Maximal outgo of fluorine in the first year was not accompanied by increase in calcium outgo and the acid inputs caused decreases in total leachings of calcium and of magnesium, without significant effect upon potassium outgo.

Because of those effects and minimal retention of fluorine in the soil of least alumina content *vs.* decidedly small recoveries and high retentions in the soils of highest contents of alumina (Table I), the soil retentions of fluorine from the additions of hydrofluoric acid are attributed in part to the development of calcium fluoride but chiefly to the less soluble aluminum silicofluoride.

The lysimeter results supplement findings from the pot culture experiment, in which 200-pound additions of fluorine exerted no harmful effects upon plant response on two soils (*14*).

Practical applications of the findings are: Soils of the type studied will absorb and inactivate the additive fluorine of effluent hydrofluoric acid in amounts far beyond those brought by rain waters. Atmosphere-derived fluoric effluents will not diminish a soil's fertility and will not enhance the fluorine content of its drainage waters.

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SWEET POTATO DEHYDRATION

Effects of Processing Conditions and Variety on Properties of Dehydrated Products

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THE EFFECTS OF CONDITIONS OF STORAGE of raw materials on the chemical properties of dehydrated sweet potato products have been reported (*7*). It was shown that a storage temperature of 60° F. was superior for maintenance of raw materials. A second phase of the problem of sweet potato dehydration, as indicated by the Quartermaster Food and Container Institute for the Armed Forces, was to determine the effects of conditions of processing of the raw materials on the chemical properties of dehydrated products. A third phase was to determine the effects of selected, commercial varieties on the chemical properties of dehydrated products.

The purpose of these investigations was, therefore, to determine the effects of processing and of selected, commercial varieties (1) on carotene, ascorbic acid, starch, total and reducing sugars, and the color and rehydration characteristics of freshly dehydrated products and (2) on the losses of raw materials during processing.

Methods

Moisture. A 2-gram, ground sample, passing through 20-mesh screen but held on 40-mesh screen, was weighed into tared, dry, aluminum weighing dishes (approximately 2 inches in diameter and $^3/_4$ inch in depth) with tightly fitting covers. The dishes, with cocked lids, were placed in a vacuum oven, and the samples were dried for 6 hours at 70° C. at a pressure of less than 100 mm. The dishes were covered and allowed to cool in a desiccator before weighing. The percentage of moisture in the original sample was calculated (*6*).

Ascorbic Acid. The visual titration method based on the reduction of 2,6-dichlorophenolindophenol by an acid solution of ascorbic acid was used (*4*). A 50-gram sample of dehydrated sweet potatoes was steeped under nitrogen for 15 minutes in a blender with 100 grams of 3% metaphosphoric acid. Then 150 grams of 6% metaphosphoric acid were added, and the mixture was blended until a homogeneous slurry was obtained. Thirty grams of the slurry were quantitatively transferred to a 100-ml. volumetric flask and 20 ml. of acetone were added to eliminate the effect of sulfite used during dehydration. Then the sample was diluted to 100 ml. with 3% metaphosphoric acid. The solution was clarified by centrifugation, and an aliquot was titrated with 0.025% 2,6-dichlorophenolindophenol solution to a pink end point which persisted for 15 seconds. The dye solution was standardized each day by titrating against a freshly prepared ascorbic acid standard. When analyzing raw sweet potatoes, the initial slurry was composed of 150 grams of sample and 150 grams of 6% metaphosphoric acid. The content of ascorbic acid was reported as milligrams per 100 grams.

Carotene. The carotene was extracted from 2 grams of ground dehydrated sweet potatoes (or 5 grams of raw sweet potatoes) which had been saturated with water at room tempera-

In investigations on sweet potato dehydration, the effects of conditions of processing and of selected commercial varieties on chemical properties were determined. The changes in chemical composition of raw sweet potatoes (Unit I Porto Rico variety) during processing—without preheating, with preheating at 130° to 140° F. for 30 to 40 minutes, and with preheating at 165° F. for 10 to 20 minutes in combination with drying at initial temperatures (dry bulb) of 200°., 175°., and 150° F.—do not indicate any one combination of conditions to be materially superior to any other combination. Chemical analyses of freshly dehydrated sweet potatoes indicate that satisfactory products could be made by several combinations of the processes investigated. The changes in chemical composition of selected, commercial varieties (Unit I Porto Rico, Earlyport, Goldrush, and Maryland Golden) of raw sweet potatoes during processing indicate no particular superiority among the yellow, moist-type varieties. If a freshly dehydrated product having the highest possible carotene content is desired, the Goldrush variety is superior.

