

Consumers' Sensory Perception of Fermented African Nightshades in Tanzania

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Background

- African nightshade (ANS) is underutilized and neglected vegetable regardless of its nutritional quality and high availability in Tanzania²
- Fermented relish is a common product in western countries and Asia² resulting from fermented fresh vegetables
- Relish making using leafy vegetables is also common in some societies in SSA, still there is little adaptation
- Relish consumption in Tanzania is still low, despite high market potential, nutritional potential, and long shelf life
- This study seeks to assess the consumer acceptability and willingness to buy fermented relish made with from ANS (*S. villosum* & *S. scabrum*)

Materials and Methods

- Consumer acceptance taste was conducted in Morogoro and Kilimanjaro regions in Tanzania
- About 370 tasters participated in the tasting
- A 9-Scale Hedonic test was used
- Four relish were prepared, coded and tasted; *S. scabrum* - Spontaneous fermentation, *S. scabrum*- controlled fermentation, *S. villosum* - Spontaneous fermentation, and *S. villosum* - controlled fermentation
- Tasters were served with all four types of relish and then filled evaluation form after taste

Results

Table 1. Consumers sensory scores of fermented ANS relishes (n=370)

Formulation	Color	Texture	Appearance	Taste	Odor	Flavor	Saltiness	Sourness	Bitterness	Spiciness	Overall acceptability
SSCFR	Min	1	2	2	2	2	2	2	2	2	2
	Max	9	9	9	9	9	9	9	9	9	9
	Mean	7.84 ^a	7.86 ^a	7.88 ^a	7.90 ^a	7.90 ^a	7.90 ^a	7.94 ^a	7.81 ^a	7.94 ^a	7.96 ^a
	SD	0.996	0.84	0.84	0.83	0.796	0.78	0.91	0.87	0.97	0.81
SVCFR	Min	1	1	1	1	1	1	1	1	2	1
	Max	9	9	9	9	9	9	9	9	9	9
	Mean	7.59 ^b	7.69 ^b	7.71 ^b	7.73 ^b	7.76 ^b	7.76 ^b	7.67 ^b	7.66 ^b	7.60 ^a	7.76 ^b
	SD	1.37	1.37	1.04	1.05	0.977	1.00	1.10	1.23	1.32	1.00
SSSFR	Min	2	2	2	2	2	2	2	2	2	2
	Max	9	9	9	9	9	9	9	9	9	9
	Mean	7.75 ^{ab}	7.79 ^{ab}	7.80 ^{ab}	7.80 ^{ab}	7.80 ^{ab}	7.81 ^{ab}	7.73 ^{bc}	7.71 ^{bc}	7.77 ^a	7.81 ^{ab}
	SD	1.03	0.93	0.88	0.94	0.914	0.91	1.07	1.1	0.86	0.91
SVSFR	Min	1	2	2	2	2	2	2	2	2	2
	Max	9	9	9	9	9	9	9	9	9	9
	Mean	7.71 ^{ab}	7.77 ^{ab}	7.78 ^{ab}	7.76 ^{ab}	7.78 ^{ab}	7.78 ^{ab}	7.73 ^{cd}	7.67 ^{cd}	7.73 ^a	7.78 ^b
	SD	1.22	0.95	0.97	1.05	0.94	0.96	1.07	1.25	1.06	0.96
Overall acceptability of each parameter	Mean	7.72	7.78	7.79	7.80	7.81	7.81	7.76	7.75	7.73	7.82
	SD	1.15	1.02	0.93	0.97	0.91	0.91	1.04	1.11	1.05	0.92

Means with Different superscript letters within a column are significantly different $p < 0.05$. 1 = dislike extremely, 5 = Neither like nor dislike, 9 = like extremely; The panelist (tester) preferred SSCFR over SVCFR, SSSFR, and SVSFR because the mean score for SC is higher than VC, SS, and VS in all sensory parameters tested. According to the hedonic scale, the testers like SC very much. SSCFR, *Solanum scabrum* controlled fermentation relish; SVCFR, *S. villosum* controlled fermentation relish; SSSFR, *S. scabrum* spontaneous fermentation relish; SVSFR, *S. villosum* spontaneous fermentation relish

