*A. macrorrhiza*) popular cultivars from Western Samoa.^a

Sample designation	Moisture %	Energy (kJ/100 g)		Protein %	Starch %	Sugar %	Dietary fibre %	Fat %	Ash %	Calcium (mg/100 g)	Iron (mg/100 g)	Total oxalate (mg/100 g)	Trypsin inhibitor (TIU/g)	Chymo-trypsin inhibitor (CIU/g)
		<i>E_a</i>	<i>E_b</i>											
	<i>a</i>			<i>b</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>c</i>	<i>d</i>					
Lau Penitala	75.9	219	380	2.64	8.0	1.99	2.10	0.15	1.04	36.0	2.33	32	387	75
Faitama	71.2	419	462	2.30	20.5	1.67	2.10	0.11	1.06	38.6	0.60	21	232	39
Sega ^b	59.8	622	660	2.56	33.0	0.82	1.72	0.09	0.56	24.8	0.80	43	427	77
Niukini ^b	72.8	406	434	1.96	21.2	0.44	1.36	0.15	0.78	18.0	0.45	28	198	39
	(3.8)			(0.4)	(4.0)	(0.19)	(0.04)		(0.03)	(3)	(0.02)	—	(36)	(8)
Toga ^b	72.6	389	437	1.61	20.0	1.11	1.66	0.11	1.01	23.3	0.46	28	145	31
	(1.8)			(0.23)	(2.3)	(0.7)	(0.14)	(0.03)	(0.21)	(3.9)	(0.04)	(15)	(37)	(10)
Fui	71.2	—	462	3.25	—	1.38	—	0.16	1.00	—	0.62	—	643	78
Mean ^c	70.6	411	473	2.39	20.5	1.24	1.79	0.13	0.91	28.1	0.88	30	339	57
SD	5.6	155	97	0.57	9.6	0.57	0.32	0.03	0.20	8.8	0.72	8	185	22

^a All corms were obtained from farmers' fields or from the market, January 1984. Niu Kini mean of results from two corms, Toga mean of results from four corms. Results for organic acid anions other than oxalate given in Table 3.7.

^b These corms were 6 months old from same farmer's field at Sa'anapu.

^c Sum of $a + b + c + d + e + f + g = 97.6$.

Table A.29. Composition of giant taro (*A. macrorrhiza*) cultivars from Western Samoa.^a

