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Studies on the quality attributes of cookies prepared from cassava powder with green leafy vegetables and wheat flour

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Abstract
Cassava cookies were prepared by blending cassava flour with different green leafy vegetables (fenugreek, Palak, moringa, sorrel and amaranthus) and wheat flour using sugar and jaggery as sweetening agents following completely randomized design with factorial concept in three replications. At 45 days of storage, among the treatment combinations (T), 100% wheat flour (T_7) recorded the highest mean values for carbohydrates (75%) and protein percentage (1.81%), 60% cassava powder + 30% wheat flour + 10% Menthi leaf powder (T_1) recorded the highest mean values for total sugars (24.48%) and microbial count (2.17 cfu/ml), 60% cassava powder + 30% wheat flour + 10% Amaranthus powder (T_5) recorded the highest mean value for fibre content (0.37%). Regarding sweeteners, more values for carbohydrates (72.96%) and microbial count (1.96 cfu/ml) were recorded in sugar (S_1), whereas for protein (1.67), fibre (0.32%) and total sugars (20.54%), more values were observed in jaggery (S_2). Regarding interactions between factors, highest mean value for protein content (2.87%) and fibre content (0.38%) was observed in 100% wheat flour + sugar (T_7S_1) and 60% cassava powder + 30% wheat flour + 10% Amaranthus powder + Jaggery (T_5S_2) respectively. Cookies were stored for a period of 45 days during which there was a significant decline in nutritional as well as functional attributes. The blended biscuits were found to be within safe limits even after the storage for 45 days.

Keywords: Cassava, cookies, wheat flour, nutritional, storage

Introduction
Cassava (*Manihot esculenta*) has been used as a staple food of many nations. It is also known as manioc, yucca and tapioca. It is originated in Latin America. Nutritional content of cassava is almost equal to wheat flour thus cassava can be used as wheat flour substitute but small amount of wheat flour added because it contains gluten which is absent in cassava. Cassava is very suitable to be used as cookies ingredient, cookies hold an important position in snacks because of variations in taste, crispness and digestibility, they are ready to eat, easy and inexpensive food products, containing digestive principles and a very important diet. Cassava also consists of essential micronutrients such as iron, zinc and vitamins A, B and C.
Fenugreek (*Trigonella foenum graceum*) also called as methi is widely used in preparation of meat and also with other vegetables, stir fries, curries and salads. They are known to be very high in iron as well as having significant levels of potassium, fiber, and calcium. Drumstick (*Moringa oleifera*) is an under exploited perennial vegetable species also known as the moringa, horseradish tree, or ben oil tree. The nutritional value of drumstick dry leaves include protein 5.27 g/100 g, carbohydrates 11.15 g/100 g, iron 2.32 mg/100 g, calcium 151 mg/ 100 g, ascorbic acid 31 mg/100 g, vitamin A 7013 IU. Palak (*Beta vulgaris* var. *bengalensis*) is rich in vitamins especially vitamin A (97701 IU) and other vitamins like ascorbic acid (70 mg/100 g), riboflavin and thiamine.It also contains Minerals like iron and calcium (380 mg/100 g), folic acid and some amounts of nicotinic acid, pyridoxine, antioxidants such as carotene, flavones, indoles and isothiocyanates and essential amino acids etc. Thus, it is called as "Mines of Minerals".
Sorrel (*Rumex acetosa*) is highly nutritious in addition to being low in calories it is high in fiber and micro nutrients. It is a great source of antioxidants that prevent many chronic conditions including heart disease, cancer and diabetes. Amaranthus (*Amaranthus viridis*) is also known as Kiwicha has excellent nutritional value because of their high content of essential micronutrients such as carotene, iron, calcium, vitamin C and folic acid.

One cup of amaranth leaves, that are cooked, boiled, and drained contains 90% vitamin C daily value requirement, 73% vitamin A.

Materials and Methods

The present study was conducted at post-harvest technology laboratory, College of Horticulture, Venkataramannagudem, West Godavari District, Andhra Pradesh carried out in factorial completely randomized design (FCRD). Two factors *viz.*, treatment factor with eight levels and sweetners factor with two levels (sugar and jaggery) in three replications. The following parameters were estimated for the quality of cassava cookies *viz.*, carbohydrates (%), protein content (g $100g^{-1}$), fibre (%), total sugars (%) and microbial count (cfu/ml) at initial, 15, 30 and 45 days respectively. The data collected on these observations were statistically analyzed by ANOVA using the standard procedure outlined by Panse and Sukhatme (1985)

Results and Discussion

1. Carbohydrates (%)

The data pertaining to the carbohydrates (%) of the cassava cookies affected by different combinations of cassava flour, sweeteners and their interactions are presented in (Table 1).