ture by means of 150 ml. of a foaming mixture, containing about 4 volumes of alcohol and 3 volumes of petroleum ether, in a blender for about 5 minutes. The residue was allowed to settle, and the supernatant liquid was decanted into a separatory funnel. Sufficient water was added to the liquid to adjust the concentration of alcohol to about 80%, and after the layers separated the alcohol was drawn off. The residue and alcohol solution were successively extracted with three additional 30-ml. portions of petroleum ether. Then all of the alcohol was removed from the petroleum ether solution by washing six to seven times with 100-ml. portions of water. The petroleum ether solution was made up to 200-ml. volume. A column of activated calcium diphosphate and Celite (1 to 1 mixture) (about 9 cm. in length and 2.2 cm. in diameter with a small quantity of anhydrous sodium sulfate on top) was saturated with petroleum ether; then the solution containing the pigments was drawn through the column, followed by a wash of petroleum ether. The filtrate, containing the carotene which was separated from the other pigments on the column, was added to a 100-ml. volumetric flask and brought to volume. The concentration of carotene—i.e., absorbance of the solution at 436 mμ—was determined and reported as part per million of β-carotene in original sample (*3*).

Starch. The iodine precipitation and polarimetric method for starch, as described by Steiner and Guthrie (*7*) was used. This method is claimed to be especially applicable to materials containing 10% or more starch on the moisture-free basis.

Reducing and Total Sugars. The Munson-Walker method for sugars, involving the titration of a standardized solution of potassium permanganate, using ferrous phenanthroline indicator, was used (*2*).

Sulfite. The sulfite content of the dehydrated product was determined by the method of Monier-Williams as modified by Thompson and Toy (*8*). The sulfur dioxide was liberated from a 25-gram sample of product, ground to pass through a 20-mesh screen, by refluxing it with hydrochloric acid in an atmosphere of nitrogen. The sulfur dioxide was collected in 3% hydrogen peroxide solution, previously adjusted to pH 4 by means of 0.1*N* sodium hydroxide, and the resulting solution was titrated with 0.01*N* sodium hydroxide to pH 6. The sulfite was reported as parts per million.

Peroxidase Activity. A 15-gram sample of diced, blanched sweet potatoes was boiled in 150 ml. of distilled water for 5 minutes and then cooled to about 80° F. Gum guaiac in alcoholic solution (1.5 ml. of 2.5%) and hydrogen peroxide (1.5 ml. of 1%) were added to the sample. Five milliliters of gum guaiac solution and 5 ml. of hydrogen peroxide solution were added to a 50-gram, unboiled sample. The mixtures were allowed to stand for 15 minutes, and any blue coloration in the liquid of the 50-gram sample in excess of that of the boiled control indicated the presence of peroxidase (*6*).

Extractable Color. The degree of nonenzymatic browning, as defined by Hendel, Bailey, and Taylor (*5*), was determined by measuring the absorbances at 390 and 420 mμ of aqueous, buffered, alcoholic extracts of the dehydrated products. A 10-gram ground sample, passing through 40-mesh screen, was thoroughly shaken for 1 hour with an extracting solvent composed of 75 ml. of 95% ethyl alcohol, 55 ml. of water, and 20 ml. of 0.5*M* phosphate buffer (pH 4.5). The mixture was allowed to settle for 10 minutes, and then the supernatant was decanted. An aliquot of the supernatant was clarified by centrifugation at 16,000 relative gravities for 15 minutes, and examined spectrophotometrically.

Rehydration. The rehydration properties of the dehydrated products were determined as follows: Sixty grams of diced, dried product were weighed into a 500-ml. flask; 240 grams of distilled water were added, and then the product was allowed to soak for 15 minutes; the mixture was brought to a boil in 10 to 15 minutes, under a reflux condenser to prevent loss of water; then the product was allowed to simmer for 30 minutes; and the rehydrated product and excess water were poured into a Büchner funnel and allowed to drain for 2 minutes. A drained weight was determined, and the volume of excess water

Table I. Analyses of Samples of Unit I Porto Rico Sweet Potatoes Harvested and Stored at 60° F. during 1953–54 Season[a]

Sample No.	Time in Storage, Days	Moisture[b], %	Carotene, P.P.M.	Ascorbic Acid, Mg./100 G.	Starch, %	Total Sugars, %	Reducing Sugars, %
73	66	71	280	106	33	30	17
86	113	72	234	103	34	28	12
95	129	71	271	105	43[c]	27	9

[a] Analyses reported on moisture-free basis.
[b] Moisture on "as is" basis.
[c] Apparent increase probably due to sampling error.

and the dissolved solids which it contained were measured. The moisture contents of the drained, reconstituted product and of the original raw stock were compared.