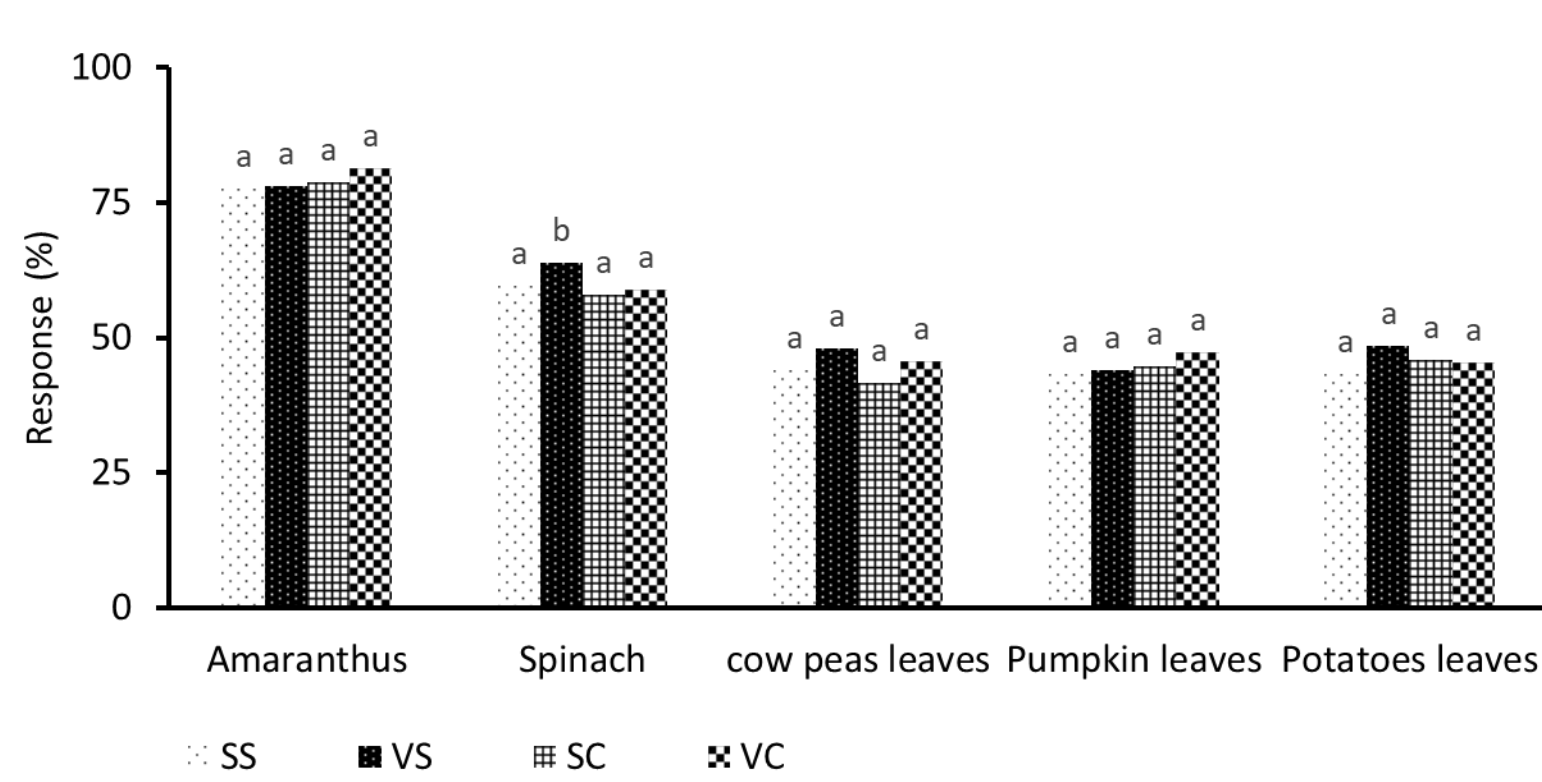


Figure 1. Vegetables which can be cooked with relish. SS, *S. scabrum* & VS, *S. villosum* spontaneous fermented. SC, *S. scabrum*, VC, *S. villosum* controlled fermentation. Same letter in each group indicate ($p > 0.05$)