Sample designation	Moisture %	Energy (kJ/100 g)		Protein %	Starch %	Sugar %	Dietary fibre %	Fat %	Ash %	Total calcium (mg/100 g)	Iron (mg/100 g)	Trypsin inhibitor (TIU/g)	Total oxalate (mg/100 g)	Soluble oxalate (mg/100 g)	Calcium oxalate ^e (mg/100 g)	Free calcium ^e (mg/100 g)	Malate (mg/100 g)	Citrate (mg/100 g)	Succinate (mg/100 g)
		E _a	E _b																
Toga 1 ^b	64.5 (0.2)	546	578	3.73 (0.57)	27.4 (1.7)	0.89 (0.30)	1.73 (0.28)	0.10	0.55 (0.09)	22.5	0.87 (0.18)	303 (67)	69	12	83	-3	132	190	—
Toga 2 ^c	75.3 (5.7)	388	390	2.14 (0.78)	20.0 (4.6)	0.64 (0.44)	1.10 (0.09)	0.06	0.58 (0.01)	20.0 (5.7)	0.41 (0.07)	160 (57)	38	7	45	6	701	69	—
Toga 3 ^d	66.3 (1.8)	497	547	3.30 (0.50)	24.6 (2.2)	1.27 (0.05)	1.61 (0.23)	0.06	0.57 (0.23)	25.7 (2.5)	0.74 (0.08)	202 (36)	36	—	—	—	—	—	—
Laufola 2 ^b	74.4 (0.6)	348	406	1.30 (0.14)	18.2 (2.8)	0.81 (0.10)	1.90 (0.06)	0.09	0.68 (0.06)	30.6 (1.4)	0.72 (0.11)	39 (25)	43 (9)	31 (4)	17	25	285 (40)	295 (36)	150
Niukini 1 ^c	70.0 (7.7)	415	482	2.89 (0.50)	20.6 (6.5)	0.81 (0.16)	1.81 (0.05)	0.07	0.86 (0.01)	26.2 (2.8)	0.79 (0.17)	156 (77)	81 (73)	—	—	—	—	—	—
Niukini 2 ^d	68.7 (4.7)	499	505	3.79 (1.19)	24.6 (4.4)	0.86 (0.13)	1.22 (0.42)	0.06	0.82 (0.06)	22.3 (3.8)	0.87 (0.25)	327 (89)	29	19	15	18	485	550	472
Fui 1 ^c	71.4 (0.6)	400	458	3.21 (0.33)	19.2 (0.2)	0.90 (0.4)	1.44 (0.08)	0.07	0.99 (0.17)	31 (2.1)	0.89 (0.04)	274 (16)	32 (6)	17 (3)	22	24	163 (47)	247 (82)	454 (174)
Sega 1 ^c	72.2 (2.6)	390	444	2.91 (0.27)	18.6 (2.1)	1.26 (0.08)	1.15 (0.07)	0.08	0.67 (0.08)	21.8 (0.7)	0.98 (0.03)	251 (17)	16 (4)	10 (1)	9	19	168 (88)	127 (51)	405 (88)
Uli 1 ^c	71.3	388	460	1.18	19.9	1.66	1.88	0.09	0.65	36.4	1.25	74	65	20	65	16	306	191	770
Mean ^f	70.4	430	474	2.72	21.4	1.01	1.43	0.08	0.71	26.3	0.83	198	45	17	37	15	320	238	450
SD	3.8	70	61	0.97	3.4	0.32	0.36	0.02	0.15	5.4	0.23	100	21	8	28	10	207	156	221

^a All cultivars obtained February 1985 from farmers' fields unless stated otherwise, each result is mean from two corms, except Uli which is from a single corm. Results for minerals other than Ca and Fe are averages over six cultivars as follows: P 44(18), Mg 52(23), Na 30(19), K 267(114), S 11.9(3.3), Cu 0.07(0.04), Zn 1.51(0.56), Mn 0.62(0.30), Al 0.36(0.16), B 0.10(0.02). Cultivars Niu Kini and Toga are the most popular and together would account for about 75% of production.

^b Harvested from same field of farmer at Tanumalala, 3 years old.

^c Harvested from same field of farmer in Sa'anapua, all 17 months old.

^d Grown in same plot at Experiment Station, Alafua, harvested 14 months, 9 days after planting.

^e Calculated as shown in section 2.6.

^f Sum of a + b + c + d + e + f + g = 97.8

Table A.30. Composition of giant taro (*A. macrorrhiza*) commonly grown cultivars from Tonga.^a

		<i>Tuu</i> cv	<i>Tea</i> cv	<i>Fohenga</i> cv	<i>Mean</i> ^b	<i>SD</i>
Moisture %	a	75.9 (2.6)	69.5 (2.8)	64.3 (3.1)	69.9	5.8
Energy (kJ/100 g)						
E _a		296	443	519	419	113
E _b		381	491	582	485	101
Protein %	b	0.50 (0.11)	1.67 (0.28)	1.88 (0.51)	1.35	0.74
Starch %	e	16.2 (0.8)	23.7 (2.7)	27.6 (2.6)	22.5	5.8
Sugar %	f	0.45 (0.05)	0.58 (0.14)	0.88 (0.13)	0.64	0.22
Dietary fibre %	g	2.31 (0.18)	1.99 (0.12)	2.73 (0.39)	2.34	0.37
Fat %	c	0.10 (0.02)	0.09 (0.05)	0.09 (0.03)	0.09	0.01
Ash %	d	1.23 (0.18)	1.10 (0.08)	1.07 (0.09)	1.13	0.09
Calcium (mg/100 g)		38.7 (6.7)	78.0 (24.3)	64.3 (12.9)	60.3	20
Iron (mg/100 g)		0.54 (0.03)	0.85 (0.18)	0.99 (0.08)	0.79	0.23

^a Results are the mean of analyses on three corms of Tea (most common cultivar in Tonga) and Fohenga, and two corms of Tuu. All samples were 2 years old, harvested at flowering (December 1984) from same farmer's field near Vaini Research Station, Tongatapu.