Processing Tests. About 60 pounds of sweet potatoes per processing test were washed and then preheated in water. In determining the effects of conditions of processing of the raw materials on the chemical properties of dehydrated products, the following tests were made. The preheating conditions were varied, as follows: no preheat; preheat at 130° to 140° F. for 30 to 40 minutes; or preheat at 165° F. for 10 to 20 minutes. The potatoes were then dumped into a rotary lye peeler. The peeling conditions were as follows: lye concentration, 20 to 22%; temperature, 210° to 220° F.; time, 6 minutes. From the peeler the sweet potatoes were dropped into a rotary, spray water washer where the lye and peelings were removed in about 1 to 1.5 minutes. The peeled and washed potatoes were diced to $^3/_8$-inch cubes directly onto the drying trays, until loaded to 1.5 pounds per square foot, and then blanched for 6 minutes in flowing atmospheric steam to a negative peroxidase test. The blanched potatoes were sulfited by spraying them for 2 minutes with a solution containing 2.1 parts of sodium sulfite and 0.7 part of sodium bisulfite per 1000 parts of water. The sweet potatoes were dehydrated in a cabinet dryer. The dehydrating conditions were varied, as follows: (1) 200° F. (dry bulb), 120° F. (wet bulb) for 3 hours followed by 160° F. (dry bulb), 100° F. (wet bulb) for sufficient time to reduce the moisture content to about 5%; and (2) 175° F. (dry bulb) and (3) 150° F. (dry bulb) for sufficient time to reduce the moisture content to about 5%.

Different combinations of the preheating and dehydrating conditions, as indicated under results, were used to produce dehydrated sweet potato products. The processing tests were run in triplicate and according to a statistical design suggested by the Quartermaster Food and Container Institute for the Armed Forces.

In determining the effects of selected, commercial varieties on the chemical properties of dehydrated products, the processing tests outlined above were made, except that the raw sweet potatoes were preheated in water for 30 to 40 minutes at 130° to 135° F., and the dehydrating conditions were 200° F. (dry bulb) for 3 hours followed by 160° F. (dry bulb) for sufficient time to reduce the moisture content to about 5%. The processing tests were run in triplicate for about 5 months of storage of the materials.

The chemical properties of freshly dehydrated products were determined. Other portions of the products were supplied to the Quartermaster Food and Container Institute for the Armed Forces for organoleptic evaluation.

Effects of Conditions of Processing of Raw Materials

Materials The investigations were conducted during the 1953–54 season on sweet potatoes of the

Table II. Processing Conditions and Moisture Contents of Dehydrated Unit I Porto Rico Sweet Potatoes

Sample No.	Time in Storage, Days	Preheating Conditions		Dehydrating Conditions		Moisture, %
		Temp., °F.	Time, min.	Temp., °F.	Time, hr.	
72	70	...	...	200	3	...
				160	16	4.1
73	66	130	30–40	150	20	5.4
74	71	165	10–20	175	20	3.8
75	72	130	30–40	175	21	3.9
76	73	165	10–20	200	3	...
				160	16	4.6
77	77	...	...	150	20	6.5
78	78	165	10–20	150	21	5.5
79	79	...	...	175	21	4.4
80	80	130	30–40	200	3	...
				160	16	4.4
81	100	165	10–20	150	23	5.9
82	105	...	...	175	21	4.0
83	106	130	30–40	200	3	...
				160	9	4.8
84	107	...	...	200	3	...
				160	8	5.2
85	108	130	30–40	150	28	5.6
86	113	165	10–20	175	21	4.4
87	114	130	30–40	175	21	4.8
88	115	165	10–20	200	3	...
				160	16	5.3
89	119	...	...	150	25	6.2
90	121	130	30–40	175	22	4.2
91	122	165	10–20	200	3	...
				160	9	5.5
92	126	...	...	150	22	6.4
93	127	165	10–20	150	22	6.3
94	128	...	...	175	21	4.3
95	129	130	30–40	200	3	...
				160	10	5.7
96	133	...	...	200	3	...
				160	9	5.0
97	134	130	30–40	150	21	6.0
98	135	165	10–20	175	21	4.6