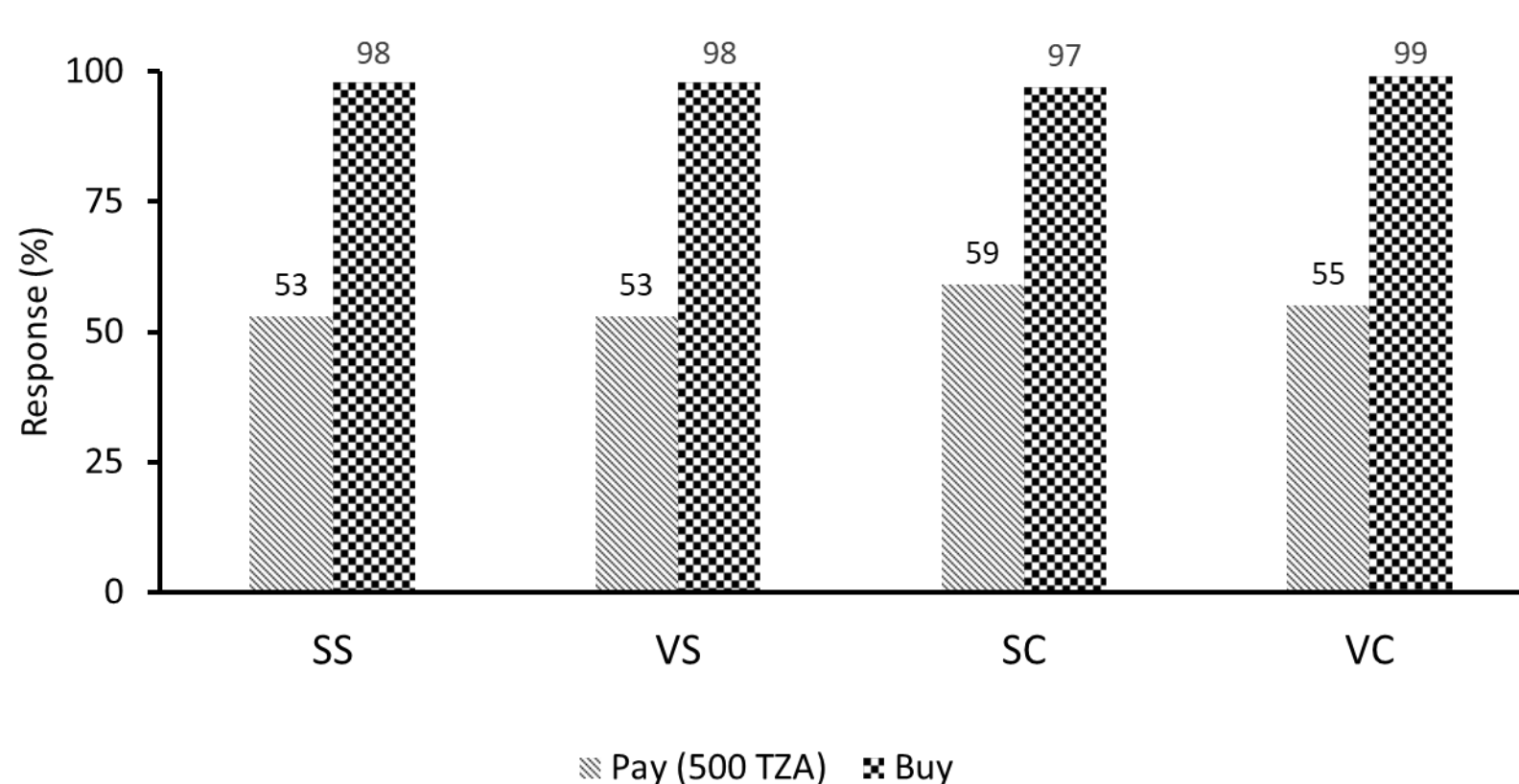


Figure 3. Willingness to buy and pay. SS, *S. scabrum* & VS, *S. villosum* spontaneous fermented. SC, *S. scabrum*, VC, *S. villosum* controlled fermentation