Significant difference was observed among the different treatment combinations of cassava flour. The highest mean carbohydrates percentage (73.35%, 73.90%, 74.11%, and 75.00%) was recorded in T_7 (100% WF) treatment throughout the storage days which was on par with T_6 (60% CP+40% WF) (70.6%), T_8 (100% CP) (72.42%) at initial days of storage**,** At 15th day of storage the highest mean carbohydrate percentage (73.90%) was recorded in T_7 (100% WF) treatment which was on par with T_6 (60% CP+40% WF) (71.85%), T_8 (100% CP) (72.64%) respectively whereas the lowest (62.93%, 63.64%, 65.00% and 66.00%) was noticed in T_1throughout the storage days with respect to combinations of cassava flour.

The significant difference was observed among the sweeteners. The highest was recorded in S_1 at 45 day of storage (72.96%) which was on par with S_1 at 30thday of storage (72.09%). The lowest percentage was recorded in S_2 at initial day of storage (67.43%) throughout the storage days with respect to sweeteners.

No significant difference among the interactions was observed among the different treatment combinations throughout the storage days.

With the progression of storage period the carbohydrate content increased that might be due to break down of insoluble polysaccharides into simple sugar. The reports of Varshney *et al.* (2008) in defatted peanut biscuits are in agreement with our findings and Anwar *et al.* (2018) [1] in multigrain biscuits.

Among all the treatment combinations treatment T_7 (100% wheat flour) recorded highest carbohydrate percentage (73.55%) and lowest in T_1 due to their proximate composition (86% and 4.80%).

2. Protein (%)

The data pertaining to the protein percentage of the cassava cookies affected by different combinations of cassava flour, sweeteners and their interactions are presented in (Table 2).

The significant difference was observed among the different treatment combinations of cassava flour. The highest mean protein percentage (2.84%, 2.15%, 2.04% and 1.81%) was recorded in T_7 treatment throughout the storage days which was on par with T_3 (60% CP+30% WF+10% MP) (2.71%, 2.02%, 2%) respectively at initial, 15th and 30th day of storage whereas the lowest protein percentage (2.01%,1.57%,1.51%, 1.41%) was noticed in T_1 throughout the storage days with respect to combinations of cassava flour.

There is no significant difference among the sweeteners at initial and 15th day of storage. The highest mean protein content was recorded in S_2 at initial day of storage (2.49%).The lowest mean protein was recorded in S_1 at 45th day of storage (1.62%) throughout the storage days with respect to sweeteners.

Significant differences among the interactions were observed throughout the days of storage. The highest protein content was recorded in T_7S_1 (2.87%) which was on par with T_8S_2 (2.83%) and T_7S_2 (2.81%) at initial day of storage and lowest was recorded in at T_1S_1 (1.38%) at 45th day of storage.

There is a decrease in protein content during storage which might be due to hydrolysis of peptide bonds with the help of protease enzyme that cause splitting of protein molecules or might be due to the result of appreciably lower protein contents of the composite flour as well as the dilution of gluten content of wheat flour in biscuits. Similar behavior of protein was also observed by Nwabueze and Atuonwu (2007) in African breadfruit seeds incorporated biscuits and Anwar *et al.* (2018) [1] in multigrain biscuits which confirm our findings.

Among all the treatment combinations T_7 has the highest protein content because of its proximate composition having more protein (13.70%) compared to other combinations

3. Fibre (%)

The data pertaining to the fibre percentage of the cassava cookies affected by different combinations of cassava flour, sweeteners and their interactions are presented in (Table 3).

The significant difference was observed among the different treatment combinations of cassava flour. The highest fibre percentage was recorded in T_5 (0.47%, 0.46%, 0.44% and 0.37%) treatment throughout the storage days which was on par with T_4 (0.46%) at initial day of storage while the lowest percentage (0.30%, 0.26%, 0.25%, 0.22%) was noticed in T_7 (100% WF) throughout the storage days.

