

VEGETABLE CROPS UPDATE

Volume 6

January 1996

No. 1

Molokai Sweetpotato

Results from sweetpotato cultivar trials conducted at the Molokai Applied Research and Demonstration Farm
Alton Arakaki and Hector Valenzuela

Introduction

Sweetpotato variety trials were conducted in Molokai and Oahu to select varieties with potential for the fresh market as well as for possible value-added products. Local, Pacific Region, and U.S. varieties were evaluated over several years during the Spring and Fall Seasons. This research was made possible in part by a GACC grant from CAPE to Alton Arakaki and Steve Fukuda. The CAPE project had the overall objective of promoting the local sweetpotato industry and to stimulate the development of possible processing sweetpotato export industries. The potential exists for the selection of sweetpotato varieties adapted to different agroclimatic conditions, and for varieties favored by the many markets for sweetpotato, including varieties ideal for production in the home-garden with tolerance to pests and nematodes and with high edible quality and nutritional properties. Soil fertility in the Molokai Research and Demonstration Farm (22° 155') is pH 6-6.5, P 20-70 ppm, K= 400-500 ppm, Ca= 550-2000 ppm, and Mg= 150-400 ppm.

Sweetpotato Variety Trial, Spring and Fall 1988

Spring. The experiment was conducted in Molokai in a commercial field to evaluate the growth of 20 sweetpotato varieties. Cutting slips were planted on flat ground on 9 March, 1988 and harvested on 12 Sept. The slips consisted of 1 ft cuttings of sweetpotato shoots. Planting density was 10 in between plants and 48 in between rows for an estimated population of 13,069 plants per acre. The plants were fertilized with 500 lbs 10-20-2 per acre preplant, followed by 300 lbs 10-20-20 per acre sidedressed and hilling 4 weeks after planting. The plants were hilled 8 in at about 4 weeks after planting after the fertilizer side-dressing. Irrigation was applied through sprinklers twice per week to supply at least 1.5 in. The herbicide Amiban was applied preemergence. Sevin was applied for sweetpotato weevil control. Other pests that were monitored included nematodes, wire worms, whiteflies, and mites during dry periods. Trial results are shown in Table 88-1. A taste panel was conducted on baked sweetpotatoes. As reference from two popular varieties the taste index for 'Waimanalo Red' was 3.2 and for 'Centennial' 3.2.

Fall. A follow-up experiment was conducted in the Fall 1988, also in commercial field. Cuttings were planted on 10 August 1988 and plant harvested on 17 Jan. 1989. Spacing used was 8 in between plants and 4 in between rows for an estimated population of 19,604 plants/Acre. Other cultural practices were similar to those followed for the Spring trials. Results are shown in Table 88-2.

Contents!!

Table of Contents

Sweetpotato variety trials in Molokai	pg. 1-10
1988-1989 trials	pg. 1-3
1992-1994 trials	pg. 3-8
Results and Discussion	pg. 9-10
Industry factoids	pg. 4
Standard varieties in Hawaii	pg. 10
Sweetpotato nutrition	pg. 11-13
Varietal Description for local varieties	pg. 11-12
Seasonal/ elevation trials	pg. 10,14

Table 88-1. Yield data and taste index from 20 sweetpotato varieties grown in Molokai, Spring 1988.

Cultivar	Grade A (lb/A)	Grade B (lb/A)	Off-Grades (lb/A)	Jumbos (lb/A)	Total (lb/A)	GradeA (% by wt)	Taste Index (1-5)
83-5	20330	4356	13069	1452	39208	51.85	1.7
Mok- RxP	18048	3112	3112	3734	28006	64	3.0
83-1	16990	3267	2614	19604	42476	40	3.6
Mokuau-Unk	13757	1719	1891	17196	34565	40	3.0
CES	9802	5718	3267	16337	35124	28	3.1
Kona-B	8911	2079	2376	1188	14555	61	2.6
83-3	7910	5502	3439	12381	29234	27	2.9
Rapoza	7624	1089	1634	3812	14159	54	3.7
83-4	6760	2704	3605	3605	16675	40	3.7
Uyenten	5809	5082	3630	2178	16699	35	3.0
78-9	5750	1307	3267	1438	11762	49	2.7
78-12	4084	1634	1634	8985	16337	25	3.7
71-5	4084	817	1225	2042	8168	50	3.2
Jewel	3659	3137	1568	0	8364	43	2.5
83-2	3388	1936	2662	0	7987	42	3.7
83-7	2904	1452	2541	0	6898	42	2.5
HSPA	1361	1634	1089	0	4084	33	3.0
71-7	467	0	0	0	467	100	2.7
71-3	0	726	968	0	1694	0	2.0
Centennial	0	0	0	0	0	0	2.7

Taste index= 1 (least) to 5 (best tasting).

Table 88-2. Yield data from several sweetpotato varieties grown in Molokai, Fall 1988.

Cultivar color	Grade A (lb/A)	Grade B (lb/A)	Off-Grades (lb/A)	culls (lb/A)	Jumbos (lb/A)	Total (lb/A)	GradeA (%)	Skin/Flesh
Hoolehua Gold	40434	13478	9802	613	11640	75966	53	R/O
Mokuau Unk	32907	14703	5251	3501	29405	85769	38	
Hoolehua Red	20830	11640	7964	3676	1838	45947	45	LR/W
Uyenten	19604	11434	11980	2178	2178	47377	41	R/W
CES	19604	9189	9189	3063	4288	45335	43	
78-9	14563	8962	5041	1120	3921	33607	43	LB/LY
83-5	14376	10456	11109	0	9149	45090	32	LR/W, P
ring								
Mokuau RxP	12648	7589	11383	5059	1897	38576	33	R/P
71-5	7723	4158	5941	2376	0	20198	38	LR/YO
Waimanalo Red	7129	5941	5941	1188	0	20198	35	R/LY
83-4	6191	6707	7739	4127	2064	26827	23	LR/Y
HSPA	6084	6084	13520	5408	0	31096	20	LY/Y
Kona B	4901	2178	3267	3267	0	13614	36	LR/LO
83-3	3921	3921	6535	3267	0	17644	22	W,Y/O
Rapoza	3676	4288	1838	1225	0	11027	33	W/P
Jewell	3519	2513	8043	3016	0	17091	21	LB/O
83-2	1089	5990	8713	7079	0	22872	5	Y,P tint/Y
71-7	1060	1060	0	2119	0	4239	25	LY/Y
83-7	653	0	2614	1960	0	5228	13	W/Y,O
71-3	0	1485	0	4158	0	5644	0	R/LY
Centennial	0	0	0	0	0	0	0	R/O