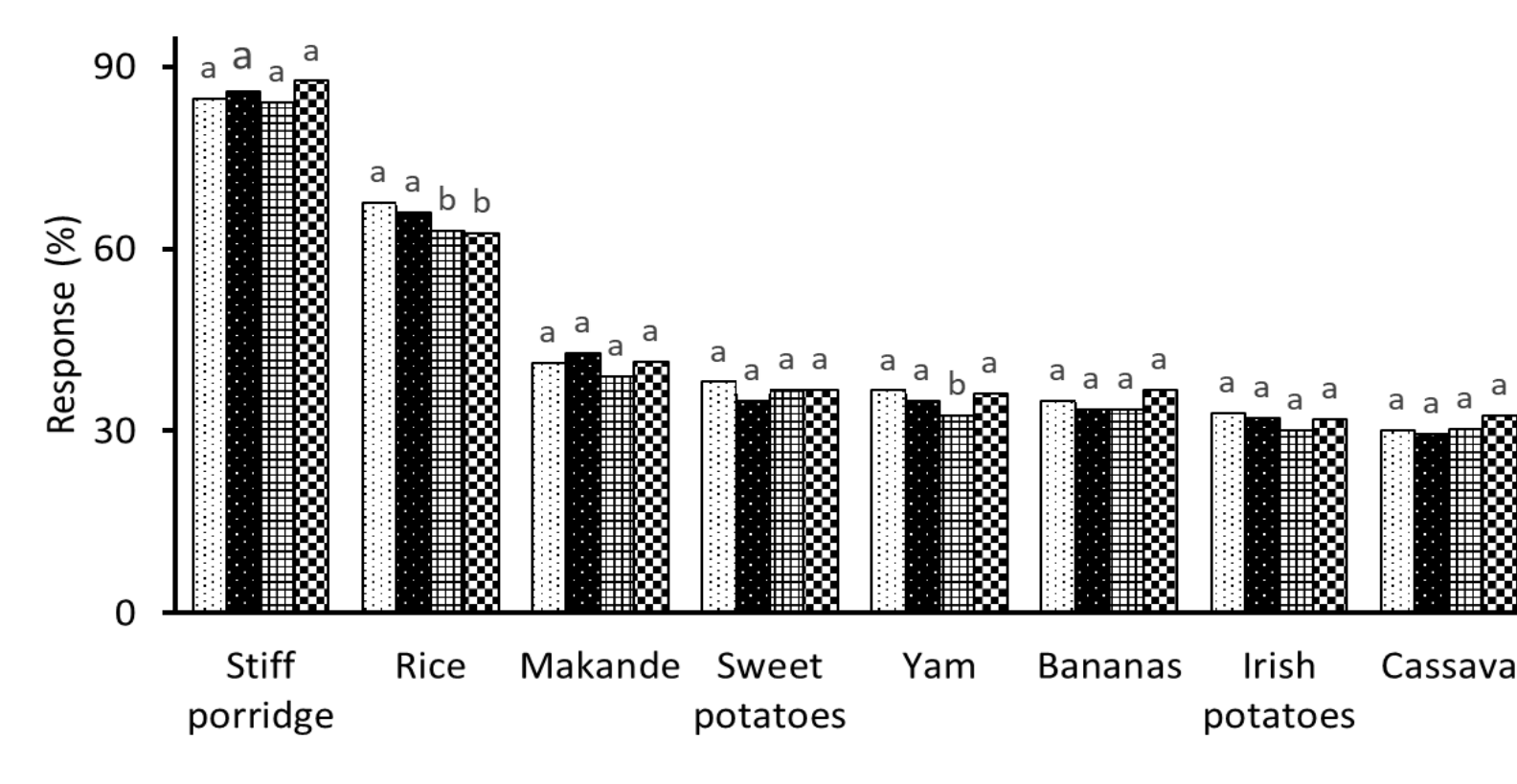


Figure 2. Foods which can accompany relish. SS, *S. scabrum* & VS, *S. villosum* spontaneous fermented. SC, *S. scabrum*, VC, *S. villosum* controlled fermentation. Same letter in each group indicate ($p > 0.05$)

