APPENDICES

Appendix 1. Applications of sprouts for food product formulation and improvement in the food industry (Miyahira et al., 2021)

Sprouts	Food applications	Positive aspects	Negative aspects	References
Amaranth	Sprouted amaranth flour as an ingredient in food formulations	Increase in the concentrations of soluble protein, total phenolic content, total flavonoid content, total anthocyanin content, and antioxidant activity	Not reported	Sandoval-Sicairs et al., 2020
		Increase in antioxidant activity, total phenolic and flavonoid contents, protein, and dietary fiber contents of amaranth seeds. Decrease in total lipid content.	Not reported	Perales-Sánchez et al., 2014
Amaranth and chia	Beverages with sprouted amaranth and chia flours	Increase in protein and dietary fiber contents, and high sensory acceptability.	Not reported	Argüelles-López et al., 2018
Blue maize	Sprouted blue maize flour as an ingredient in food formulations	Increase in protein content, antioxidant activity, and total phenolic, dietary fiber, and anthocyanin contents.	Not reported	Chavarín-Martínez et al., 2019
Brown Rice	Bread made with sprouted brown rice flour	No significant difference in the acceptability scores for aroma, flavor, and taste between the formulated bread and the control bread.	Bread formulations had lower loaf volume and greater hardness than wheat bread due to the absence of gluten in rice.	Charoenthaikij et al., 2010
Buckwheat	Bread made with sprouted buckwheat flour	Breads made using buckwheat flour still contained flavonoids in significant amounts.	The negative impact of baking on the polyphenol content suggests that some degradation may have occurred.	Alvarez-Jubete et al., 2010
Chia	Sprouted chia flour as an ingredient in food formulations	Higher protein and total phenolic contents, antioxidant activity, γ-aminobutyric acid, essential amino acids, and total dietary fiber contents than non-sprouted grain chia flour.	Not reported	Gómez-Favela et al., 2017
Lentil	Bread made with sprouted lentil flour	Increase in the content of phenols and flavonoids in bread plus 10% of sprouted grain lentil flour; Sensory acceptance.	Higher hardness and less cohesiveness than wheat bread possibly due to the greater resistance of the swollen starch during the cooking process.	Hernandez-Aguilar et al., 2020
Moth bean	Sprouted moth bean flour as an ingredient in food formulations	Higher gelation and thermal stability, and lower viscosity degradation than non-sprouted beans. Higher gelation and thermal stability, and lower viscosity degradation than non-sprouted beans.	Decrease in ash content due to the draining out of macro and microelements from the flour through soaking and cooking.	Medhe et al., 2019

Mung bean	Noodle with sprouted mung bean flour	Improvement in protein content and functional properties such as water absorption, water solubility, oil absorption ability, and water retention.	Reduction of fat content due to the consumption of fat in the germination process. Reduction of pasting viscosity with the increase of germination time due to the starch degradation.	Liu et al., 2018
	Bread made with composite flour	Increase in phenolic and protein contents.	Decrease in loaf height and volume due to the decrease in the swelling index. Increase in loaf weight due to increased water retention. Lower acceptance score.	Menon et al., 2015
Quinoa	Sprouted quinoa flour as an ingredient in food formulations	Increase in copper and zinc availability improved the stability of the foam, increase in amylolytic enzyme levels.	Decreased the ability to foam due to proteolytic modification.	Suárez-Estrella et al., 2020
Sorghum	Sprouted sorghum flour as an ingredient in food formulations	Reduction of antinutritional factors such as phytate, tannin, oxalate, and improved functional properties	Reduction of bulk density and viscosity due to the action of amylase.	Ojha et al., 2018
Wheat	Sprouted wheat flour as an ingredient in food formulations	Increased the levels of tocopherols, niacin, riboflavin, as well as free and bound phenolic compounds.	Not reported	Zilic et al., 2014
		Gluten degradation promoted by germination.	Impairment of the functional properties of germinated wheat flour due to higher solvent retention.	Boukid et al., 2018
	Bread made with sprouted wheat flour	Increased phenolics and protein contents.	Decrease in starch digestibility due to the increased content of resistant starch.	Świeca et al., 2017
		Increase in antiradical and chelating compounds as well as phytochemicals. The bioactive compounds were potentially bioaccessible. The replacement of wheat flour by SF in up to 10% had little influence on the total acceptability.	Bread with less elastic, little sprung back after compression and characterized by sticky, wet crumbs when 15 and 20% of the wheat flour was replaced by germinated flour.	Gawlik-Dziki et al., 2017
	Wheat bread enriched with sprouted wheat flour rich in phenolic compounds	Baking properties comparable to those of control flour.	Decrease in total phenolic content, total flavonoid content, and antioxidant activity.	Tian et al., 2019
Wheat, barley, lentil, nozzle grain, and quinoa	Bread made with sprouted wheat flour	Flour: Increase in peptides, free amino acids, and γ-aminobutyric acid contents. Decreased concentrations of phytic acid, condensed tannins, raffinose, and trypsin inhibitors. Bread: high digestibility protein content; No significant differences in the specific volume.	Flour: increased microbiological contamination. Bread: higher value of hardness and fracturability.	Montemurro et al., 2019