Table III. Effect of Processing Conditions on Chemical Properties of Freshly Dehydrated Unit I Porto Rico Sweet Potatoes[a]

Sample No.	Carotene, P.P.M.	Ascorbic Acid, Mg./100 G.	Starch, %	Total Sugars, %	Reducing Sugars, %
72	269	62	9	36	5
73	260	88	2	39	25
74	254	60	3	42	27
75	237	65	3	43	25
76	235	61	2	44	27
77	258	87	4	42	23
78	239	73	2	45	25
79	237	67	7	40	22
80	244	66	3	43	24
81	243	76	5	38	23
82	274	67	10	32	17
83	238	76	3	39	23
84	281	70	9	37	21
85	253	92	4	40	24
86	234	59	2	42	26
87	236	72	2	44	25
88	257	65	2	43	25
89	235	84	8	40	22
90	233	59	3	42	22
91	240	65	3	44	22
92	232	69	6	40	22
93	234	94	2	44	26
94	243	60	5	41	23
95	238	68	3	42	24
96	267	65	6	36	22
97	278	92	2	42	24
98	241	55	2	42	26

[a] Analyses reported on moisture-free basis.

Unit I Porto Rico variety grown in Louisiana. The potatoes were harvested about October 15 and cured for 10 days at 85° F. and 80 to 85% relative humidity on the farm where they were grown. Then the potatoes were shipped to the Southern Regional Research Laboratory and placed in storage at 60° F. The processing investigations were conducted on sweet potatoes held in raw storage for not less than 2 months nor more than 4.5 months. The analytical data, on samples of the raw materials taken at the beginning, at the end, and at an intermediate time during the processing studies, are given in Table I.

Results A description of processing conditions (conditions of preheating and dehydrating) and the moisture contents of dehydrated Unit I Porto Rico sweet potatoes are given in Table II. Time in raw storage of the sweet potatoes during the processing tests varied from 66 to 80, 100 to 119, and 121 to 135 days for each group of tests.

Properties of Freshly Dehydrated Products. The effects of processing conditions on the properties of freshly dehydrated products are indicated in Tables III and IV.

Carotene. Tables I, II, and III indicate that the conditions of processing did not materially reduce the carotene content of sweet potatoes during dehydration.

Ascorbic Acid. The conditions of processing used, in all cases, reduced the ascorbic acid content of the sweet potatoes (Tables I, II, and III). However, the conditions of preheating appeared to be a smaller factor than the conditions of dehydrating. At initial drying temperatures of 175° or 200° F. (dry bulb), the ascorbic acid content was reduced to 50 to 70% of the original content of the raw sweet potatoes during dehydration. At an initial drying temperature of 150° F., the ascorbic acid content was reduced to only 70 to 90% of the original content of the raw sweet potatoes.

Starch, Total Sugars, and Reducing Sugars. Under all conditions of processing used, the starch content decreased, and the total and reducing sugar contents increased (Tables I, II, and III). There was no apparent, systematic variation in the analyses with variation in processing conditions; however, all conditions of processing used appeared to affect the results quantitatively about the same. The analyses reported for starch and sugars do not necessarily include all of the carbohydrate material present. The analytical methods used would not determine degraded starch or dextrins.

Sulfite Content. Although the same amount of sulfite was added in each dehydration run, from the data in Tables II and IV it is observed that the amount of sulfite retained in the dehydrated product was much greater when the initial drying temperature was 150° F. than when it was 175° or 200° F.

Extractable Color. There does not appear to be any definite pattern of change in extractable color with change in processing conditions (Table II and IV). A factor, which affects these results, is the varying amounts of sulfite retained in the dehydrated products under different processing conditions. Different sulfite contents would tend to "bleach out" the extractable colors of the different products and give a lower extractable color than was actually the case.