^b Sum of a + b + c + d + e + f + g = 98.0.

Table A.31. Amino acid analyses (mg amino acid/g N sample) and amino acid scores for giant taro (*A. macrorrhiza*) from Western Samoa.^a

<i>Amino acid</i>	<i>Lau Penitala</i> cv	<i>Faitama</i> cv	<i>Sega</i> cv	<i>Toga</i> cv	<i>Mean</i>	<i>SD</i>
Alanine	228	265	260	249	—	—
Arginine	526	315	311	337	—	—
Aspartic acid	643	737	682	707	—	—
Cystine (Cys)	168	98	227	207	—	—
Glutamic acid	657	821	617	661	—	—
Glycine	323	380	320	339	—	—
Histidine	123	106	96	107	—	—
Isoleucine	149	138	181	180	—	—
Leucine	295	455	424	418	—	—
Lysine	235	217	264	215	—	—
Methionine (Met)	68	55	83	70	—	—
Phenylalanine (Phe)	204	200	262	257	—	—
Proline	253	231	240	343	—	—
Serine	263	306	290	253	—	—
Threonine	199	181	290	303	—	—
Tryptophan	—	98	72	67	—	—
Tyrosine (Tyr)	155	150	180	192	—	—
Valine	265	279	297	278	—	—
Amino Acid Scores						
Histidine	103	89	81	90	91	9
S-containing (Cys + Met)	151	98	199	178	157	44
Isoleucine	85	79	103	103	93	12
Leucine	71	110	103	101	96	17
Lysine	65	60	73	59	64	6
Aromatic (Phe + Tyr)	91	89	112	114	102	13
Threonine	93	85	136	142	114	29
Tryptophan	—	163	120	112	132	27
Valine	121	127	136	127	128	6
% Recovery of N	70	65	66	66	67	2

^a Samples obtained January 1984; other data given in Table A.28.

Table A.32. Effect of cooking (boiling and baking) on the vitamin content (mg/100 g) of giant taro (*A. macrorrhiza*).^a

<i>Time of treatment (min)</i>	<i>Thiamin</i>	<i>Riboflavin</i>	<i>Nicotinic acid</i>	<i>Ascorbic acid (AA)</i>	<i>Dehydroascorbic acid (DAA)</i>	<i>Total vitamin C (AA + DAA)</i>
Boiling						
0	0.040	0.022	0.67	11.5	8.4	19.9
10 ^b	0.031	0.019	0.44	5.5	4.7	10.2
10 ^c	0.033	0.019	0.55	8.0	9.4	17.4
20 ^b	0.025	0.015	0.38	3.9	3.9	7.8
20 ^c	0.033	0.019	0.46	6.4	7.9	14.3
30 ^b	0.015	0.012	0.36	2.2	2.3	4.5
30 ^c	0.028	0.015	0.46	4.1	6.4	10.5
Baking						
0	0.040	0.022	0.67	11.5	8.4	19.9
15	0.033	0.019	0.52	7.2	6.3	13.5
30	0.031	0.019	0.47	4.8	4.2	9.0
45	0.025	0.015	0.45	2.6	2.2	4.8

^a Giant taro corm from Western Samoa, February 1985, cultivar Niu Kini, age 14–17 months.

^b Water discarded.

^c Cooking water retained.

