Foods 2024 Conference

The 5th International Electronic Conference on Foods

28–30 October 2024 | Online

MDPI

Digestibility, nutritional and sensory qualities of pearl millet-based extruded legumes containing balanced essential amino acids

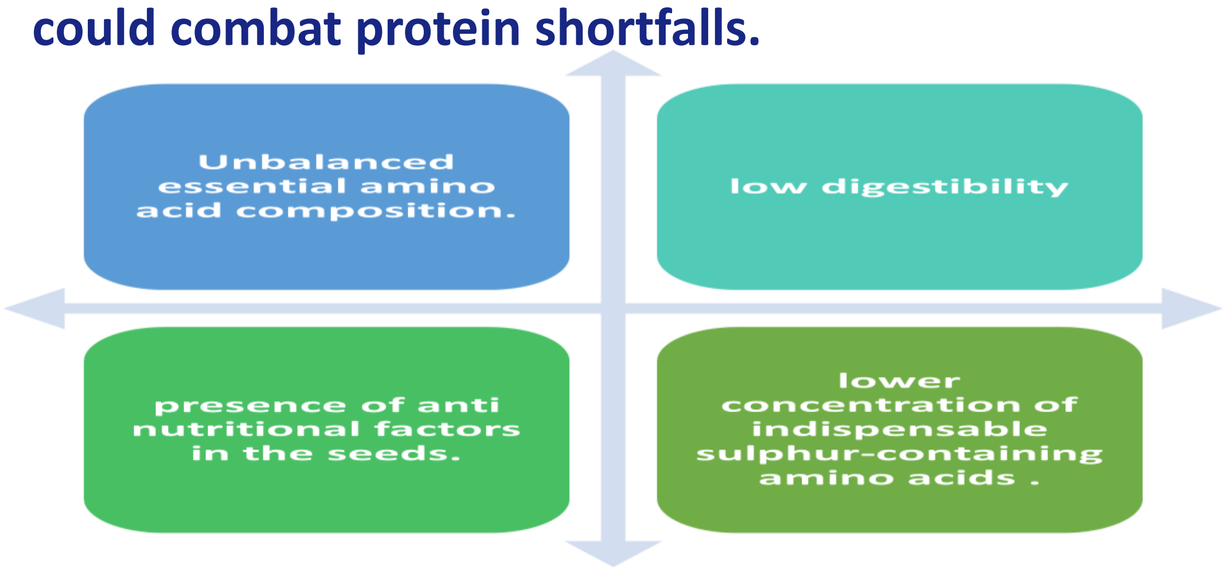
JAYSHREE MAJUMDAR1,2, HARI NIWAS MISHRA1

1 Agricultural & Food Engineering Department, Indian Institute of Technology Kharagpur, India

2. Food technology Department, Guru Nanak Institute of Technology, kolkata

INTRODUCTION & AIM

This global study aims to develop a plant-based protein source. However, legume protein is not recommended due to its low digestibility, antinutrient, and incomplete amino acid composition. Pearl millet, a drought-resistant superfood contains the crucial sulphur-containing amino acid. Thus, combining cereals with legumes could combat protein shortfalls.



METHOD

A composite flour is prepared by mixing different legume flours, pearl millet flour, and pea protein isolate into three formulations. With the necessary amount of moisture supplied, the flour is extruded via a twin screw extruder's specially designed die. The die temperature (95-115 °C) and extruder screw speed (50-70 rpm) are varied, with a constant feeder speed at 40 rpm. This study investigated the protein, micronutrient and antinutrient factors viz. the trypsin, chymotrypsin, and tannin content of the extruded product. The in vitro protein digestibility, starch digestibility, and bile binding capability are studied. The sensory profiling of extruded lentils was explored using QDA and a consumer test for the overall acceptance using a 9-point hedonic scale

RESULTS & DISCUSSION

Extrusion Temperature	Composition	Phytic acid (g/100 g dry	Tannin (mg eq. cat/100 g	Trypsin inhibitor
95	a	0.057 ± 0.02 (95.01%)	0.065 ± 0.04 (93.08%)	**0.049 ± 0.02 (98.26%)**
	b	0.054 ± 0.01 (95.27%)	0.062 ± 0.01 (93.40%)	**0.046 ± 0.05 (98.37%)**
	c	0.052 ± 0.01 (95.45%)	0.059 ± 0.02 (93.72%)	**0.044 ± 0.04 (98.44%)**
105	a	0.030 ± 0.03 (97.38)	0.040 ± 0.01 (95.74%)	**0.030 ± 0.02 (98.94%)**
	b	0.027 ± 0.01 (97.64%)	0.038 ± 0.03 (95.96%)	**0.026 ± 0.01 (99.07%)**
	c	0.026 ± 0.01 (97.73%)	0.035 ± 0.01 (96.28%)	**0.020 ± 0.02 (99.29%)**
115	a	0.011 ± 0.02 (99.04%)	0.020 ± 0.01 (97.87%)	**0.017 ± 0.01 (99.39%)**
	b	0.010 ± 0.001 (99.13%)	0.018 ± 0.02 (98.08%)	**0.014 ± 0.03 (99.50%)**
	c	0.008 ± 0.01 (99.30%)	0.011 ± 0.02 (98.83%)	**0.013 ± 0.01 (99.54%)**
Lentil seed (Control)		**1.1436 ± 0.10**	**0.94 ± 0.09**	**2.823 ± 0.12**

Table 1. . Phytic acid, tannin, trypsin inhibitor, total polyphenols content made from lentil using different extrusion temperature and feed moisture

