Biochemical and Nutritional Assessment of Tubers from 16 Cultivars of Sweetpotato (*Ipomoea batatas* L.)

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Proximate composition, starch content, total sugar content, mineral profile, trypsin inhibitor activity, and total oxalate content of tubers from 16 cultivars of sweetpotato (*Ipomoea batatas* L.) were determined. Sweetpotato cultivars differed ($P < 0.05$) with regard to all of these parameters. The amino acid composition of eight selected cultivars also showed differences among cultivars in the proportions of most amino acids. The mean *in vitro* digestibility of sweetpotato protein was 75.8%, which indicates that sweetpotato protein is well utilized. The apparent metabolizable energy values for poultry of sweetpotato tuber meals prepared from different cultivars ranged from 14.34 to 14.76 MJ/kg of dry weight (mean, 14.54 MJ/kg), highlighting the potential usefulness of sweetpotato tubers as an energy source in tropical regions. Trypsin inhibitor activity in the tubers was not related to the *in vitro* protein digestibility or apparent metabolizable energy values, suggesting that the presence of trypsin inhibitor does not influence the nutritive value of sweetpotato tubers, at least in the cultivars evaluated in this study.

Keywords: *Sweetpotato tubers; cultivar effects; nutrients; antinutrients; apparent metabolizable energy; poultry*

INTRODUCTION

The underground tubers of sweetpotato (*Ipomoea batatas* L.) are an important source of carbohydrates in many tropical areas and are cultivated extensively in Asia. World production is about 126 million metric tonnes with >92% of sweetpotatoes being produced in Asia (FAO, 1991). Sweetpotato has received increasing attention in recent years in human nutrition (Bouwkamp, 1985) and in animal production (Yeh and Bouwkamp, 1985; Dominguez, 1992) due to a number of favorable features, such as adaptability to diverse environments and its high yielding ability. The tubers are a good source of carbohydrates and energy (O'Hair, 1984). The digestibility of the carbohydrate fraction of sweetpotato tubers is reported to be >90% (Yoshida and Morimoto, 1958).

Several researchers have studied the cultivar differences in sweetpotato tubers with regard to protein, amino acids (Purcell et al., 1972; Li, 1982; Bradbury et al., 1985; Bradbury and Holloway, 1988), and trypsin inhibitors (Bradbury et al., 1985). The oxalate contents of sweetpotato tubers have also been reported (Holloway et al., 1989). However, there is a paucity of information on cultivar differences with regard to the nutritive value of the tubers. The major objective of the present study was to compare the biochemical composition and nutritive value of a range of sweetpotato cultivars. Protease inhibitors are known to adversely influence protein utilization and animal performance (Liener and Kakade, 1980), and cultivar variability with regard to protease inhibitory activity may be expected to cause differences in nutritive value. Information on variation in the nutritive value of sweetpotato cultivars has become increasingly important in recent years, in view of their consideration as a potential energy source in several regions of the tropics (Scott, 1992). In this paper, we report the results of a study in which 16 cultivars of sweetpotato grown in Sri Lanka were analyzed for proximate composition, minerals, starch, total oxalates, and trypsin inhibitor. The amino acid profiles of tubers from eight selected cultivars are also provided. In addition, the *in vitro* protein digestibility and the apparent metabolizable energy (AME) values for poultry of sweetpotato tubers were determined.

MATERIALS AND METHODS

Samples. Fresh tubers from 16 cultivars of sweetpotato (two batches of 30 tubers per cultivar) were obtained from the plant accessions maintained at the Department of Animal Science, University of Peradeniya, Peradeniya (longitude 80° 29′ E, latitude 7° 13′ N, elevation 485 m). The germplasm unit was maintained in a reddish brown latasolic soil with a pH value of 6.1. The crop was rain-fed, and the rainfall during the 4-month growing period was 692 mm. No fertilizers were applied because sweetpotato in the tropics is a subsistence crop, and farmers do not normally apply fertilizers. Undamaged tubers of medium size and uniform shape were selected immediately after the harvest and washed free of dirt. The tubers were manually sliced, initially sun-dried, and then dried in an Unitherm oven at 60° C for 18 h. The dried chips were ground in a stainless steel Wiley mill to pass through an 0.8-mm screen. The flour samples were stored in airtight containers at room temperature until analyzed.