The significant difference was observed among the sweeteners. The highest was recorded in S_2(0.47%) at initial days of storage. The lowest mean was recorded in S_1 at 45th day of storage (0.23%) throughout the storage days with respect to sweeteners.

No significant difference among the interactions was observed among the different treatment combination at the initial day of storage.

Significant differences among the interactions were observed at 15, 30 and 45 days of storage. The highest was recorded in T_2S_2 (60% CP+30% WF+10% PP with jaggery) (0.52%) at 15th day of storage which was on par with T_4S_2 (0.47%). At 45 days of storage the highest was recorded in T_5S_2 (0.38%) which was on par with T_5S_1 (60% CP+30% WF+10% PP with sugar) (0.36%), and T_4S_2 (0.36%). Lowestfibre content was recorded in at T_7S_1 (100% WF with sugar) (0.17%, 0.16% and 0.15%) at 15, 30 and 45 days of storage respectively.

The decrease in fibre content throughout the storage days might be due to the heat and moisture stabilizers which degrade pectic substances. The relevance of our findings with

respect to the fibre content was also supported by Butt *et al.* (2007) in vitamin-A fortified cookies and Anwar *et al.* (2018) [1] in multigrain biscuits.

Among all the treatment combinations T_5 has the highest protein content because of its proximate composition having more fibre (5.70%) compared to other combinations.

4. Total sugars (%)

The data pertaining to the total sugars percentage of the cassava cookies affected by different combinations of cassava flour, sweeteners and their interactions are presented in (Table 4).

The significant difference was observed among the different treatment combinations of cassava flour with respect to total sugar percentage. The highest total sugar percentage (18.68%, 21.35%, 23.52% and 24.48%) was recorded in T_2 treatment throughout the storage days which was on par with T_3 (18.02%, 23.75%) at initial and 45th day of storage respectively whereas the lowest (15.23%,16.12%, 16.44% and 17.35%) was noticed in T_7 (100% WF) throughout the storage days with respect to combinations of cassava flour.

Significant difference was observed among the sweeteners. The highest total sugars percentage was recorded in S_2 at 45 days of storage (20.54%) while the lowest was recorded in S_1 at initial day of storage (16.19%) throughout the storage days with respect the sweeteners.

No significant difference among the interactions was observed among the different treatment combination cassava flour on the initial day of storage and 15 days of storage.

Significant differences among the interactions were observed at 30 and 45 days of storage. The highest total sugar percentage was recorded in T_2S_2 (23.81%) which was on par with T_2S_1 (23.23%) at 30 days of storage and at 45th day of storage the highest was recorded in T_2S_2 (24.63%). Lowest was recorded in at T_7S_1 (15.98% and 16.02%) at 30 and 45 days of storage respectively.

The results revealed that total sugars gradually increased as storage period progressed from initial day to 45th day. Increase in total sugar content during storage period might be due to accelerated hydrolysis of insoluble polysaccharides and other carbohydrates and also due to increased degree of inversion of sugar. Similar results were also reported by Evelin *et al.* (2007) in banana flour, Dabhade and Khedkar (1980) [2] and Teotia *et al.* (1987) in mango powder.

5. Microbial count (cfu/ml)

The data pertaining to the microbial count (cfu/ml) of the cassava cookies affected by different combinations of cassava flour, sweeteners and their interactions are presented in (Table 5).

The significant difference was observed among the different treatment combinations of cassava flour. The highest microbial count was recorded in T_1 (2.17 cfu/ml) which was on par with T_3 (1.85 cfu/ml) whereas the lowest was noticed in T_7 (1.19 cfu/ml) at 30 storage days while at 45 days of storage T_1 (2.92cfu/ml) was recorded highest followed by T_5 (2.36cfu/ml).

The significant difference was observed among the sweeteners. The highest was recorded in S_1 (1.96cfu/ml) at 45 days of storage. The lowest (cfu/ml) was recorded in S_2 (1.51 cfu/ml) was recorded at 30th day of storage with respect the sweeteners.

No significant difference among the interactions was observed among the different treatment combination cassava flour on the initial and 15th day of storage.

Significant differences among the interactions were observed at 30 and 45 days of storage. Microbial count (cfu/ml)was recorded in T_1S_1(2.20cfu/ml) which was on par withT_1S_2 (2.13 cfu/ml) at 30 days of storage. Microbial count was recorded was recorded in T_1S_1 (2.98 cfu/ml) which was on par with T_1S_2 (2.86 cfu/ml) at 45 days of storage.