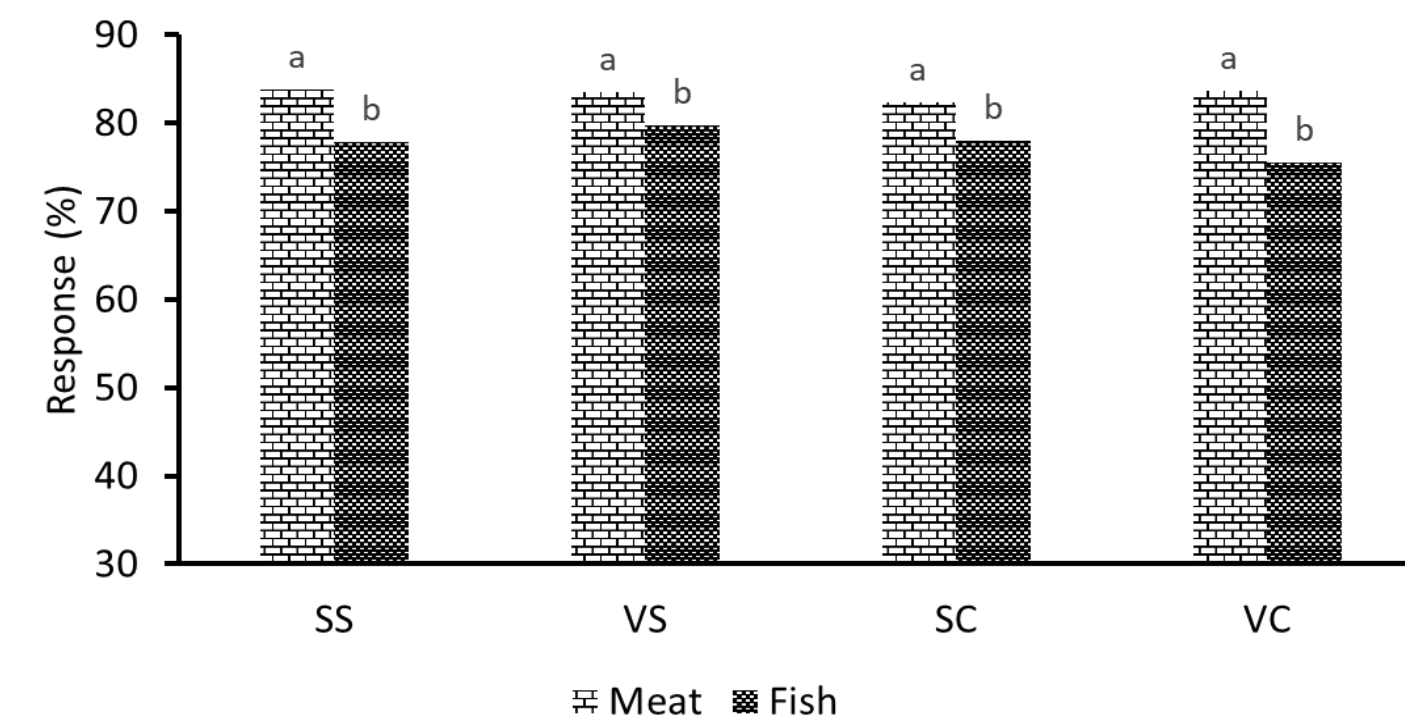


Figure 4. Other food which can be cooked with relish. SS, *S. scabrum* & VS, *S. villosum* spontaneous fermented. SC, *S. scabrum*, VC, *S. villosum* controlled fermentation. Same letter in each group indicate ($p > 0.05$)