Nutrient Analyses. All determinations were carried out in triplicates. Moisture, nitrogen, crude fat, crude fiber, and ash were determined according to AOAC (1980) methods. Crude protein contents were calculated as N × 6.25. The determination of starch was based on the method of Pucher et al. (1948), which involved extraction of starch with perchloric acid and separation of starch as the iodine complex, decomposition of the complex with alkali and measurement

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Table 1. Composition (Grams per 100 g of Air-Dry Weight) of the Reference and Test Diets Used in the Apparent Metabolizable Energy Assays

constituent	reference diet	test diet
glucose	40	
sweetpotato tuber meal/corn		40
common ingredients[a]	59	59
chromic oxide "bread"[b]	1	1

[a] Common ingredients in both diets: rice polishings, 21.0; sesame meal, 15.0, corn, 10.0; fish meal, 7.0; skim milk powder, 5.0; vitamin–trace mineral premix, 0.5; bone meal, 0.5. [b] Contained wheat flour and chromic oxide in the ratio of 7:3, respectively.

of sugars by the phenol–sulfuric acid method (Dubois et al., 1956). A 92% recovery of starch was obtained with cornstarch, used as the standard. Soluble sugars were extracted from the tuber flour with 85% ethanol as described by AOAC (1980) and quantified by the phenol–sulfuric acid method (Dubois et al., 1956) against glucose (Sigma Chemical Co., St. Louis, MO) as the standard.

Mineral analyses were carried out on samples digested with perchloric and nitric acids. Phosphorus was determined colorimetrically using the ammonium vanadate reaction (Chapman and Pratt, 1961). All other minerals were determined using an atomic absorption spectrophotometer (Perkin-Elmer Model 2380). Tuber flours from eight of the sweetpotato cultivars, chosen because they represented a range of protein levels, were analyzed for amino acid profiles. The amino acid compositions of samples were estimated with ion-exchange chromatography (Model TSM, Technicon Instruments, New York) after hydrolysis in 6 N HCl for 24 h at 110 °C. Methionine and cystine values were based on hydrolysates prepared after treatment of samples with performic acid (Moore, 1963).

Analysis of Antinutrients. Total oxalate contents were determined according to the method described by Abaza et al. (1968). The trypsin inhibitor was extracted with phosphate buffer (0.1 M, pH 7.6), and the trypsin inhibitor activity was measured as the extent to which the extract inhibited the action of porcine trypsin on the substrate benzoyl-DL-arginine *p*-nitroanilide hydrochloride (Kakade et al., 1969). The results are expressed as the number of trypsin units inhibited per gram of tuber flour (TIU/g). Trypsin inhibitor activity was also measured on meal samples prepared from tubers that had been cooked in boiling water.

Nutritive Evaluation. *In Vitro Protein Digestibility.* The *in vitro* protein digestibility of flour samples were estimated using the multienzyme method of Hsu et al. (1977).

Energy Bioassay. The nutritive quality of sweetpotato tuber meal for poultry was assessed in three separate AME trials. In each trial, tuber meals from five cultivars were assayed. Tuber meal from cultivar L 5 was not assayed, since sufficient quantities were not available. To ensure reproducibility between assays, a sample of corn was evaluated with sweetpotatoes as a control. Test diets were formulated by replacing 40 parts (w/w) of glucose in the reference diet with sweetpotato tuber meals or corn (Table 1).

In each trial, 120 White Leghorn cockerels, 1 week old, were allocated to 12 groups of equal initial weight, and then each dietary treatment was assigned to two groups of chicks at random. Each group was housed in separate compartments of an electrically heated battery brooder that had facilities for excreta collection. Cockerels were fed either the reference diet or test diets from 7 to 21 days of age. Diets and water were provided *ad libitum*. Excreta were collected daily for 4 consecutive days starting from day 18, dried in an Unitherm oven at 60 °C, and pooled for subsequent sampling. All diet and excreta samples were analyzed for dry matter, nitrogen, gross energy, and chromic oxide. The chromic oxide concentrations were determined spectrophotometrically following the procedure described by Hill and Anderson (1958). The relative concentrations of the chromic oxide marker in the diet and excreta were used to calculate the AME of the diet and feedstuffs (Hill et al., 1960). The AME values were corrected for nitrogen equilibrium (zero retention) using a factor of 34.4 kJ/g of nitrogen retained in the body (Hill and Anderson, 1958).