Extrusion Temperature	Composition	Protein Digestibility	starch digestibility	bile binding capability
95	a	5.1 ± 0.8 (27.14%)	70.62 ± 0.14	**77.52 ± 0.11**
	b	4.8 ± 0.13 (31.43%)	73.08 ± 0.17	**78.37 ± 0.15**
	c	4.6 ± 0.12 (34.28%)	75.38 ± 0.55	**80.13 ± 0.22**
105	a	3.7 ± 0.6 (47.14%)	78.31 ± 0.20	**85.22 ± 0.27**
	b	3.5 ± 0.16 (50%)	80.22 ± 0.10	**86.15 ± 0.05**
	c	3.2 ± 0.11 (54.28%)	81.06 ± 0.26	**87.20 ± 0.09**
115	a	2.9 ± 0.1 (58.57%)	86.23 ± 0.12	**91.94 ± 0.09**
	b	2.5 ± 0.09 (64.29%)	87.12 ± 0.25	**94.64 ± 0.07**
Lentil seed (Control)		**2.4 ± 0.4 (65.71%)**	**88.64 ± 0.11**	**96.04 ± 0.18**

vTable 2: itro protein digestibility, starch digestibility, and bile binding capability

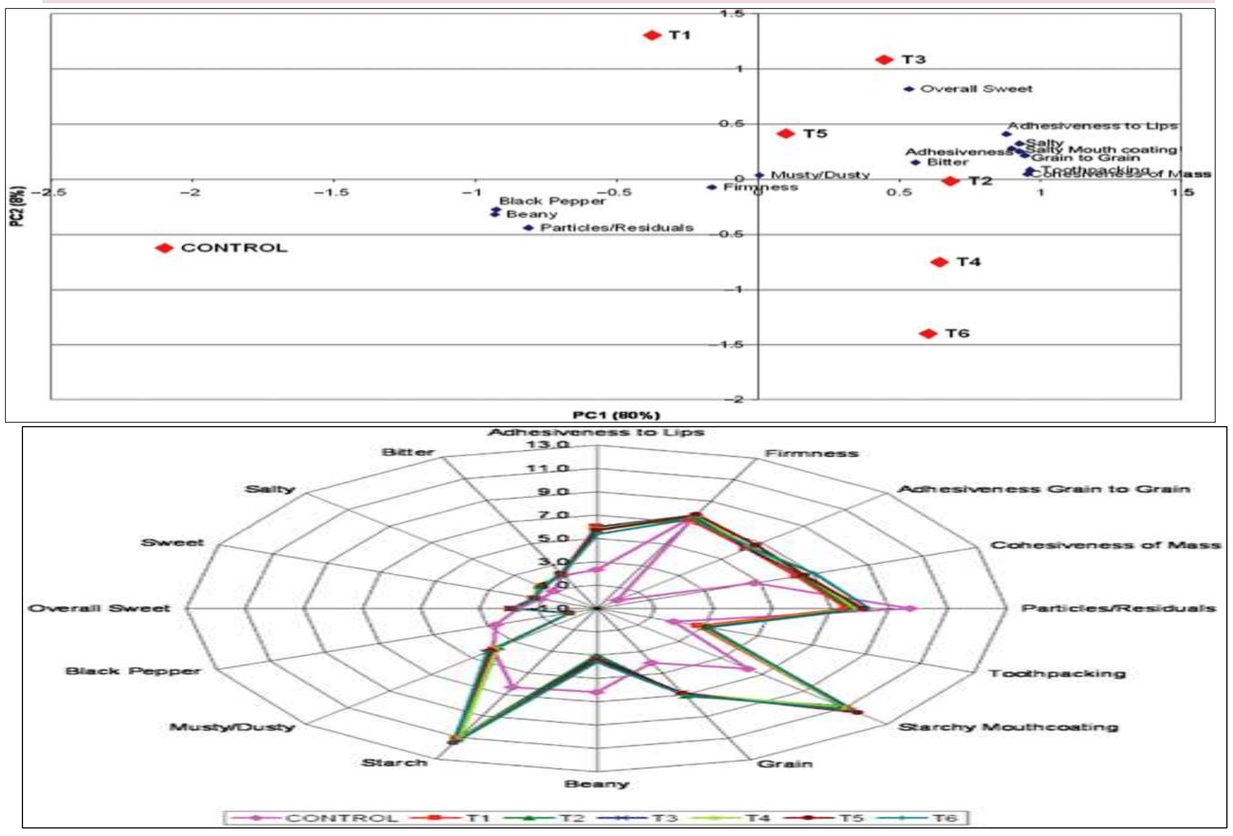


Fig. 1& 2 . Spider Chart and QDA for sensory profiling Treatments

CONCLUSION

The improvement of protein digestibility after extrusion processing could be attributable to the reduction in different antinutritional factors. QDA revealed that extruded lentils have descriptive features of sticky mouthfeel, beany aroma, beany taste, an aftertaste, and crunchy texture. The consumer test showed that the extrusion of lentil did not cause any difference in terms of overall acceptability

FUTURE WORK / REFERENCES

- Adedeji AA, Joseph MV, Plattner B, Alavi S. Physicochemical and functional properties of extruded sorghum-based bean analog. Journal of Food Process Engineering. 2017 Apr;40(2):e12401.
- Ghumman A, Kaur A, Singh N, Singh B. Effect of feed moisture and extrusion temperature on protein digestibility and extrusion behaviour of lentil and horsegram..