The maximum microbial growth was recorded in the treatment T_1 due to the presence of high moisture content and water activity that leads to the favourable conditions for microbes than the other treatments. Similar findings were reported by Satish *et al.* (2012) [3].

Table 1: Effect of different blends of green leafy vegetables and wheat flour on carbohydrates (%) of cassava cookies.

Treatment combinations (T)		Initial			15th day			30th day			45th day		
		Sweeteners		Mean (T)	Sweeteners		Mean (T)	Sweeteners		Mean (T)	Sweeteners		Mean (T)
		S_1	S_2		S_1	S_2		S_1	S_2		S_1	S_2	
T_1	60% CP+30%WF+10% MLP	64.67	61.19	62.93	65.04	62.23	63.64	67.00	63.00	65.00	68.00	64.00	66.00
T_2	60% CP+30%WF+10% PP	70.96	67.36	69.16	72.02	68.25	70.14	73.00	69.00	71.00	73.86	70.00	71.93
T_3	60% CP+30%WF+10% MP	70.22	66.98	68.60	71.23	67.34	69.29	72.00	68.00	70.00	73.00	69.00	71.00
T_4	60% CP+30%WF+10% SP	69.06	65.36	67.21	70.22	66.22	68.22	71.00	67.00	69.00	72.00	68.00	70.00
T_5	60% CP+30%WF+10% AP	68.32	63.98	66.15	69.43	65.46	67.45	70.00	66.00	68.00	71.00	67.00	69.00
T_6	60% CP+40%WF	71.02	70.18	70.60	73.24	70.46	71.85	74.20	71.00	72.60	74.86	72.00	73.43
T_7	100% WF	74.22	72.48	73.35	75.24	72.56	73.90	75.21	73.00	74.11	76.00	74.00	75.00
T_8	100% CP	72.88	71.96	72.42	74.16	71.12	72.64	74.36	72.00	73.18	75.00	73.00	74.00
Mean (S)		70.16	67.43		71.32	67.95		72.09	68.62		72.96	69.62	
Factors		S.Em±	CD @ 5%		S.Em±	CD @ 5%		S.Em±	CD @ 5%		S.Em±	CD @ 5%	
Treatments (T)		1.226	3.548		1.24	3.59		1.254	3.627		1.27	3.675	
Sweeteners (S)		0.613	1.774		0.62	1.795		0.627	1.814		0.635	1.838	
Treatments (T) X Sweeteners (S)		1.734	NS		1.754	NS		1.773	NS		1.796	NS	

CP: Cassava powder **PP:** Palak powder **AP:** Amaranthus powder
WF: Wheat flour **MP:** Moringa powder **S$_1$:** Sugar
MLP: Menthi leaf powder **SP:** Sorrel powder **S$_2$:** Jaggery

Table 2: Effect of different blends of green leafy vegetables and wheat flour on protein (%) of cassava cookies.

Treatment combinations (T)		Initial		Mean (T)	15th day		Mean (T)	30th day		Mean (T)	45th day		Mean (T)
		Sweeteners			Sweeteners			Sweeteners			Sweeteners		
		S_1	S_2		S_1	S_2		S_1	S_2		S_1	S_2	
T_1	60% CP+30%WF+10% MLP	1.95	2.06	2.01	1.48	1.65	1.57	1.44	1.58	1.51	1.38	1.44	1.41
T_2	60% CP+30%WF+10% PP	2.58	2.23	2.41	1.93	1.80	1.87	1.80	1.72	1.76	1.58	1.52	1.55
T_3	60% CP+30%WF+10% MP	2.74	2.67	2.71	2.04	2.00	2.02	2.01	1.99	2.00	1.73	1.69	1.71
T_4	60% CP+30%WF+10% SP	2.73	2.26	2.50	2.08	1.74	1.91	1.81	1.73	1.77	1.75	1.58	1.67
T_5	60% CP+30%WF+10% AP	2.05	2.10	2.08	1.58	1.66	1.62	1.54	1.62	1.58	1.48	1.54	1.51
T_6	60% CP+40%WF	2.35	2.95	2.65	1.89	2.21	2.05	1.74	2.10	1.92	1.66	1.98	1.82
T_7	100% WF	2.87	2.81	2.84	2.17	2.13	2.15	2.08	2.00	2.04	1.83	1.79	1.81
T_8	100% CP	2.23	2.83	2.53	1.80	2.11	1.96	1.72	2.09	1.91	1.52	1.80	1.66
Mean (S)		2.44	2.49		1.87	1.91		1.77	1.86		1.62	1.67	
Factors		S.Em ±	CD @ 5%		S.Em ±	CD @ 5%		S.Em ±	CD @ 5%		S.Em ±	CD @ 5%	
Treatments (T)		0.044	0.128		0.034	0.098		0.032	0.093		0.029	0.085	
Sweeteners (S)		0.022	NS		0.017	NS		0.016	0.047		0.015	0.042	
Treatments (T) X Sweeteners (S)		0.062	0.181		0.048	0.138		0.046	0.132		0.042	0.120	