Statistical Analysis. The data were statistically analyzed according to the General Linear Models procedure (SAS, 1985). If the null hypothesis was rejected, the least significant difference (lsd) test was used to determine where differences existed. Probabilities higher than $P = 0.05$ were regarded as nonsignificant. Standard deviation and coefficient of variation for each parameter were also calculated. To determine whether the nutritive value of the sweetpotato tubers was influenced by the presence of trypsin inhibitor, the TIA of each cultivar was individually regressed by using a linear model against the *in vitro* protein digestibility and AME values.

RESULTS AND DISCUSSION

Significant ($P < 0.05$) differences were observed among sweetpotato cultivars with regard to their proximate composition and, starch and total sugar contents

Table 2. Proximate Composition and Starch and Sugar Contents of Sweetpotato Tubers from 16 Sri Lankan Cultivars (All Values Except the Dry Matter Are Given on a Grams per 100 g of Dry Weight Basis)[a]

cultivar	dry matter	crude protein	crude fat	crude fiber	ash	NFE[b]	starch	total sugars
Wariyapola	34.5	3.28	1.75	3.48	2.65	88.84	73.20	5.12
FA 17	36.3	3.37	1.27	1.99	4.19	89.18	72.03	7.45
Jewel	36.7	5.47	1.07	3.34	3.16	85.96	68.16	5.23
B 5	32.8	3.41	1.80	2.07	2.90	89.82	70.78	3.98
Nemogold	33.2	5.81	1.34	2.04	2.83	87.98	72.18	4.57
I 16	32.8	3.00	1.76	2.34	2.87	90.03	75.65	5.77
I 28	31.2	4.96	1.86	2.78	2.34	88.06	73.61	4.17
I 29	30.6	6.32	2.11	2.40	2.74	86.43	66.10	9.76
L 1	34.4	5.60	1.75	2.23	2.56	87.86	73.63	7.37
L 3	36.1	3.09	1.49	1.90	2.81	90.71	76.74	4.55
L 5	37.2	4.62	2.14	1.89	2.66	88.69	73.52	5.11
L 9	35.4	3.53	1.96	2.03	2.81	89.67	66.70	8.17
L 11	31.9	4.98	1.79	2.03	2.35	88.85	76.32	4.03
L 16	35.6	3.04	1.76	2.34	2.87	89.99	74.17	3.74
L 17	33.4	2.95	1.39	2.18	2.67	90.81	77.34	7.16
LS 9	34.1	7.19	1.60	2.76	3.17	85.28	63.13	9.89
mean	34.1	4.41	1.68	2.36	2.85	88.64	72.09	6.00
SD	1.99	1.38	0.30	0.49	0.43	1.64	4.12	2.03
CV,[c] %	5.84	31.29	17.86	20.76	15.09	1.85	5.72	33.83
lsd[d]	2.51	0.46	0.26	0.17	0.16	4.36	3.70	0.76

[a] Each value represents a mean of two samples. [b] Nitrogen-free extractives; calculated by difference. [c] Coefficient of variation. [d] Least significant difference ($P < 0.05$); error degrees of freedom for all variables, 15.

Table 3. Mineral Composition (Milligrams per 100 g of Dry Weight) of Sweetpotato Tubers from 16 Sri Lankan Cultivars[a]

	Ca	P	Mg	Na	K	Fe	Cu	Zn	Mn
Wariyapola	126	220	62	146	940	3.1	0.55	5.4	0.38
FA 17	239	206	120	255	1040	2.7	0.72	5.1	0.46
Jewel	95	188	89	173	1280	2.3	0.68	3.7	0.32
B 5	155	164	102	188	846	1.3	0.66	1.6	0.60
Nemogold	101	212	89	162	1208	1.6	0.90	4.4	0.58
I 16	148	196	71	230	966	4.9	0.86	4.8	0.73
I 28	118	176	79	202	1070	6.2	0.74	4.2	0.76
I 29	116	214	91	178	1026	4.8	0.78	5.1	0.66
L 1	174	226	100	246	1088	4.4	0.89	5.0	0.78
L 3	154	189	92	223	840	4.1	0.72	4.6	0.59
L 5	134	161	58	170	1149	5.9	0.86	3.2	0.36
L 9	126	154	62	188	1056	4.1	0.58	3.2	0.61
L 11	146	166	86	178	1210	2.6	0.71	5.1	0.36
L 16	96	148	101	162	856	3.1	0.51	4.3	0.69
L 17	118	176	98	192	867	4.4	0.81	4.8	0.61
LS 9	89	155	69	171	845	2.8	0.59	4.3	0.54
mean	133	184	86	192	1018	3.64	0.73	4.30	0.56
SD	37.2	25.6	17.4	31.6	146	1.43	0.12	0.98	0.15
CV,[b] %	27.97	13.91	20.23	16.46	14.34	39.28	16.44	22.79	26.79
lsd[b]	31.5	33.7	29.5	40.1	242	1.64	0.34	1.75	0.23