Table A.33. Giant swamp taro (*C. chamissonis*) from Kiribati.^a

Sample designation	Age of corm	Moisture %	Energy (kJ/100 g)		Protein %	Starch %	Sugar %	Dietary fibre %	Fat %	Ash %	Calcium (mg/100 g)	Iron (mg/100 g)	Total oxalate (mg/100 g)	Trypsin inhibitor (TIU/g) ^b	
			E _a	E _b											
Ikaraoi Kairoro	a	1-2	84.4 (1.3)	184	232	0.60 (0.22)	8.1 (0.5)	1.97 (0.39)	2.18 (0.19)	0.10 (0.01)	0.57 (0.01)	86 (36)	0.37 (0.06)	100	6.6 (6.9)
	b	3-4	82.8 (0.5)	206	260	0.92 (0.17)	10.4 (0.4)	0.57 (0.04)	2.04 (0.45)	0.11 (0.02)	0.63 (0.07)	129 (54)	0.54 (0.06)	187 (80)	—
Atimainiku	a	1	79.5	268	317	0.19	14.0	1.10	2.40	0.21	0.68	67	0.34	380	<0.2
	b	2-2.5	81.9 (3.6)	209	276	0.57 (0.01)	11.2 (2.8)	0.34 (0.04)	2.38 (0.49)	0.11 (0.04)	0.58 (0.11)	185 (43)	0.16 (0.04)	330 (85)	—
Ikaraoi Ikauraura	a	1.5	79.2	250	323	0.63	12.9	0.97	2.35	0.13	0.55	162	0.48	140	0.41
	b	2-2.5	72.4 (5.6)	369	441	0.49 (0.11)	19.9 (0.01)	0.96 (0.09)	2.94 (0.06)	0.17 (0.02)	1.20 (0.04)	577 (46)	0.47 (0.08)	725	—
Katutu Uraura	a	0.75	76.1	304	376	0.81	14.9	1.95	2.49	0.12	0.87	243	0.62	—	4.0
	b	2-2.5	81.4 (0.07)	—	284	0.39	—	0.44	—	0.14 (0.03)	0.80 (0.01)	246 (117)	0.24 (0.02)	—	—
Katuta Kairoro	a	0.75	77.7	283	349	0.31	15.1	0.76	2.39	0.21	0.93	383	0.96	450	<0.2
Ikaraoi natutebubua	a	2	79.0	287	326	0.75	14.9	0.96	2.03	0.16	0.56	116	0.40	90	3.4
Mean (SD)	—	—	79.4 (3.5)	262 (60)	318 (61)	0.50 (0.23)	13.5 (3.6)	1.06 (0.56)	2.36 (0.27)	0.14 (0.04)	0.74 (0.21)	219 (156)	0.46 (0.22)	300 (218)	2.5 (2.6)

^a January 1984 samples (labelled a in the Table) were small corms of size normally eaten, from same pit from village of Rawannawi on island of Marakei; January 1985 samples (labelled b in the Table) were 2-3 different corms of the same cultivar; results were averaged. Cultivars Atimainiku, Katutu Uraura and Ikaraoi Ikauraura from same pit in Tearinibai, North Tarawa and Ikaraoi Kairoro from pit in Bonriki, South Tarawa. Mean mineral analyses for January 1984 samples are Ca 176(119), P 13.8(2.2), Mg 24.9(3.7), Na 100(24), K 53(13), S 4.0(1.2), Fe 0.53(0.23), Cu 0.09(0.07), Zn 1.02(0.41), Mn 0.22(0.09), Al 1.30(0.54), B 0.08(0.03). Mean values for organic acid anions are given in Table 3.8.

^b All samples labelled 'a' were tested and found to contain no chymotrypsin inhibitor.

Table A.34. Giant swamp taro (*C. chamissonis*) of commonly grown cultivars from the high island and atoll of Pohnpei State, Federated States of Micronesia.^a