Sweetpotato Variety Trial, Fall 1989

A sweetpotato variety trial was conducted at the Molokai Applied Research Farm in the Fall 1989. Cuttings were planted on 9 Aug. 1989 and harvested on 7 March 1990. Plant density was 0.66 ft between plants and 4 ft between rows for an estimated population of 16,501 plants per acre. Field preparation consisted of plowing and discing. The crop was irrigated with T-tape drip lines. Fertilization consisted of pre-plant application of 600 lbs/A of 10-30-30 followed by a side-dressed application of 600 lbs/A of 10-30-10 applied prior to hilling at about 4 weeks after planting. Hand weeding was conducted as needed. Insecticides applied were Sevin and Malathion. Yield results are shown in Table 89-1.

Sweetpotato variety trials in Molokai, Spring and Fall 1993.

Sweetpotato germplasm was obtained from Dr. Robert Jarrett, Sweetpotato Clonal Repository, Griffin, Georgia, Dr. Wanda Collins, North Carolina State Univ., and from Dr. Janice Bohac, USDA Vegetable Research Laboratory, Charleston, South Carolina, to conduct variety trials in Hawaii. Observation variables included adaptability to Hawaii, time to harvest, yields, root uniformity, edible quality for both dry and moist-type sweetpotatoes (Asian and "Western" style cuisines, respectively), and resistance to nematodes, the sweetpotato weevil, and other pests. Sweetpotato cuttings were planted on 23 April, at an estimated plant population of 8713 plants/Acre, and plants harvested on 16 Sept. 1993. Cultural practices were similar to those followed for the earlier trials. Trial results are shown in Table 93-1. A follow-up trial was conducted in the Fall 1993 with the same varieties. For the Fall trial cuttings were planted on 17 Sept. 1993 at an estimated population of 8713 plants/Acre and plants harvested on 14 April 1994. Results of the Fall trial are shown in Table 93-2.

Table 89-1. Yield data from several sweetpotato varieties grown in Molokai, Fall 1989.

Cultivar	Grade A (lb/A)	Grade B (lb/A)	Off-Grades (lb/A)	Jumbos (lb/A)	Culls (lb/A)	Total Yield (lb/A)	Grade A (%)
Mokuau Unk	39604	18152	16501	4950	15677	94886	42
Hoolehua Gold	36304	29703	4538	21452	49505	141503	26
Georgia Jet	33003	16914	9076	8250	18152	85397	39
Waimanalo Red	26403	8251	6601	0	13201	54456	48
Yoshida	16501	0	3300	13201	13201	46205	36
Uyenten	13201	9901	3300	0	18152	44555	30
88-3	13201	8251	9901	0	9076	40429	32
71-5	11551	0	4950	0	8251	24753	47
88-1	9901	0	0	0	16502	26403	37
Mokuau RxP	8251	4950	13201	0	16502	42905	19
88-6	4950	8251	7425	0	18977	39604	12
W149	2887	1650	3300	0	4950	12789	22
88-2	0	9901	3300	0	0	13201	0
88-4	0	8251	6601	0	11551	26403	0
Mokuau Yam	0	8251	3300	0	14852	26403	0
88-7	0	4125	0	0	0	4125	0
Regal	0	1650	6601	0	9901	18152	0
Resisto	0	0	0	0	16914	16914	0
88-5	0	0	0	0	0	0	0

Sweetpotato weevil damage on several sweetpotato cultivars, Spring 1992

A sweetpotato variety trial was conducted in the Spring 1992 to evaluate their susceptibility to sweetpotato weevil damage. Cuttings were planted on 27 March and harvested on 22 September 1992. Harvested roots were evaluated for symptoms of sweetpotato weevil damage and the ratio of damaged to undamaged roots was determined. Results are shown in Table 92-1.

Factoids: The sweetpotato industry in Hawaii (1993)

Total Acreage: 160; Volume of production= 1.6 million lbs; Value of sales= \$688,000. About 80% of local production is in the island of Molokai. Yields as reported by DOA= 10,000 lbs/Acre. Monthly production in the state= ranges from 80-130,000 lbs from Feb-Aug, and 140-230,000 lbs/month from Sept. to January. Farm price= 37-47 cents/lb.

Table 92-1. Effect of sweetpotato varieties on damage from the sweetpotato weevil, Spring 1992.

Cultivar	Grade A (lb/A)	Jumbos (lb/A)	Off Grades (lb/A)	Culls (lb/A)	Weevil damage (% of all roots)
Uyenten	13104	3397	8493	5096	46
Hoolehua Gold	7765	5823	6309	5823	37
Agena	6794	0	2305	2429	15
Mokuau RxP	6309	2184	5824	3882	49
88-7	6309	0	971	2912	43
88-1	6309	0	3276	2427	52
Okinawa	6066	728	4489	6673	65
Mokuau Yam	5824	0	2912	1699	34
Hoolehua Red	5096	0	2912	2427	59
Satsuma Imo	4974	6309	2184	1820	35
Waimanalo Red	4853	2669	3155	2912	67
Kauai	4368	1941	1456	1456	60
71-5	3397	0	4732	4368	50
83-8	3033	0	971	1456	49
No Sweet	2912	0	3397	3397	71
Fukuda all Red	2669	0	3397	2548	58
78-4	2427	0	2912	1941	34
Yoshida	2184	0	1941	970	62
Excel	1941	0	971	728	55
Mililani	1941	0	1941	970	44
Samir	1820	0	1820	2427	52
McBryde	1699	0	3397	2427	29
Jewel	1699	0	971	2063	60
HSPA	1455	0	1456	2427	37
Regal	1456	0	2427	2184	41
72-2	1213	0	1456	1941	53
Lanai	728	0	1456	2184	47
88-2	607	0	728	1699	62
Mokuau unk	606	0	0	1335	25
71-3	485	0	1941	1456	47
88-3	0	0	0	1699	31
Simon #1	0	0	0	728	67
Kona B	0	0	0	364	0
So. Delite	0	0	0	121	0