[a] Each value represents a mean of two samples. [b] See Table 2.

Table 4. Amino Acid Profiles of Sweetpotato Tubers from Eight Selected Cultivars

	Wariyapola	FA 17	Jewel	Nemogold	I 29	L 1	L 17	LS 9
crude protein[a]	3.28	3.37	5.47	5.81	6.32	5.60	2.95	7.19
amino acid[b]								
aspartic acid	19.6	18.1	19.2	17.4	18.5	18.6	19.7	18.9
threonine	4.7	5.1	5.4	5.9	5.8	5.4	5.3	5.7
serine	5.6	6.5	5.7	5.7	5.9	5.7	5.7	5.9
glutamic acid	13.4	13.4	11.3	11.5	11.0	12.7	13.0	10.9
proline	6.6	5.9	5.1	5.2	5.1	5.4	6.5	4.9
glycine	4.4	4.6	4.9	4.5	4.7	4.5	5.2	4.7
alanine	5.4	5.6	4.9	5.3	4.9	4.5	5.6	5.1
valine	5.2	5.0	6.0	5.3	5.4	5.1	4.9	5.2
isoleucine	4.6	3.9	3.9	4.0	4.6	3.9	3.8	3.9
leucine	5.4	5.4	5.8	5.4	5.7	5.1	4.9	5.5
tyrosine	3.5	3.3	3.7	4.0	3.8	3.9	4.1	3.9
phenylalanine	5.4	5.7	5.4	5.9	6.6	6.3	5.3	6.8
lysine	3.1	2.9	3.8	3.6	3.7	3.2	2.6	3.9
histidine	3.3	3.2	3.0	3.8	3.2	3.8	3.1	3.4
arginine	4.0	3.3	3.6	3.9	3.4	3.6	3.4	3.7
methionine	1.0	1.1	1.1	1.2	1.3	1.2	0.9	1.4
cystine	1.2	1.1	1.4	1.3	1.7	1.4	1.1	2.0

[a] g/100 g of dry weight. See Table 2. [b] g/100 g of crude protein.

(Table 2). The average crude protein content of the tubers was 4.41 g/100 g on a dry weight basis. The values determined for the Sri Lankan cultivars fall within the range of 1.3 to > 10 g/100 g reported in the literature for samples from North America (Purcell et al., 1972), Taiwan (Li, 1982), Africa (Onwueme, 1978), Japan (Yoshida and Morimoto, 1958), Papua New Guinea (Bradbury et al., 1985), and the South Pacific (Bradbury and Holloway, 1988). Cultivar LS 9 had the highest (7.19%) and cultivar L 17 the lowest crude protein content (2.95%). The crude protein contents of LS 9, Jewel, Nemogold, I 28, I 29, L 1, L 5, and L 11 were higher ($P < 0.05$) than those of the other cultivars.

Starch was the predominant fraction of the dry matter of sweetpotato tubers (Table 2). The average starch content of the tubers was 72.1 g/100 g of dry weight. The total sugar contents ranged from 3.74 to 9.86 g/100 g. The starch contents were lower ($P < 0.05$) and total sugar contents higher ($P < 0.05$) in cultivars I 29, L 9, and LS 9. Similar or slightly higher sugar contents have been reported for samples from the South Pacific by Bradbury and Holloway (1988). Among the parameters determined, considerable variability was observed for crude protein (CV, 31.3%), total sugars (CV, 33.8%), and crude fiber (CV, 20.8%). In particular, the diversity in protein content found among cultivars highlights the potential to improve the nutritive quality of sweetpotato tubers through selective breeding. Since tropical roots and tubers are generally considered to be poor sources of protein, the high protein contents of tubers from some sweetpotato cultivars are also of practical significance from a nutritional point of view.