CP: Cassava powder **PP:** Palak powder **AP:** Amaranthus powder
WF: Wheat flour **MP:** Moringa powder **S_1:** Sugar
MLP: Menthi leaf powder **SP:** Sorrel powder **S_2:** Jaggery

Table 3: Effect of different blends of green leafy vegetables and wheat flour on fibre (%) of cassava cookies.

Treatment combinations (T)		Initial		Mean (T)	15th day		Mean (T)	30th day		Mean (T)	45th day		Mean (T)
		Sweeteners			Sweeteners			Sweeteners			Sweeteners		
		S_1	S_2		S_1	S_2		S_1	S_2		S_1	S_2	
T_1	60% CP+30%WF+10% MLP	0.28	0.46	0.37	0.26	0.41	0.34	0.21	0.39	0.30	0.20	0.32	0.26
T_2	60% CP+30%WF+10% PP	0.31	0.47	0.39	0.27	0.43	0.35	0.24	0.40	0.32	0.21	0.33	0.27
T_3	60% CP+30%WF+10% MP	0.27	0.45	0.36	0.23	0.41	0.32	0.20	0.37	0.29	0.18	0.30	0.24
T_4	60% CP+30%WF+10% SP	0.39	0.52	0.46	0.34	0.47	0.41	0.32	0.45	0.39	0.31	0.36	0.34
T_5	60% CP+30%WF+10% AP	0.41	0.53	0.47	0.40	0.52	0.46	0.39	0.48	0.44	0.36	0.38	0.37
T_6	60% CP+40%WF	0.23	0.42	0.33	0.21	0.37	0.29	0.19	0.35	0.27	0.16	0.29	0.23
T_7	100% WF	0.18	0.41	0.30	0.17	0.34	0.26	0.16	0.33	0.25	0.15	0.28	0.22
T_8	100% CP	0.33	0.49	0.41	0.31	0.44	0.38	0.26	0.43	0.35	0.25	0.34	0.30
Mean (S)		0.31	0.47		0.28	0.42		0.26	0.40		0.23	0.32	
Factors		S.Em±	CD @ 5%		S.Em±	CD @ 5%		S.Em±	CD @ 5%		S.Em±	CD @ 5%	
Treatments (T)		0.020	0.050		0.010	0.040		0.020	0.040		0.010	0.030	
Sweeteners (S)		0.010	0.020		0.010	0.020		0.010	0.020		0.010	0.020	
Treatments (T) X Sweeteners (S)		0.020	NS		0.020	0.060		0.020	0.060		0.020	0.040	

CP: Cassava powder **PP:** Palak powder **AP:** Amaranthus powder
WF: Wheat flour **MP:** Moringa powder **S_1:** Sugar
MLP: Menthi leaf powder **SP:** Sorrel powder **S_2:** Jaggery

Table 4: Effect of different blends of green leafy vegetables and wheat flour on total sugars of cassava cookies.