Recent Sustainable Ag. Extension Activities

- Over 450 people attended the 1995 annual Sustainable Agriculture Conference 10-11 Nov., co-sponsored by the World Sustainable Ag. Assoc. and the UH College of Tropical Ag. and Human Resources. The morning session consisted of a grower and expert panel, along with 15 minute video clips to display a diversified herb and leafy crop operation, a diversified Asian vegetable farm, and an organic taro farm in Oahu. In the afternoon participants visited the 1.5 Acre compost experiment and demonstration plots at the UH Waimanalo Experiment Station.
- Over 50 people attended the Workshop on "Transition to Sustainable Agriculture," held in Kauai on 6 December, and co-sponsored by the Hawaii Farm Bureau Federation and the UH College of Tropical Ag. Presentations were made by Dr. Jack Fuji (UH Hilo), by Drs. Kathleen Delate and Hector Valenzuela from UH Manoa, and by several sustainable/organic farmers. In the afternoon participants visited an 8 acre "transitional" banana operation.

Table 93-1. Yields, quality and origin of several sweetpotato varieties grown in Molokai, Spring 1993.

Cultivar	Origin	Color (Skin/flesh)	Grade A (lb/A)	Jumbos (lb/A)	Culls (lb/A)	Total yield (lb/A)	GradeA (%)
Mokuau P	G. Mokuau	R/P	36523	7940	8469	52931	69
27983	W. Samoa	R/WC	35832	12961	27446	76238	47
Beauregard	W. Collins	LR/COYO	31193	10722	6823	48738	64
White Delight	W. Collins	LR/COYO	29650	0	6073	35723	83
92-04	W. Collins	LR/O	22643	0	13298	35941	63
SC Regal	J. Bohac	LR/C	19702	3529	6175	29406	67
White Regal	J. Bohac	R/CO	19552	3555	6517	29624	66
Agena	UH	R/PW	17146	1478	10938	29562	58
27992	Papua NG	W/W	17050	2750	7700	27500	62
Uyuenten	UH	R/W	16995	1433	2048	20475	83
27978	Tonga	R/YPcortex	16468	0	9671	26139	63
No-sweet	S. Fukuda	W/W	15781	0	9268	25050	63
Okinawan	UH	R/P	15727	0	11864	27591	57
Asian SP	J. Bohac	LR/C	14703	0	3449	18152	81
Sumor	J. Bohac		14311	0	5293	19604	73
28016	Philippines	LtR/DkO	14115	18820	19343	52278	27
25727	Peru	R/O	14760	12111	10976	37847	39
Tinian	J. Bohac	LR/C	11109	0	1960	13069	85
Waimanalo Red	UH	R/C	10053	7733	1547	19332	52
Goldstar	W. Collins	LO/O	9769	0	11468	21238	46
27987	Solomon	W/C	9751	38432	9178	57360	17
28017	Philippines	LtR/O	9671	7319	9149	26139	37
27786	Taiwan	W/W	9584	40254	14057	63895	15
PI399163	J. Bohac	R/P	9469	2555	3006	15030	63
SC Excel	J. Bohac	LtO/O	9149	0	1743	10891	84
29439	Puerto Rico	R/C	8982	7485	33434	49901	18
27985	Solomon	W/LtO	8746	18684	12323	39753	22
Excel	UH	LO/O	8417	366	3415	12198	69
28002	Papua NG	LtR/LtY	7863	0	5932	13795	57
27999	Papua NG	LtO/LtO	7425	4125	15950	27500	27
83-8	UH	R/LO	6814	501	2705	10020	68
25723	Peru	R/LtVP	6709	0	5271	11980	56
25711	Peru	W/LtO	6419	0	5925	12343	52
Hyman White	J. Bohac	LBW/C	6360	0	2353	8713	73
25721	Peru	W/W	6172	0	2904	9076	68
27997	Papua NG	C/LtO	5614	3062	16841	25516	22
28001	Papua NG	LtR/C	5233	0	3207	8441	62
Creole	J. Bohac	WLB/LC	5228	0	23816	29043	18
27988	Solomon	R/C	4828	15129	12232	32189	15
25709	Peru	W/W	4215	0	5587	9802	43
27989	Papua NG	W/LtC	4220	3798	34185	42203	10
88-7	UH	R/P	3842	2379	2928	9149	42
25729	Peru	Pk/CO	3839	1225	3104	8168	47
27984	Solomon	Pk/C	3812	0	7079	10891	35

Table 93-1, CONTINUES. Yields (lbs/Acre), quality and origin of several sweetpotato varieties grown in Molokai, Spring 1993.