Potassium was the major mineral present in sweetpotato tubers (Table 3). The results showed that sweetpotato tubers are moderately good sources of minerals. Significant ($P < 0.05$) cultivar differences were observed in relation to all minerals. Compositional differences with regard to proximate components, starch, total sugars, and minerals probably reflect genetic effects rather than environmental effects, since all samples were obtained fom the same cropping area subjected to similar agronomic practices. However, it should be noted that environmental factors are also known to contribute to variability in nutrient composition of sweetpotato tubers (Purcell et al., 1972; Walter et al., 1984; Bradbury and Holloway, 1988). Future studies must be conducted for several cropping seasons at different locations before definite conclusions can be made regarding environmental and genetic influences on the nutrient composition of sweetpotatoes.

Table 5. Oxalate Contents, Trypsin Inhibitor Activity, and *in Vitro* Protein Digestibility of Sweetpotato Tubers[a]

	total oxalate (mg/100 g of dry weight)	trypsin inhibitor activity (TIU/g of sample)	*in vitro* protein digestibility, %
Wariyapola	116	32	75.4
FA 17	63	8.2	73.3
Jewel	42	6.6	77.7
B 5	74	8.0	76.0
Nemogold	66	11	72.8
I 16	90	14	75.4
I 28	48	9.4	71.4
I 29	110	4.8	77.2
L 1	88	2.8	77.4
L 3	44	16	78.2
L 5	67	8.1	74.1
L 9	56	24	79.5
L 11	49	7.4	77.8
L 16	88	6.6	75.7
L 17	65	2.6	78.4
LS 9	105	3.8	71.9
mean	73.0	10.22	75.8
SD	23.8	8.16	2.47
CV,[b] %	32.60	79.84	3.26
lsd[b]	14.1	3.81	8.96

[a] Each value represents a mean of two samples. [b] See Table 2.

Table 6. Apparent Metabolizable Energy (AME) Contents (Megajoules per Kilogram of Dry Weight) for Poultry of Sweetpotato Tubers from 15 Cultivars and of Corn

	trial no.	AME
Wariyapola	1	14.44
FA 17	1	14.56
Jewel	1	14.68
B 5	1	14.47
Nemogold	1	14.56
I 16	2	14.42
I 28	2	14.61
I 29	2	14.38
L 1	2	14.54
L 3	2	14.76
L 9	3	14.41
L 11	3	14.34
L 16	3	14.52
L 17	3	14.39
LS 9	3	14.65
mean		14.54
SD		0.12
CV,[a] %		0.83
lsd[b]		0.91
corn	1	14.38
	2	14.52
	3	14.46
mean		14.45

[a] See Table 2. [b] Least significant difference ($P < 0.05$); error degrees of freedom, 14.

The amino acid profiles of tubers from eight selected cultivars of sweetpotato are shown in Table 4. Tryptophan was not determined since it is known to be destroyed during acid hydrolysis (Gehrke et al., 1985). The data were not statistically analyzed, since only one sample was assayed per cultivar, but it can be seen that different cultivars showed differences in the proportions of most of the amino acids. In general, aspartic acid, glutamic acid, alanine, and proline were higher in the low-protein cultivars, and phenylalanine, lysine, threonine, and cystine were higher in the high-protein cultivars. Interestingly, the amino acid contents of cultivar Jewel were remarkably similar to those reported for samples of the same cultivar from North America by Walter et al. (1983). The amounts of most essential amino acids in sweetpotato tubers conformed to the reference protein pattern recommended by NAS/NRC (1988), except for sulfur-containing amino acids, lysine, and leucine. Sulfur-containing amino acids were the first limiting amino acids, followed by lysine and leucine. Purcell et al. (1972) also reported sulfur-containing amino acids and lysine to be the first and second limiting amino acids in sweetpotatoes. In a study of sweetpotato samples from Papua New Guinea, Bradbury et al. (1985) found that, in addition to these two amino acids, leucine was limiting in some cultivars.