Rehydration. The effects of conditions of processing on the rehydration proper-

Table IV. Effect of Processing Conditions on Sulfite Content, Extractable Color, and Rehydration of Freshly Dehydrated Unit I Porto Rico Sweet Potatoes

Sample No.	Sulfite, (Dry Basis), P.P.M.	Extractable Color[a] 390 mμ	Extractable Color[a] 420 mμ	Rehydration (Drained Wt./Solids)
72	75	0.330	0.147	3.9
73	300	0.130	0.067	3.8
74	45	0.400	0.190	4.1
75	52	0.340	0.165	4.4
76	22	0.410	0.200	4.3
77	320	0.130	0.065	3.8
78	23	0.230	0.095	4.0
79	59	0.297	0.140	3.8
80	36	0.312	0.152	4.0
81	140	0.165	0.080	4.0
82	14	0.460	0.205	3.9
83	17	0.300	0.145	3.9
84	23	0.305	0.140	3.9
85	215	0.355	0.165	3.8
86	23	0.155	0.075	3.9
87	23	0.345	0.170	4.0
88	21	0.470	0.220	4.2
89	267	0.175	0.090	3.8
90	15	0.510	0.290	4.1
91	16	0.470	0.237	4.1
92	201	0.337	0.137	4.0
93	304	0.197	0.105	4.2
94	22	0.530	0.270	4.0
95	31	0.403	0.187	4.0
96	26	0.370	0.183	4.0
97	243	0.240	0.117	3.9
98	24	0.570	0.297	4.1

[a] Absorbance of extracts.

Table V. Effect of Processing Conditions on Raw Materials Balance for Unit I Porto Rico Sweet Potatoes

Sample No.	Raw Material, Lb.	Losses, % Trim	Losses, % Peel	Diced Raw Material, %	Dehydrated Product, Lb.	Raw Material/ Dehydrated Product, Lb./Lb
72	60	4.4	27	67	11.3	5.3
73	60	6.5	34	59	9.3	6.5
74	60	5.8	23	71	9.8	6.1
75	60	7.4	30	63	10.3	5.8
76	60	7.4	28	64	10.3	5.8
77	60	6.4	35	58	9.8	6.1
78	60	7.7	28	64	10.3	5.8
79	60	5.6	26	68	10.8	5.6
80	60	6.7	29	64	10.3	5.8
81	60	7.3	20	73	11.6	5.2
82	60	4.9	24	71	11.0	5.5
83	60	11	26	64	10.2	5.9
84	60	5.8	25	69	11.1	5.4
85	60	8.0	22	70	11.7	5.1
86	60	7.3	25	68	10.8	5.6
87	60	8.9	28	63	10.1	5.9
88	60	8.3	28	64	10.3	5.8
89	60	5.3	28	66	10.5	5.7
90	60	6.7	30	64	10.1	5.9
91	60	7.4	28	64	10.2	5.9
92	60	8.4	28	64	10.7	5.6
93	60	6.7	30	63	10.0	6.0
94	60	7.4	28	64	10.3	5.8
95	60	7.4	29	64	10.3	5.8
96	60	6.7	26	67	10.8	5.6
97	60	7.6	30	62	9.8	6.1
98	60	6.3	29	64	10.0	6.0

ties of dehydrated products are shown in Tables II and IV. Under the conditions used, variation in processing conditions did not materially affect the rehydration properties of the dehydrated products.

Processing Materials Balance. From the data presented in Tables II and V, it is observed that although variations in processing conditions affected the distribution of peeling and trimming losses, approximately 5 to 6 pounds of raw material were required to produce 1 pound of dehydrated product in all cases.

Organoleptic Evaluation of Products. Samples of all dehydrated products made during these investigations were forwarded to the Quartermaster Food and Container Institute for the Armed Forces for organoleptic evaluation.

Table VII. Processing Conditions and Moisture Contents of Dehydrated Sweet Potatoes Produced in Determining Effects of Variety on Chemical Properties of Products During 1953–54 Season

Sample No.	Drying Time, Hours		Moisture, %
	At 200° F.	At 160° F.	
60 PR	3	17	5.5
61 GR	3	17	5.3
62 EP	3	17	6.2
64 GR	3	17	5.6
65 PR	3	16	5.4
66 EP	3	17	6.7
68 GR	3	6	4.5
69 PR	3	7.5	5.0
70 EP	3	5	4.9
71 MG	3.5	5.5	5.9
99 PR	3	17	4.3
100 GR	3	9	5.3
101 EP	3	9	5.4
102 MG	3	9	5.5
103 PR	4.5	8.5	5.2
104 EP	3	16.5	4.5
105 GR	3	9.5	5.2

Effects of Selected, Commercial Varieties on Chemical Properties

Materials The investigations on the effect of variety of the raw materials on the chemical properties of dehydrated sweet potatoes, were conducted during the 1953–54 season on sweet potatoes of the Unit I Porto Rico, Goldrush, and Earlyport varieties grown in Louisiana and on sweet potatoes of the Maryland Golden variety grown in Maryland. Sweet potatoes grown in Louisiana were harvested about October 9, cured for 10 days at about 80° F., and stored at 60° F. The Maryland Goldens were harvested and shipped to Louisiana for storage at 60° F. Because of probable shipping damage, the Maryland Goldens used in these investigations may not be of representative quality. The analytical data, on samples of the raw materials, are given in Table VI.