Cultivar	Origin	Color	Grade A	Jumbos	Culls	Total yield	GradeA
27991	Papua NG	R/W	3598	39583	8225	51407	7
27977	Tonga	W/W	3594	6099	1198	10891	33
Regal	UH	R/DkO	3472	0	613	4084	85
24752	Peru	W/C	3413	0	3848	7261	47
Hoolehua Red	UH	R/W	3355	15282	0	18636	18
28000	Papua NG	LtR/W	3148	0	15368	18515	17
71-5	UH	R/CO	3131	0	3676	6807	46
McBryde	UH	LBW/C	3022	0	7052	10074	30
28006	Papua NG	W/W	2982	0	2343	5325	56
Satsuma Imo	UH	R/C	2882	823	869	4574	63
28013	Papua NG	DkR/W	2839	1605	7900	12343	23
J1	UH	W/C	2718	0	2509	5229	52
28012	Papua NG	R/W	2558	0	4966	7525	34
27784	Taiwan	CPk/C	2360	11980	3812	18152	13
27996	Papua NG	C/W	2052	0	1820	3872	53
88-1	UH	DR/O	1862	0	1405	3267	57
24939	Puerto Rico	R/C	1753	24111	17973	43837	4
25733	Peru	W/W	1725	0	6117	7841	22
28003	Papua NG	W/LtY	1597	3122	2541	7261	22
Hoolehua Gold	UH	R/O	1525	16773	3485	21782	7
SC1149	J. Bohac	J. Bohac	1470	0	3975	5445	27
Mokuau Un	G. Mokuau	W/C	1331	0	4720	6051	22
27990	Papua NG	LtR/C	1239	16601	6938	24777	5
25724	Peru	R/LtO	1217	77	4073	5290	23
Puerto Rico	J. Bohac	LO/YO	1111	0	8147	9257	12
88-2	UH	R/C	1002	0	1176	2178	46
25720	Peru	W/LtO	958	0	3398	4356	22
Banana Yam	J. Bohac	W/C	911	0	7367	8277	11
28005	Papua NG	W/LtY	581	1975	3253	5809	10
Sumor	UH	W/C	401	0	1342	1743	23
28014	Papua NG	W/W	0	1575	5271	6846	0
28015	Philippines	W/Yo	0	0	8060	8059	0
Lanai	UH	DR/Y	0	0	6777	6777	0
28010	Papua NG	R/W	0	0	2178	2178	0
78-4	UH	LR/Oyrg	0	0	2178	2178	0
72-2	UH	R/O	0	0	1743	1743	0
Mililani	UH	w/PW	0	0	0	0	0
28009	Papua NG	LOST	0	0	0	0	0
25725	Peru	LOST	0	0	0	0	0
25726	Peru	W/W	0	0	0	0	0
27785	Taiwan	C/C	0	0	0	0	0
25734	Peru	W/C	0	0	0	0	0
25736	Peru	R/C	0	0	0	0	0
25707	Peru	W/W	0	0	0	0	0
88-3	UH	W/O	0	0	0	0	0
88-6	UH	R/C	0	0	0	0	0
Kona B	UH	LR/O	0	0	0	0	0

Color Code: L=Light, D= Dark, R=Red, W=White, P=Purple, Y=Yellow, O= Orange, B=Brown, C=Cream.

Table 93-2. Yields, and grading of several sweetpotato varieties grown in Molokai, Fall 1993.

Cultivar	Grade A (lb/A)	Off-Grade (lb/A)	Culls (lb/A)	Total yield (lb/A)	GradeA (%)	Off-Grade (%)
27983	30496	11327	9584	51406	59	22
27999	24396	10456	7842	42693	57	24
27996	22654	31367	26139	80160	28	39
28003	15683	20911	31367	67961	23	31
25727	15683	7842	9584	33109	47	24
28000	15683	7842	10456	33981	46	23
28005	13941	12198	0	26139	53	47
25752	13941	3485	3485	20911	67	17
27987	13070	26139	21783	60991	21	43
27997	13070	10456	13941	37466	35	28
Hoolehua Gold	13070	9584	17426	40080	33	24
27977	13070	8713	15683	37465	35	23
28001	12198	19169	36595	67961	18	28
88-7	11327	5228	2614	19169	59	27
Mokuau PxP (88-7)	10456	7842	11327	29624	35	26
Beauregard	9584	6099	7842	23525	41	25
27988	8713	20911	20911	50535	17	41
27992	8713	12198	24396	45308	19	27
28013	8713	12198	15683	15683	24	33
28002	8713	12198	26139	47050	18	26
Satsumaimo	8713	10456	7842	27010	32	39
29439	7842	13070	18297	18297	20	33
28016	6099	15683	11327	11327	18	47
27786	6099	3485	6099	15683	39	22
Okinawan	6099	2614	4357	13069	47	20
SC Excel	6099	2614	3485	12198	50	21
28014	5228	8713	3485	3485	30	50
Asian Sw. Potato	5228	4357	3485	13069	40	33
88-1	4357	2614	0	6970	62	37
No-sweet	4357	2614	0	6970	62	37
Hoolehua Red	4357	1743	1743	7842	55	22
27785	3485	6970	5228	15683	22	44
Lanai	3485	1743	6970	12198	28	14
28006	3485	0	10456	13940	25	0
Yoshida	2614	4357	10456	17426	15	25
Uyuenten	2614	1743	871	5229	50	33
24939	2614	0	3485	6099	43	0
27985	1743	15683	8713	26139	7	60
28012	1743	8713	12198	12198	8	38
71-5	1743	3485	3485	8713	20	40
Agena	1743	1743	871	871	40	40
88-2	1743	871	6099	8713	20	10
Rapoza	1743	871	871	3485	50	25
McBryde	1743	0	10456	12198	14	0
J1	1743	0	3485	5228	33	0
SC Regal	1743	0	6099	7842	22	0
White Regal	871	0	871	1742	50	0
Waimanalo Red	871	0	3485	4356	20	0
Mililani	871	0	2614	2614	25	0
HSPA	0	8713	1743	10456	0	83
27991	0	7842	13070	20911	0	37
25723	0	6970	5228	12198	0	57
25736	0	6970	1743	8713	0	80
27984	0	5228	27882	33109	0	16
25721	0	5228	19169	24396	0	21
25711	0	3485	3485	6970	0	50

Sweetpotato variety trial, Spring 1994.

A non-replicated trial was conducted in the Spring 1994 to evaluate the marketable yield of several local and exotic sweetpotato varieties. Plants were planted on 11 April and harvested on 22 September 1994. Each plot consisted of 5 plants per variety for the USDA numbered lines, and 10 plants per variety for all other varieties. Planting density was 5 feet between rows and 1 feet between plants for a total density of 8712 plants per acre. Results listed in Table 94-1 include estimated yields per acre based on the per plant yields obtained in this trial.

Table 94-1. Yields, and grading of several sweetpotato varieties grown in Molokai, Spring 1994.