Sample designation	Moisture %	Energy (kJ/100 g)		Protein %	Starch %	Sugar %	Dietary fibre %	Fat %	Ash %	Total oxalate (mg/100 g)	Soluble oxalate (mg/100 g)	Calcium oxalate ^c (mg/100 g)	Free calcium ^c (mg/100 g)	Malate (mg/100 g)	Citrate (mg/100 g)	Succinate (mg/100 g)
		E _a	E _b													
	a			b	e	f	g	c	d							
From Pohnpei (high island)																
Simiden	62.5	504	613	0.54	27.3	1.01	2.57	0.18	0.35	50	—	—	—	—	—	—
Nein Alex	74.7	322	401	0.41	16.9	1.14	3.09	0.13	0.64	244	18	329	18	136	78	105
Nukuro	78.7	—	331	0.38	—	0.85	—	0.13	—	160	—	—	—	—	—	—
Pohnengles	66.7	440	540	0.81	23.0	1.22	4.30	0.23	0.54	210	—	—	—	—	—	—
Nein Bob	73.7	346	418	0.26	19.1	0.63	3.31	0.19	0.42	350	—	—	—	—	—	—
From Ngatik (atoll)																
Simiden	72.5	360	439	0.34	19.7	0.87	2.97	0.13	0.57	190	—	—	—	—	—	—
Nein Alex	73.0	367	430	0.30	19.6	1.29	3.07	0.21	0.58	397	90	447	32	—	179	83
Nukuro	82.2	252	270	0.21	13.9	0.60	1.74	0.09	0.39	316	27	420	-20	76	107	232
Pohnengles	74.5	325	404	0.94	16.2	1.74	3.52	0.16	0.76	340	—	—	—	—	—	—
Nein Bob	66.9	449	536	0.31	25.0	0.61	4.16	0.21	0.87	710	—	—	—	—	—	—
Mean ^b	71.9	374	438	0.45	20.1	1.00	3.19	0.17	0.57	297	45	399	10	106	121	140
SD	5.8	80	102	0.24	4.6	0.36	0.78	0.05	0.17	179	39	62	27	42	52	80

^a Two corms of each sample bulked together. Samples obtained May 1985.^b Sum of a + b + c + d + e + f + g = 97.4.^c Calculated as shown in section 2.23.

Table A.35. Mineral content (mg/100 g) of giant swamp taro (*C. chamissonis*) from the high island and atoll of Pohnpei, Federated States of Micronesia.^a

<i>Sample designation</i>	<i>Ca</i>	<i>P</i>	<i>Mg</i>	<i>Na</i>	<i>K</i>	<i>Fe</i>	<i>Cu</i>	<i>Zn</i>	<i>Mn</i>
From Pohnpei (high island)									
Simiden	34	11.7	16.4	26.9	88.9	1.34	0.11	3.22	2.58
Nein Alex	121	10.5	12.5	29.1	167	0.79	0.28	4.43	3.27
Nukuro	116	10.9	25.2	42.3	59.3	0.85	0.26	12.3	2.81
Pohnengles	93	12.5	14.3	30.4	136	2.14	0.13	2.80	1.27
Nein Bob	93	9.5	17.9	31.2	59.3	0.84	0.12	4.3	0.93
Mean	91	11.0	17.3	32.0	102	1.19	0.18	5.41	2.17
SD	35	1.2	4.9	6.0	48	0.58	0.08	3.9	1.0
From Ngatik (atoll)									
Simiden	89	27.9	14.8	68.3	82.5	0.48	0.06	0.37	0.05
Nein Alex	172	15.3	21.1	40.0	45.0	0.81	0.05	0.63	0.22
Nukuro	111	6.3	12.0	36.8	30.9	0.23	0.01	0.77	0.09
Pohnengles	166	41.8	26.3	77.3	83.0	0.67	0.18	4.56	0.09
Nein Bob	257	26.8	15.2	60.0	62.0	0.70	0.14	1.48	0.24
Mean	199	23.6	17.9	56.5	60.7	0.58	0.09	1.56	0.14
SD	65	13.5	5.8	17.6	23	0.23	0.07	1.7	0.09

^a Samples obtained May 1985; see Table A.34. All results obtained by inductively coupled plasma technique. Results for S, Al and B showed no change between mainland and atoll and hence have been omitted; averages are given in Table 3.8.