Appendix 2. Pharmacological properties of sprouts, health benefits and their food applications (Aloo et al., 2021; Waliat et al., 2023).

Sprouts	Pharmacological properties/ Phytochemicals	Health benefits	Food Applications	References
Pea sprouts	Salicylic derivatives	Antimicrobial, Anti-inflammatory, analgesic, antipyretic effects, cardioprotective, and neuroprotective activities.	Used in cooking	Ho et al., 2006
Ramson sprouts	Alliins, flavonoids, polyphenols, and thiosulfinates	Anti-inflammatory, antioxidant, antidiabetic activities	Used as healthy herbs and food spices	Sobolewska et al., 2015; Silva et al., 2013.
Lentil sprouts	Phytic acid, phytosterols, and saponins	Antioxidant, cholesterol-reducing, cardioprotective, anticarcinogenic, immunomodulation properties	Sprouted lentil flour used in breadmaking	Hernandez-Aguilar et al., 2020
Fenugreek sprouts	Sapogenins, fenugreekine, saponins, coumarin, and nicotinic acid	Antioxidant, blood sugar regulating, cholesterol-reducing, anti-inflammatory, anticoagulant properties	Used as food additives: colour and seasoning enhancer	El-GebalY et al., 2022
Ginger and turmeric	Gingerols, paradols, phenolics terpenoids, shogaols, and curcuminoids	Anti-inflammatory, antioxidant, antibacterial, antioxidants, and anticarcinogenic properties	Used as preservatives, spices, flavour and colour enhancer	Retana-Cordero et al., 2021
Amaranth and chia	Polyphenols, and proteins	Antioxidant, anti-inflammatory, blood sugar-regulating properties	Sprouted amaranth and chia flours used in making functional beverages	Argüelles-López et al., 2018
Wheat sprouts	Phenolic acids, tocopherols, and carotenoids, quercetin, lectins	Antioxidant, anti-inflammatory, and cardioprotective properties	Sprouted wheat flour used in bakery products	Ojha et al., 2018
Mung bean sprouts	Flavonoids, isoflavonoids, flavone and isoflavone	Antioxidant, anti-inflammatory, phytoestrogenic, neuroprotective, anticarcinogenic activities	Sprouted mung bean flour used in making noodle	Diego et al., 2020
Buckwheat sprouts	Quercetin, lectins, anthocyanins and flavonoids	Anti-inflammatory, hypocholesterolemic, antioxidant, antidiabetic, and anticancer activities.	Sprouted buckwheat flour used in breadmaking	Alvarez-Jubete et al., 2010; Bastida et al., 2015; Watanabe and Ayugase et al., 2008
Quinoa sprouts	Total phenolics and anthocyanins	Anticancer, antioxidant, Anti-inflammatory, antidiabetic activities	Sprouted quinoa flour used as an ingredient in food formulations	Liu et al., 2018; Guo et al., 2011, Charron et al., 2007.