Cultivar	Grade A (lb/A)	Grade B (lb/A)	Culls (lb/A)	Jumbos (lb/A)	Total yield (lb/A)	Grade A (%)	Jumbo (%)
25727	43560	5227	22651	0	71438	61	0
Uyenten	39204	11979	6534	0	57717	68	0
28005	31363	5227	6970	16117	59677	52	27
28016	28750	14375	13939	13939	71002	40	20
Beauregard	23740	9583	8494	12197	54014	44	22
27989	21780	11761	11326	41817	86684	25	48
28013	20909	0	3485	24829	49223	42	50
28000	18731	0	10454	9148	38333	49	24
27987	18730	5663	14810	12197	51401	36	24
88-1	17424	5227	4356	1307	28314	61	5
88-7	17206	8712	4356	3485	33759	51	10
27997	15681	3484	15682	13939	48787	32	28
Hoolehua Gold	15246	3702	2614	27225	48787	31	56
Waimanalo Red	14592	0	10237	16117	40946	36	39
Mokuau RxP	14520	10890	10164	0	35574	41	0
Okinawa	13503	1960	1525	0	16988	79	0
27990	12197	2613	52272	10454	77537	16	13
White Delight	11979	4356	3485	31363	51183	23	61
27977	11761	0	12197	36590	60548	19	60
Hoolehua	11543	0	2395	28750	42689	27	67
No Sweet	11325	9148	8494	9801	38768	29	25
28017	11325	6098	9583	19166	46174	24	13
SC 1149	10237	3267	12632	0	26136	39	0
25752	10018	0	15682	8276	33977	29	24
Mokuau Yam	9583	2614	3920	3845	19602	49	18
27988	9148	0	12632	87555	109335	8	80
88-2	8712	11326	6970	0	27007	32	0
Yoshida	8712	2614	1742	21562	34630	25	62
Asian Swt. Pot.	8712	436	2396	19602	31145	28	63
25733	8712	0	7841	3049	19602	44	15
25729	8276	0	5227	0	13504	61	0
27786	8044	0	20328	55176	83548	10	66
Tinian	7840	1742	1525	0	11108	70	0
Agena	7405	4574	2178	0	14157	52	0
28014	6970	4792	1742	0	13504	52	0
Mililani	6970	3485	6970	0	17424	40	0
28006	6969	3485	871	30056	41382	17	72
P1399163	6534	1742	2614	0	10890	60	0
SC Excel	6098	3267	2831	7623	19820	31	38
Banana Yam	6098	1742	2614	0	10454	58	0
White Regal	5445	4574	4574	9148	23740	23	38
Satsuma Imo	5227	0	4138	12850	22215	23	58
27996	5227	0	5227	0	10454	50	0
71-5	5009	5880	2614	5227	18730	27	28
SC Regal	4356	4356	8 5881	9148	23740	18	38

Results and Discussion

Spring Trials

Spring 1988. These plants were planted on 9 March and harvested in early September. The greatest Grade A yields ranging from 13-20,000 lbs/Acre for the Spring 1988 were obtained by '83-5', 'Mokuau R x P', '83-1', and 'Mokuau-Unknown' (Table 88-1). Total root biomass > 30,000 lbs/Acre which is of interest when growing sweetpotatoes for industrial/processing purposes was obtained with '83-5', '83-1', 'Mokuau Unknown' and 'CES'. The best tasting varieties (index >3.5) were '83-2', '78'12', '83-4', 'Rapoza', and '83-1'. Of these better tasting varieties only '83-1' was among the higher yielders. Additional information included in Table 88-1 includes lbs/Acre for Grade B, off-grades and jumbo roots plus percent Grade A roots on a weight basis.

Spring 1992. These plants were planted on 27 March and harvested on 22 September. The greatest Grade A yields were obtained by 'Uyenten', 'Hoolehua Gold', and 'Agena' (Table 92-1). Yields may have been low in this trial due to high sweetpotato weevil damage. Varieties with sweetpotato weevil damage index ranging from 45-59% included 'Uyenten', 'Mokuau RxP', '88-1', 'Hoolehua Red', '71'5', '83-8' and other less popular ones. Varieties with a damage index >60% included 'Simon #1', '88-2', 'Jewel', 'Yoshida', 'No Sweet', 'Kauai', 'Waimanalo Red', and 'Okinawa'. Among the high yielding varieties lowest weevil damage was observed for 'Agena'. Additional information provided in Table 92-1 includes lbs/Acre for jumbo, off-grade, and cull roots.

Spring 1993. These plants were planted on 23 April and harvested on 16 September. The greatest Grade A yields > 29,000 lbs/Acre were obtained by 'Mokuau Purple', '27983', 'Beauregard', and 'White Delight' (Table 93-1). Greatest total root yields >50,000 lbs/Acre were obtained with 'Mokuau Purple, '27983', '28016', '27987', '27786', and '27991'. Yields between about 40-50,000 lbs/Acre were obtained with 'Beauregard', '29439', '27985', '27989', and '24939'. Additional information provided in Table 93-1 includes germplasm place of origin, skin/flesh color, lbs/Acre for jumbo and cull roots, and percent Grade A roots by weight.

Spring 1994. These plants were planted on 11 April and harvested on 22 September. The greatest Grade A yields were obtained with '25727', 'Uyenten', '28005', and '28016' (Table 94-1). 'Beuregard' was among the highest yielding for the commercially grown varieties. Greatest total root yields >70,000 lbs/Acre were obtained with '25727', '28016', '27989', '27990', '27992' and '27786'. Total root yields between 50-70,000 lbs/Acre were obtained with 'Uyenten', '28005', 'Beauregard', '27987', 'White Delight', and '27997'. Additional information in Table 94-1 includes lbs/Acre for Grade B, cull, and jumbo roots plus percent Grade A and jumbo roots, on a by weight basis.

Fall Trials.

Fall 1988. These plants were planted on 10 August and harvested on 17 January. Greatest Grade A yields with a range of 19-40,000 lbs/Acre were obtained with 'Hoolehua Gold', 'Mokuau Unknown', 'Hoolehua Red', 'Uyenten', and 'CES'. Greatest total root yields >70,000 lbs/Acre were obtained with 'Hoolehua Gold', and 'Mokuau Unknown'. Varieties with total root yields of 40-70,000 lbs/Acre included 'Hoolehua Red', 'Uyenten', 'CES', and '83-5'. Table 88-2 provides additional information on lbs/Acre of Grade B roots, off-grades, culls, jumbos, root skin and flesh color, plus percent of Grade A roots out of the total root fresh weight.