The determination of oxalate and trypsin inhibitory activity were of interest because of their negative effects on nutrient utilization in foods. Sweetpotato cultivars differed ($P < 0.05$) in their oxalate contents and trypsin inhibitor activities (Table 5). Cultivars Wariyapola, I 29, and LS 9 had high levels (105–116 mg/100 g) while cultivars Jewel, I 28, L 3, and L 11 had low levels of total oxalate (44–49 mg/100 g). The oxalate contents determined for our samples were lower than those reported for samples from the South Pacific region (Bradbury and Holloway, 1988; Holloway et al., 1989). However, these oxalate levels do not pose a nutritional hazard since >60% of the oxalates in sweetpotato tubers are reported to be present in water-soluble form (Holloway et al., 1989). Water-soluble oxalates are known to leach out during cooking in water (Libert and Franceschi, 1987) and can be removed by discarding the water.

Variability observed in the trypsin inhibitory activity of tubers from different sweetpotato cultivars (Table 5) is consistent with the data of Bradbury et al. (1985), who reported an 67-fold range in 30 Papua New Guinean cutivars. However, the range of results for trypsin inhibitor activity in 16 cultivars in the present study was only 12-fold. Among the cultivars, Wariyapola and L 9 showed high levels of trypsin inhibitory activity. Although direct comparison of analytical results on trypsin inhibitors is made difficult by differences in methodology and units of measurement, using a similar analytical technique, very much higher levels of trypsin inhibitor activity have been reported for grain legumes (110–2100 TIU/g of sample; Kute et al., 1984; Ravindran et al., 1987; Ravindran and Ravindran, 1988). Thus, the trypsin inhibitor levels present in sweetpotato tubers can generally be regarded as too low to cause any concern under practical situations. Analysis of boiled tubers showed that moist heat treatment completely destroyed the trypsin inhibitor activity in sweetpotato tubers.

Protein quality data, as measured by *in vitro* protein digestibility, showed a low variability (CV, 3.3%; Table 5) and the absence of cultivar effect ($P < 0.05$). *In vitro* protein digestibility values ranged from 71.4 to 79.5%, with a mean of 75.8% and indicate that sweetpotato protein is well utilized. These figures compare closely with the range of 71.0–83.0% reported for cooked grain legumes (Bressani and Elias, 1980). It is, however, relevant to note that these *in vitro* values may not be applicable to *in vivo* situations and therefore should be considered only as a crude indicator of the quality of sweetpotato protein.

The AME values for poultry of tubers from 15 cultivars of sweetpotato were remarkably similar (Table 6).

The values ranged from 14.34 to 14.76 MJ/kg of dry weight, with a mean of 14.54 MJ/kg, which was similar to that determined for samples of corn (14.45 MJ/kg). The comparable AME values of corn and sweetpotato highlight the potential role of sweetpotato meal as a replacement for corn in poultry diets. In the present study, no significant correlation ($P > 0.05$) was found between the trypsin inhibitor activity and *in vitro* protein digestibility ($r = 0.28$) or between trypsin inhibitor activity and AME ($r = -0.15$). These findings were unexpected, since feeding of sweetpotato meal to pigs and poultry has been reported to adversely affect animal performance (Gerpacio et al., 1978; Nwokolo, 1990), and these negative effects have often been attributed to the presence of trypsin inhibitor. As noted earlier, it is possible that the trypsin inhibitor activity of sweetpotato cultivars used in this study was too low to have any adverse effects on nutrient utilization. Wide variations in trypsin inhibitor activity are known to occur between sweetpotatoes from different cultivars (Bradbury et al., 1985), and one can possibly speculate that the effects of trypsin inhibitors on *in vitro* protein digestibility and AME would be significant in sweetpotato cultivars with high inhibitory activity. Bradbury and Holloway (1988) were of the opinion that the trypsin inhibitory activity in some sweetpotato cultivars from the South Pacific is sufficient to slow growth performance of animals.

The overall results suggest that sweetpotato tubers can play an important role as an energy source in human nutrition and animal feeding in the tropics and subtropics. As a protein source, its amino acid profile is not well balanced, being deficient in sulfur-containing amino acids, lysine, and leucine. However, human beings have been maintained in nitrogen balance with all nitrogen supplied by sweetpotato (Walter et al., 1984). The presence of trypsin inhibitor in sweetpotato tubers does not appear to influence their nutritive value, at least in the cultivars evaluated in our study. In any case, trypsin inhibitor should not pose a problem if the tubers are properly processed prior to use. The data also highlight the wide variability in nutrient composition among tubers from different cultivars of sweetpotato. In particular, the variability observed with regard to crude protein may be useful for selective breeding of high-protein tubers (Walter et al., 1984).

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