Table A.36. Amino acid analyses (mg amino acid/g N sample) and scores for giant swamp taro (*C. chamissonis*) from Kiribati.^a

<i>Amino acid</i>	<i>Ikaraoi Natutehubua cv</i>	<i>Katuta Uraura^b cv</i>	<i>Ikaraoi Kairoro cv</i>	<i>Mean</i>	<i>SD</i>
Alanine	287	320	458	—	—
Arginine	215	186	271	—	—
Aspartic acid	503	745	753	—	—
Cystine (Cys)	—	123	139	—	—
Glutamic acid	614	707	1005	—	—
Glycine	276	261	324	—	—
Histidine	127	83	145	—	—
Isoleucine	169	194	212	—	—
Leucine	302	388	412	—	—
Lysine	164	178	397	—	—
Methionine (Met)	41	149	40	—	—
Phenylalanine (Phe)	199	184	220	—	—
Proline	134	218	322	—	—
Serine	177	242	307	—	—
Threonine	196	179	281	—	—
Tryptophan	55 ^c	49	21	—	—
Tyrosine (Tyr)	178	129	165	—	—
Valine	285	219	309	—	—
Amino Acid Scores					
Histidine	107	94	122	107	14
S containing (Cys + Met)	—	138	115	127	16
Isoleucine	97	103	121	107	12
Leucine	73	87	100	87	14
Lysine	45	56	109	70	34
Aromatic (Phe + Tyr)	96	95	98	96	2
Threonine	92	91	132	105	23
Tryptophan	92	82	35	70	30
Valine	130	110	141	127	16
% Recovery of N	52	60	74	62	11

^a Samples arrived January 1984; for other results see Table A.33.

^b Mean value of results on two different hydrolysates.

^c This tryptophan analysis obtained on cv Nein Alex from Pohnpei (high island), Table A.34.

Table A.37. Yam (*D. alata*) popular cultivars from East Sepik Province of Papua New Guinea.^a

Sample designation	Yield (t/ha) fresh weight ^b	Moisture %	Energy (kJ/100 g)		Protein %	Starch %	Sugar %	Dietary fibre %	Fat %	Ash %	Calcium (mg/100 g)	Total oxalate (mg/100 g)	Mole ratio Ox/Ca ^c	Trypsin inhibitor (TIU/g)
			E _a	E _b										
		a			b	e	f	g	c	d				
Takua Kupmi	28.9 (4.4)	80.8	277	294	1.00	14.5	0.66	0.79	0.06	0.68	4.5	19.2	1.94	—
Kpmora	28.9 (6.8)	78.9	312	327	1.31	15.8	1.24	0.94	0.06	0.96	3.7	24.2	2.97	0.7
Du Kupmi	49.8	76.2	392	374	1.56	20.9	0.55	1.33	0.07	0.74	5.6	—	—	0.8
Takua Yaimbi	13.0 (1.9)	83.4	244	249	1.19	12.7	0.33	1.17	0.08	0.56	7.7	3.8	0.22	0.2
Tolai	43.3 (5.7)	83.8	248	242	1.06	13.1	0.25	0.95	0.07	0.68	5.9	21.9	1.69	0.4
Yavovi	26.7 (2.6)	75.2	378	392	2.00	18.5	1.59	1.95	0.09	0.90	6.8	6.1	0.41	0.7
Mean ^d	—	78.6	309	313	1.35	15.9	0.77	1.19	0.07	0.75	5.7	15.0	1.45	0.56
SD	—	4.0	66	63	0.37	3.4	0.53	0.42	0.01	0.15	1.5	9.4	1.14	0.25

^a Samples harvested in August 1984. Mineral analyses with standard deviations in parentheses are Ca 5.7(1.5), P 32(7), Mg 17.7(3.5), Na 2.34(0.72), K 312(159), S 9.8(2.3), Fe 0.14(0.03), Cu 0.14(0.04), Zn 0.36(0.10), Mn 0.02(0.01), Al 0.10(0.04), B 0.09(0.03). Mean results for organic acid anions given in Table 3.10.

^b Standard error of mean given in parentheses.

^c Mole ratio Ox/Ca = (oxalate content) 40/(Ca content) 88.

^d Sum of a + b + c + d + e + f + g = 98.6.