Fall 1989. These plants were planted on 9 August and harvested on 7 March 1990. Greatest yields of Grade A roots ranging from 26-39,000 lbs/Acre were obtained with 'Mokuau Unknown', 'Hoolehua Gold', 'Georgia Jet', and 'Waimanalo Red'. Greatest total underground yields with a range from 50- 141,000 lbs/Acre were obtained with 'Mokuau Unknown', 'Hoolehua Gold', 'Georgia Jet', and 'Waimanalo Red'. Total root yields with a range from 40-46,000 lbs/Acre were obtained with 'Yoshida', 'Uyenten', and '88-3'. Table 89-1 also provides information on lbs/Acre of Grade B, off-grade, jumbo, and culls, plus percent Grade A roots by weight.

continues ...

Results, continue...

Fall 1993. These cuttings were planted on 17 September and Harvested 14 April 1993. Greatest Grade A yields ranging from 22-34,000 lbs/Acre were obtained with '27983', '27999', and '27996'. Greatest total yields >50,000 lbs/Acre were obtained with '27983', '27996', '28003', '27987', '28001', '27988'. Other varieties with high total root yields of over 40,000 lbs/Ace included '27999', 'Hoolehua Gold', '27992', and '28002'. Table 93-2 also provides information on lbs/Acre yields for off-grade, culls, and percent Grade A and off-grade on a per weight basis.

Summary

Spring Trials Summary: Top yielding cultivars for spring planting were '83-5', 'Mokuau R x P', '83-1', 'Mokuau Unknown', 'Uyenten' (in 2 years), 'Hoolehua Gold', 'Agena', 'Mokuau Purple', '27983', 'Beauregard', 'White Delight', '25726', '28005', and '28016'. For total root biomass the high yielders were: '83-5', '83-1', 'Mokuau Unknown', 'CES', 'Mokuau Purple', '27983', '28016' (in 2 years), '27987', '27786' (in 2 years), '27991', '25727', '27989', '27990', and '27992'.

Fall Trials Summary: Top yielders for the Fall plantings included: 'Hoolehua Gold' (in 2 years), 'Mokuau Unknown' (in 2 years), 'Hoolehua Red', 'Uyenten', 'CES', 'Georgia Jet', 'Waimanalo Red', '27983', '27999', and '27996'. For the total root biomass the high yielders were: 'Hoolehua Gold' (in 2 years), 'Mokuau Unknown' (in 2 years), 'Georgia Jet', 'Waimanalo Red', '27983', '27996', '28003', '27987', '28001', and '27988'.

Summary for year round trials: High year-round (Fall and Spring) Grade A yields were obtained with 'Mokuau Unknown' 'Uyenten', 'Hoolehua Gold', and '27983'. High year-round (Fall and Spring) total underground biomass yields were obtained with '83-5', 'Mokuau Unknown', '27983', and '27987'.

Standard Sweetpotato Varieties in Hawaii

(from Valenzuela, Arakaki and Fukuda, 1994)

Moist (baking) types:

1. Hoolehua Gold- reddish skin with orange flesh.
2. Kona B- High yielding cultivar. Light red to orangish skin with light orange flesh.
3. Iliua- orange flesh.

Dry (boiling, frying) types:

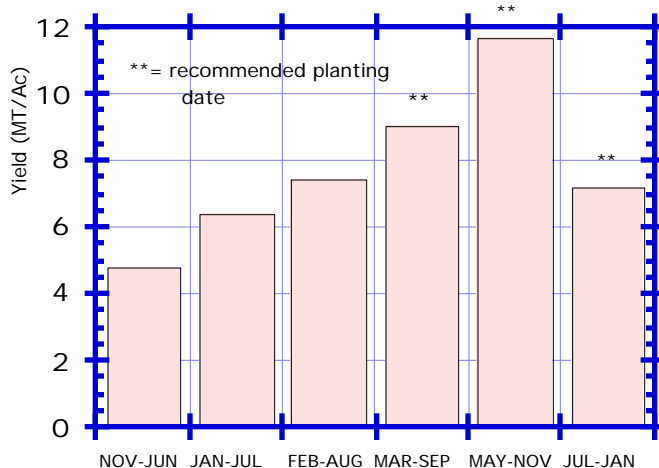
1. Waimanalo Red- Early maturing variety and high yielding. Red skin with white flesh. This cultivar was introduced from Okinawa.
2. Hoolehua Red- red skin with white flesh.
3. Rapoza- whitish skin with purple flesh.
3. Onokeo- Purple skin, white flesh, excellent quality.
4. Miyashiro-

Semi-dry type:

1. 71-5- light red skin with yellow-orange flesh.

Effect of planting season on yields of sweetpotato at 800 ft elevation

Fig. 1. Mean yield of sweetpotatoes as affected by planting date in Poamoho (1953)



Sweetpotato use as a calorie rich and nutrient rich food source

Cultivars from the Continental U.S.

Standard commercial cultivars developed in the Continental U.S. (moist type, with orange flesh) may perform well when grown in Hawaii but take too long to mature (about 7 months) compared to local cultivars (about 5 months). Until recently 'Jewel', developed by the North Carolina Experiment station in 1970, was the standard cultivar representing 75-85% of sweetpotato production in the Continental U.S., especially in areas with sandy-loams. 'Jewel' is resistant to rootknot nematodes, fusarium wilt, and tolerates sweet potato fleabeetles, and internal cork. The Louisiana Experiment Station introduced 'Beauregard' in 1988 and is rapidly overtaking 'Jewel' in several production areas as the industry standard. 'Beauregard' is high yielding and matures a month earlier than 'Jewel' but is not nematode resistant, and in addition, does not store as well as 'Jewel'. 'Satsuma' is a popular Asian variety, in demand by Asian and Polynesian consumers in the continental U.S.