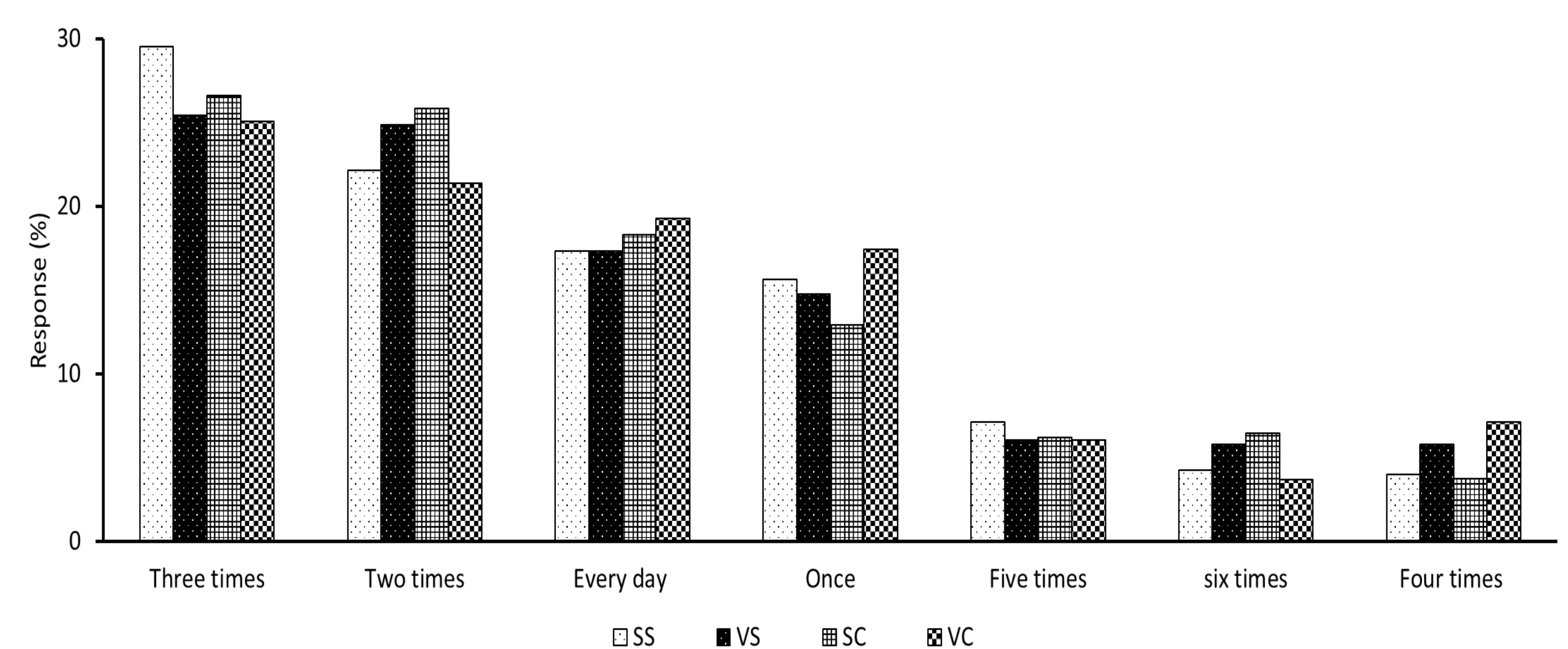


Figure 5. Rate of consuming relish in a week. SS, *S. scabrum* & VS, *S. villosum* spontaneous fermented. SC, *S. scabrum*, VC, *S. villosum* controlled fermentation. Same letter in each group indicate ($p > 0.05$)