It is observed that (1) the ranges of dry weights for the Unit I Porto Rico, Goldrush, Earlyport, and Maryland Golden were, respectively, 27 to 30, 23 to 25, 23 to 32, and 28 to 34%; (2) the ranges of carotene contents were, respectively, 196 to 291, 459 to 544, 126 to 279, and 169 to 214 p.p.m.; (3) the ascorbic acid contents of Unit I Porto Rico and Goldrush were relatively stable at about 100 mg. per 100 grams in raw storage at 60° F., while the ascorbic acid contents of Earlyport and Maryland Golden decreased to about 60 mg. per 100 grams with increase in time in raw storage at 60° F.; (4) the range of starch content of the Earlyport variety was 32 to 49% and was higher than the starch contents of the other varieties; (5) the ranges of total sugar contents of the Goldrush and the Maryland Golden varieties were 29 to 36 and 28 to 30%, respectively, and were higher than the total sugar contents of the Unit I Porto Rico and Earlyport varieties, which were 23 to 29 and 22 to 27%, respectively; and (6) the reducing sugar contents of the Earlyport and Maryland Golden varieties were 6 to 10 and about 8%, respectively, and were slightly less than those of the Unit I Porto Rico and Goldrush varieties, which were 9 to 14 and 11 to 17%, respectively.

Table VI. Analyses of Sweet Potatoes Harvested and Stored at 60° F. During 1953–54 Season[a]

Sample No.	Variety	Time in Storage, Days	Moisture, %	Carotene, P.P.M.	Ascorbic Mg./100 G.	Starch, %	Total Sugars, %	Reducing Sugars, %
60	PR	...	71	212	108	35	26	14
61	GR	...	76	487	122	32	29	14
62	EP	...	73	172	103	45	22	9
64	GR	...	77	476	116	35	29	13
65	PR	...	72	217	99	42	23	11
66	EP	...	74	126	95	46	22	10
68	GR	34	75	459	98	34	30	11
69	PR	35	70	196	98	36	26	10
70	EP	41	68	206	65	32	22	7
71	MG	42[b]	66	169	92	31	28	8
99	PR	96	73	291	100	29	29	13
100	GR	97	77	544	99	24	36	17
101	EP	98	77	279	78	36	27	10
102	MG	90[b]	72	214	67	32	30	8
103	PR	152	71	215	103	39	26	9
104	EP	153	75	235	60	49	26	6
105	GR	154	76	498	93	34	32	11

[a] Samples 60, 61, 62, freshly harvested; samples 64, 65, 66, cured at 80° F. for 10 days.
[b] Approximate time in storage.

PR. Unit I Porto Rico.
GR. Goldrush.
EP. Earlyport
MG. Maryland Golden.

Results A description of processing conditions and moisture contents of dehydrated sweet potatoes, produced in determining the effects of variety on the chemical properties of freshly dehydrated products, is given in Table VII.

Carotene. The effect of processing on the carotene contents of the four varieties dried was small and was not materially changed over the period of raw storage (Tables VI and VIII)—i.e., from freshly harvested to 5 months in storage at 60° F.

Ascorbic Acid. The ascorbic acid contents of the varieties examined decreased with processing, and the magnitude of this decrease was larger as the period of raw storage was increased (Tables VI and VIII). The ascorbic acid content of the Earlyport variety was less stable than that of the other varieties.

Starch, Total Sugars, and Reducing Sugars. The starch content of all the varieties decreased with processing; a smaller change in starch content with processing was observed for the freshly harvested and the cured raw sweet potatoes than for raw materials held in raw storage for 1, 3, or 5 months at 60° F.; the Earlyport and Maryland Golden varieties had a smaller change in starch content with processing than the Unit I Porto Rico and Goldrush varieties; the starch contents of dehydrated products derived from Earlyport or Maryland Golden varieties were approximately constant for periods of raw storage of 1 to 5 and 1 to 3 months, respectively, at 60° F.; the total and reducing sugar contents of dehydrated products derived from the varieties dried were about equal and constant irrespective of the time in raw storage; and the reducing sugar contents of all varieties increased with processing (Tables VI and VIII).