Sweetpotato is a staple crop in many tropical areas of the world, and contributes carbohydrates and nutrients to the diet. Because varieties vary in their nutritional quality, selection is possible for varieties that meet specific nutrient requirement needs in specific communities. The sweetpotato has historically helped to swerve famine during the U.S. civil war, during the economic depression in the 1930s, in Japan during WWII, and probably in many other cases as well. Along those lines the sweetpotato is considered as the best "emergency energy" food for areas such as Hawaii that are dependent on imported produce with an estimated "energy" production of 144,897 calories per day per Ha compared to 93,328 for the Irish potato (Bisone and Maretki, 1982).

In some varieties both the roots and shoots are important sources of vitamins A and C (Bisone and Maretki, 1982). The higher the orange flesh of the sweetpotato, the higher the carotene content which can range from 600 to 10,000 iu in sweetpotato. An average 100 gm sweetpotato provides over 50% of an adult's vitamin A daily requirement, and over 30% of an adult's daily vitamin C requirement. In addition the young leaves have a 25-33% protein content on a dry weight basis.



General Description of Hawaii Grown Sweetpotato roots

Variety	Source	Shape	Skin Color	Flesh color	% Moisture
Orange fleshed					
Excel	Continental US	oblong, long oblong (6 cm)	light orange	orange	78.8
HSPA	Molokai	round, long ovate (5.8-8.9 cm)	dark or l. purple	orange	70.1
Jewel	Continental US	long elliptic long (3.4-5.9 cm)	dull light brown	orange	78.2
Kona B	Oahu	elliptic (7.6 cm)	light red brown	orange	77.8
Mokuau Yam	Molokai	obovate, long elliptic (6.4-7.6 cm)	very dull and dark red purple	orange	62.2
Regal	Continental US	elliptic, long ell. (5-7 cm)	bright red purple	orange	77.2
So. Delite	Continental US	elongated (6.4 cm)	brownish pink	orange	75.1
71-5	Molokai	round elliptic, ell (6.4-7.6 cm)	dull dark purple	orange	70.3
72-2	Molokai	long curved (4.4-6.4 cm)	dull dark purple	orange	70.4
78-4	Molokai	elongated (5.7-7.6 cm)	dull brownish pink	yellowish orange	73.0
83-8	Molokai	long ell. (5.7 cm)	dull dark red pur.	l orange	70.1
88-1	Molokai	long obl, long ell. (5.7 cm)	dark red purp.	orange	79.3
88-3	Molokai	round, long ell. (4.2-6.8 cm)	l brown	l orange	74.9

General Description of Hawaii Grown Sweetpotato roots, continues...

Variety	Source	Shape	Skin Color	Flesh color	% Moisture
Yellow-white flesh					
Agena RxW	Maui	long oblong (5 cm)	light red brown to reddish purp.	white	68.3
Hoolehua Red	Oahu	obovate, round	red purple	white	70.4
J-1	Japan	ovate	brownish yell.	yellowish white	60.5
J-2	Japan	elongated	brownish yell.	light yell.	65.3
J-3	Japan	elongated	brownish yell.	yellowish white	73.8
Kapaa	Oahu	elongated	dark purple	cream	63.0
Lanai	Lanai	long elliptic (5-6.4 cm)	dull brownish purp.	1 yellow w/ purple inner skin	69.4
McBryde	Oahu	long curved (7.6 cm)	dull yellow brown	1 yellow	73.1
Mokuau Unk.	Molokai	long ovate (6.4-8.9 cm)	brownish yell.	1 yellow	72.6
No Sweet	Oahu	long oblong (5-6.8 cm)	dull whitish yell.	white	86.7
Satsuma Imo	Continental US	round, ovate, long ell (5-7.6 cm)	dull purplish bro.	yellowish wh.	68.3
Simon #1	Oahu	elongated (5-7 cm)	whitish yell.	yellowish wh.	68.7
Sumor	Continental US	logn, ovate, long ell (5 cm)	light yell.	yellow	72.6
Uyeunten	Oahu	elliptic	light brownish yellow	yellow	71.0
Waimanalo Red	Okinawan	ovate	reddish purple	yellowish wh.	67.7
88-2	Molokai	long oblong (6.4-6.8 cm)	v/ dark purple	cream	61.7
88-6	Molokai	long oblong (3.8 cm)	purplish brown	yellow	61.7
Purple flesh					
Agena WxP	Maui	elliptic (3.8-5.9 cm)	white-yellow	1 purple	69.4
Fukuda	Molokai	long ovate (5 cm)	1 red purplish	purple	64.2
Mililani	Oahu	elliptic (4.4 cm)	cream	purple	61.8
Mokuau Purple	Molokai	long elliptic	reddish purple	purple	63.7
Mokuau RxP	Molokai	long ellipt, long (5 cm)	dull red purplish	purple w/ white dots	66.3
Okinawan	Oahu	long obl., long curved (5.9-7.6 cm)	dull purple	purple w/ white dots	61.9
Rapoza	Oahu	elliptic (6.4 cm)	yellowish wh.	purple	63.7

Note: all the cultivars named by number are from the breeding selections. Almost all orange-fleshed varieties have Kona B as a mother root, and almost all white-fleshed varieties have Waimanalo Red as a mother root. Number in parenthesis is the approximate diameter of the root (N=4-5). l= light. wh= white. Table adapted from Tanudjaja (1993).

Beta-Carotene Content (mg/100 g fresh weight) of orange-fleshed sweetpotato grown in Hawaii

Variety	B-Carotene mg/100 g fresh wt.	Hunter color a
88-1	14.9	27.3
Regal	13.1	28.3
Excel	12.8	22.1
HSPA	10.7	22.3
Jewel	10.8	28.0
72-2	10.7	27.5
South Delite	10.4	27.2
Mokuau Yam	8.7	17.6
83-8	8.2	17.7
71-5	8.0	22.1
Kona	6.7	24.3
78-4	3.7	9.3
88-3	7.6	21.2

The University of Hawaii at Manoa, College of Tropical Agriculture and Human Resources, Cooperative Extension Service is an Equal Opportunity/Affirmative Action Institution providing programs and services to the people of Hawaii without regard to race, sex, age, religion, color, national origin, ancestry, disability, marital status, arrest and court record, sexual orientation, or veteran status.