Treatment combinations (T)		Initial		Mean (T)	15th day		Mean (T)	30th day		Mean (T)	45th day		Mean (T)
		Sweeteners			Sweeteners			Sweeteners			Sweeteners		
		S_1	S_2		S_1	S_2		S_1	S_2		S_1	S_2	
T_1	60% CP+30%WF+10%MLP	15.78	16.32	16.29	16.27	17.16	17.02	16.68	17.85	17.63	19.48	20.32	20.23
T_2	60% CP+30%WF+10% PP	18.33	19.02	18.68	21.33	21.36	21.35	23.23	23.81	23.52	24.32	24.63	24.48
T_3	60% CP+30%WF+10% MP	17.18	18.86	18.02	18.38	19.32	18.85	19.46	20.36	19.91	23.52	23.98	23.75
T_4	60% CP+30%WF+10% SP	16.34	17.36	16.85	17.36	18.48	17.92	18.32	19.53	18.93	21.36	22.32	21.84
T_5	60% CP+30%WF+10% AP	15.98	16.98	16.48	16.46	17.32	16.89	17.16	18.23	17.70	20.08	21.04	20.56
T_6	60% CP+40%WF	15.34	15.78	15.56	16.02	16.32	16.17	16.64	16.76	16.70	17.32	17.64	17.48
T_7	100% WF	14.98	15.23	15.11	15.36	15.75	15.56	15.98	16.28	16.13	16.02	16.88	16.45
T_8	100% CP	15.12	15.34	15.23	15.98	16.26	16.12	16.32	16.56	16.44	17.16	17.54	17.35
Mean (S)		16.19	16.86		17.22	17.75		18.07	18.67		19.99	20.54	
Factors		S.Em±	CD @ 5%		S.Em±	CD @ 5%		S.Em±	CD @ 5%		S.Em±	CD @ 5%	
Treatments (T)		0.330	0.940		0.350	1.020		0.380	1.100		0.410	1.180	
Sweeteners (S)		0.160	0.470		0.180	0.510		0.190	0.550		0.200	0.590	
Treatments (T) X Sweeteners (S)		0.460	NS		0.500	NS		0.540	1.580		0.580	0.170	

CP: Cassava powder **PP:** Palak powder **AP:** Amaranthus powder
WF: Wheat flour **MP:** Moringa powder **S_1:** Sugar
MLP: Menthi leaf powder **SP:** sorrel powder **S_2:** Jaggery

Table 5: Effect of different blends of green leafy vegetables and wheat flour on microbial count (cfu/ml) of cassava cookies.

Treatment combinations (T)		Initial		Mean (T)	15th day		Mean (T)	30th day		Mean (T)	45th day		Mean (T)
		Sweeteners			Sweeteners			Sweeteners			Sweeteners		
		S_1	S_2		S_1	S_2		S_1	S_2		S_1	S_2	
T_1	60% CP+30%WF+10% MLP	0.00	0.00	0.00	0.00	0.00	0.00	1.40	1.38	1.39	1.88	1.80	1.84
T_2	60% CP+30%WF+10% PP	0.00	0.00	0.00	0.00	0.00	0.00	2.20	2.13	2.17	2.98	2.86	2.92
T_3	60% CP+30%WF+10% MP	0.00	0.00	0.00	0.00	0.00	0.00	1.90	1.80	1.85	2.40	2.32	2.36
T_4	60% CP+30%WF+10% SP	0.00	0.00	0.00	0.00	0.00	0.00	1.80	1.60	1.68	2.10	2.06	2.09
T_5	60% CP+30%WF+10% AP	0.00	0.00	0.00	0.00	0.00	0.00	1.60	1.50	1.55	1.92	1.90	1.91
T_6	60% CP+40%WF	0.00	0.00	0.00	0.00	0.00	0.00	1.30	1.28	1.29	1.64	1.60	1.62
T_7	100% WF	0.00	0.00	0.00	0.00	0.00	0.00	1.20	1.18	1.19	1.35	1.30	1.33
T_8	100% CP	0.00	0.00	0.00	0.00	0.00	0.00	1.30	1.20	1.25	1.45	1.40	1.43
Mean (S)		0.00	0.00	0.00	0.00	0.00	0.00	1.58	1.51		1.96	1.86	
Factors		S.Em±		CD @ 5%	S.Em±		CD @ 5%	S.Em±		CD @ 5%	S.Em±		CD @ 5%
Treatments (T)		0.000		0.000	0.000		0.000	0.030		0.080	0.040		0.110
Sweeteners (S)		0.000		0.000	0.000		0.000	0.010		0.040	0.020		0.050
Treatments (T) X Sweeteners (S)		0.000		0.000	0.000		0.000	0.040		0.120	0.050		0.160

CP: Cassava powder **PP:** Palak powder **AP:** Amaranthus powder
WF: Wheat flour **MP:** Moringa powder **S_1:** Sugar
MLP: Menthi leaf powder **SP:** Sorrel powder **S_2:** Jaggery

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