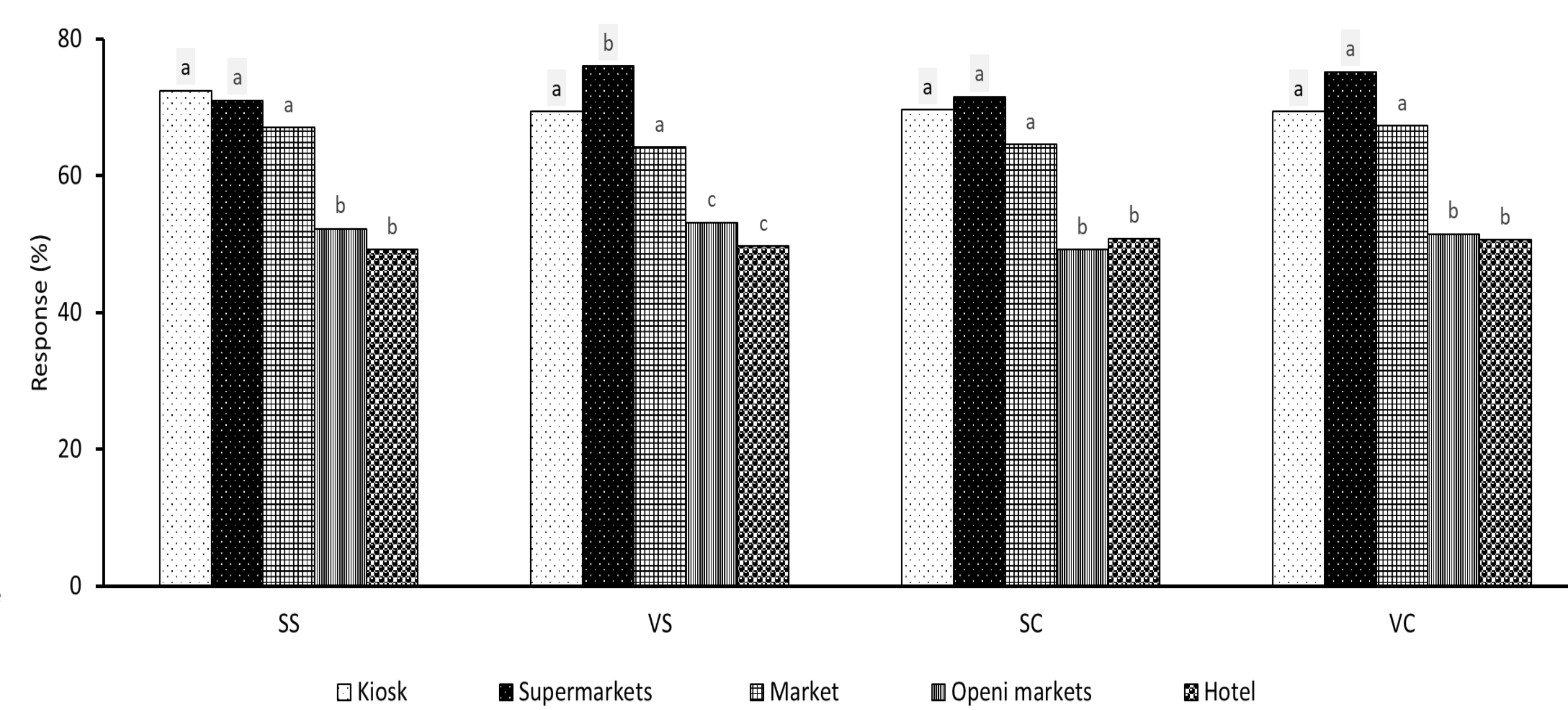


Figure 6. Place where relish can be sold. SS, *S. scabrum* & VS, *S. villosum* spontaneous fermented. SC, *S. scabrum*, VC, *S. villosum* controlled fermentation. Same letter in each group indicate ($p > 0.05$)

Discussion

- Low bitterness and short time fermentation of SC contributed to high preference by most consumers
- Good flavor and odor of ANS relish product attracted majority of the consumers than other sensory parameters, therefore fermentation should be controlled to ensure consistent of these parameters
- Majority of consumers preferred to take fermented relish at least 2-3 days a week.
- Ugali* is highly consumed staple food in Tanzania, many consumers preferred to accompany fermented ANS relish product with *ugali*.
- Consumers preferred to prepare ANS with other fresh vegetables, meat and fish improve appetite due to attractive acidic flavor
- Majority of consumers were willing to buy fermented ANS relish product, from kiosk, supermarket and local markets.

Conclusion

- Controlled fermented *Solanum scabrum* was the most preferred relish product.
- Most of consumers preferred to mix ANS with other vegetables and accompanied with other staple foods
- Bitterness of *S. villosum* contributed to low consumption of relish
- Good flavour and odour contributed to high preference of ANS relish
- Colour of ANS relish contributed to low preference and utilization of relish
- Affordable price contribute to willingness to buy for ANS relish
- Therefore, the color of relish should be improved to enhance its utilization

References

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- Sangija, F., Martin, H., & Matemu, A. (2021). African nightshades (*Solanum nigrum* complex): The potential contribution to human nutrition and livelihoods in sub-Saharan Africa. *Compr Rev Food Sci Food Saf.* 2021; 1–35.

Acknowledgements

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