Percent of Total, Insoluble, and Soluble Dietary Fiber (dwb) of sweetpotatoes grown in Hawaii (adapted from Tanudjaja, 93)

Variety	flesh color	Total Dietary fiber (%)	Insoluble Dietary fiber (%)	Soluble Dietary fiber (%)
Jewel	orange	14.7f	12.9h	2.7c
88-1	orange	13.6f	12.2h	2.3b
Excel	orange	12.8e	9.6f	4.2f
Regal	orange	11.9d	10.7g	2.6c
So. Delite	orange	11.7d	8.8e	3.5e
72-2	orange	11.4d	8.6e	2.7c
78-4	orange	10.3d	8.0de	2.1a
88-3	orange	10.3d	9.0ef	2.0a
83-8	orange	9.7c	7.1cd	2.7c
HSPA	orange	9.3c	7.6d	3.0d
Kona B	orange	9.1c	6.3bc	2.3b
Mokuau Yam	orange	7.0a	4.8a	2.5c
71-5	orange	7.2b	5.5ab	2.5c
No Sweet	Yell or white	19.6-l	15.6f	4.8f
Sumor	Yell or white	12.2k	8.5e	3.1d
Lanai	Yell or white	10.6j	8.3e	2.7c
Mokuau Unk.	Yell or white	10.3ij	6.4c	2.9d
McBryde	Yell or white	10.2i	8.5e	2.8cd
J-3	Yell or white	9.1gh	7.3d	2.2b
88-6	Yell or white	9.1gh	6.7d	2.0ab
Kapaa	Yell or white	8.7fg	6.2c	3.3de
J-2	Yell or white	8.1de	5.6b	3.1d
Simon #1	Yell or white	8.4ef	6.6c	2.2bc
Hoolehua Red	Yell or white	8.3e	6.5cd	3.3e
Agena RxW	Yell or white	8.0cd	6.8b	2.6c
Uyeunten	Yell or white	7.8c	6.4c	2.8c
Satsuma Imo	Yell or white	7.0b	5.6b	1.5a
Waimanalo Red	Yell or white	7.0b	5.3b	3.8e
88-2	Yell or white	7.0b	5.9bc	2.2bc
J-1	Yell or white	6.1a	4.2a	2.6c
Agena WxP	purple	11.1d	8.9e	2.5bc
Mokuau purple	purple	9.3c	6.9d	3.7d
Mokuau RxP	purple	8.8b	6.2c	2.2b
Mililani	purple	8.6b	6.9d	1.5a
Fukuda	purple	7.7a	3.9a	3.1c
Okinawan	purple	7.5a	5.7bc	2.2b
Rapoza	purple	7.3a	5.3b	2.1ab

References and Citations

Bisone, L.E. and A.N. Maretzki. 1982. Sweetpotato. Commodity Fact Sheet. Univ. HI. Coop. Ext. Serv. SP-1(A).
 Huang, W. 1979. Comparative food values of sweetpotatoes in Hawaii. Univ. HI. Coop. Ext. Serv. FSHN Paper No. 42.
 Tanudjaja, L. 1993. Color and textural properties of sweetpotato and a survey of Hawaii Grown Varieties. Univ. Hawaii. FSHN.
 Valenzuela, H., S. Fukuda, and A. Arakaki. 1994. Sweetpotato production guides for Hawaii. Univ. HI. Coop. Ext. Serv. RES 146.
 Valenzuela, H. and J. DeFrank. 1995. Agroecology of tropical root crops. CRC Crit Rev Pl. Sciences. 14:213-238.

Hector Valenzuela, Ph.D.
Vegetable Crops Asst. Extension Specialist
Tel. 808-956-7903, Fax 808-956-3894, hector@hawaii.edu

From the Archives:

Sweetpotato cultivar trials to evaluate orange and white fleshed sweetpotatoes at 70 and 800 foot elevation in Hawaii.

Table 74-1. Yield of orange flesh sweetpotato, Poamoho Research Station (800 ft elevation).
Planted June 19 and harvested on Nov. 20.

Cultivar	Hawaii No. 1 lbs/Acre	Jumbo lbs/Acre	Total lbs/Acre
HES 71-5	27,188	2,729	29,918
Kona B	27,087	8,022	35,109
HES 72-3	25,351	348	25,700
HES 72-2	21,264	951	22,215

Table 74-2. Yield of white/yellow flesh sweetpotato, Poamoho (800 ft elevation)
Planted June 19 and harvested on Nov. 20

Cultivar	Hawaii No. 1 lbs/Acre	Jumbo lbs/Acre	Total lbs/Acre
Onokeo	28,553	3,818	32,372
HES 71-7	24,684	2,744	27,428
HES 71-3	23,130	1,524	24,654
Waimanalo Red	21,141	2,178	23,319

Table 74-3. Yield of orange flesh sweetpotato, Waimanalo Research Station (70 ft elevation).
Planted May 16 and harvested on Oct. 8.

Cultivar	Fancy & Hawaii No. 1 lbs/Acre	Hawaii No. 2 lbs/Acre	Jumbo lbs/Acre	Total lbs/Acre
HES 72-2	35,936	5,975	3,147	45,059
HES 72-3	35,029	4,726	3,787	43,544
Kona B	25,928	4,641	5,228	35,797
HES 71-5	20,251	4,054	9,282	33,802

Table 74-4. Yield of white flesh sweetpotato, Waimanalo (70 ft elevation)

Cultivar	Fancy & Hawaii No. 1 lbs/Acre	Hawaii No. 2 lbs/Acre	Jumbo lbs/Acre	Total lbs/Acre
Onokeo	37,537	4,214	9,496	51,248
HES 71-3	36,544	5,868	4,908	47,321
HES 71-7	29,662	3,254	3,467	36,384
Waimanalo Red	28,488	4,214	6,882	39,585