Sulfite Content, Extractable Color, and Rehydration. The data presented in Tables VI and IX indicate no definite pattern of variation of the sulfite content, extractable color, or rehydration of the derived dehydrated products with variety of sweet potato. The extractable colors of the products appeared to increase with increasing time in raw storage at 60° F.

Processing Materials Balance. There are no material variations between varieties of sweet potatoes as to the pounds of raw material required to yield a pound of dehydrated products (Tables VI and X); however, this value appeared to increase slightly with increase in time of raw storage.

Organoleptic Evaluation of Products. Samples of all dehydrated products made during these investigations were forwarded to the Quartermaster Food and Container Institute for the Armed Forces for organoleptic evaluation.

Table VIII. Effect of Variety on Chemical Properties of Freshly Dehydrated Sweet Potatoes[a]

Sample No.	Carotene, P.P.M.	Ascorbic Acid, Mg./100G.	Starch, %	Total Sugars, %	Reducing Sugars, %
60 PR	207	78	21	47	19
61 GR	431	88	26	32	18
62 EP	172	81	39	28	17
64 GR	457	72	16	33	21
65 PR	248	69	13	33	22
66 EP	171	62	32	29	18
68 GR	545	71	8	40	23
69 PR	278	72	9	42	20
70 EP	246	60	22	35	18
71 MG	249	79	17	39	22
99 PR	275	62	4	39	22
100 GR	581	65	5	42	22
101 EP	284	45	14	35	18
102 MG	241	63	15	38	14
103 PR	258	54	4	39	22
104 EP	190	40	18	36	18
105 GR	482	54	6	43	25

[a] Analyses reported on moisture-free basis.

Table IX. Effect of Variety on Sulfite Content, Extractable Color, and Rehydration of Freshly Dehydrated Sweet Potatoes

Sample No.	Sulfite, P.P.M.	Extractable Color		Rehydration (Drained Wt./Solids)
		390 mμ	420 mμ	
60 PR	28	0.200	0.095	3.7
61 GR	52	0.275	0.135	3.9
62 EP	30	0.171	0.077	3.7
64 GR	112	0.177	0.095	4.0
65 PR	55	0.155	0.075	3.8
66 EP	35	0.190	0.095	3.6
68 GR	43	0.310	0.165	4.0
69 PR	76	0.165	0.090	3.8
70 EP	43	0.162	0.085	3.7
71 MG	27	0.360	0.185	3.9
99 PR	23	0.355	0.190	4.0
100 GR	50	0.350	0.200	3.9
101 EP	38	0.290	0.150	3.9
102 MG	100	0.240	0.125	3.8
103 PR	20	0.480	0.265	4.0
104 EP	19	0.355	0.195	3.8
105 GR	45	0.435	0.260	4.2

Table X. Effect of Variety on Raw Materials Balance for Processing Sweet Potatoes

Sample No.	Raw Material, Lb.	Losses, %		Diced Raw Material, %	Dehydrated Product, Lb.	Raw Material/ Dehydrated Product, Lb./Lb.
		Trim	Peel			
60 PR	60	7.7	24	68	11.0	5.4
61 GR	55	2.2	28	70	8.4	6.5
62 EP	55	3.6	26	70	9.9	5.6
64 GR	60	2.3	28	69	9.0	6.7
65 PR	60	6.8	31	61	9.9	6.1
66 EP	60	3.7	25	71	12.1	5.0
68 GR	60	2.3	34	63	7.8	7.7
69 PR	60	7.2	28	64	10.0	6.0
70 EP	60	5.0	25	69	10.5	5.7
71 MG	60	11	28	61	9.2	6.5
99 PR	60	5.8	28	65	9.4	6.4
100 GR	60	2.5	32	65	7.9	7.6
101 EP	60	2.5	25	72	10.0	6.0
102 MG	60	15	25	60	9.5	6.3
103 PR	60	5.8	29	65	9.2	6.5
104 EP	60	3.0	29	68	9.3	6.5
105 GR	60	2.7	34	63	7.7	7.8

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