Appendix 3. Confusion table of the PCA-LDA models for the sunflower sprouts subjected to three different humidity levels (70%, 80%, and 90%) according to the measurement days.

Humidity	70%RH					80%RH						90%RH					
Average Recognition (91.498%)						Average Recognition (87.958%)						Average Recognition (86.318%)					
Days	**D4**	**D6**	**D8**	**D10**	**D12**	**Days**	**D4**	**D6**	**D8**	**D10**	**D12**	**Days**	**D4**	**D6**	**D8**	**D10**	**D12**
D4	94.57	1.86	0	0	0	D4	100	5.56	0	0	0	D4	94.57	0.92	1.86	0	0
D6	5.43	83.31	10.19	0.92	0	D6	0	72.22	5.56	0	0	D6	0	95.36	2.78	6.47	0
D8	0	4.64	89.81	5.56	0	D8	0	5.56	94.44	4.64	0	D8	0	0	88.89	0	0
D10	0	10.19	0	91.67	1.86	D10	0	15.75	0	85.17	12.03	D10	5.43	1.86	5.56	76.86	24.08
D12	0	0	0	1.86	98.14	D12	0	0.92	0	10.19	87.97	D12	0	1.86	0.92	16.67	75.92
Humidity	**70%RH**					**80%RH**						**90%RH**					
Average Prediction (89.482%)						**Average Prediction (85.557%)**						**Average Prediction (85.891%)**					
Days	**D4**	**D6**	**D8**	**D10**	**D12**	**Days**	**D4**	**D6**	**D8**	**D10**	**D12**	**Days**	**D4**	**D6**	**D8**	**D10**	**D12**
D4	88.18	3.72	0	0	0	D4	100	5.56	0	0	0	D4	94.17	0	1.83	0	0
D6	11.82	83.29	9.28	1.83	0	D6	0	72.22	5.56	0	0	D6	0	94.5	3.72	5.56	0
D8	0	3.72	90.72	5.56	0	D8	0	5.56	90.77	3.72	3.72	D8	0	1.83	88.89	1.83	0
D10	0	9.27	0	87.06	1.83	D10	0	14.83	1.83	81.45	12.94	D10	5.83	1.83	3.72	75.94	24.06
D12	0	0	0	5.56	98.17	D12	0	1.83	1.83	14.83	83.33	D12	0	1.83	1.83	16.67	75.94

Appendix 3

Appendix 4. Confusion table of the PCA-LDA models for the sunflower sprouts subjected to three different temperatures levels (15˚C, 19˚C, 23˚C) according to the measurement days.

Temperature	T15˚C				T19˚C					T23˚C					
Average Recognition (92.817%)					Average Recognition (92.144%)					Average Recognition (71.942%)					
Days	D6	D8	D10	D12	Days	D6	D8	D10	D12	Days	D4	D6	D8	D10	D12
D6	100	2.78	0	0	D6	94.49	0	0	0	D4	82.58	2.47	0	0	1.55
D8	0	89.81	2.78	0	D8	3.66	87.03	3.7	0	D6	11.92	70.98	9.88	10.19	0
D10	0	7.42	84.25	2.78	D10	0	12.97	89.83	2.78	D8	0	4.01	71.6	5.56	0.93
D12	0	0	12.97	97.22	D12	1.84	0	6.47	97.22	D10	4.6	19.14	14.51	59.88	22.84
										D12	0.91	3.4	4.01	24.38	74.69
Temperature	**T15˚C**				**T19˚C**					**T23˚C**					
Average Prediction (92.595%)					**Average Prediction (90.732%)**					**Average Prediction (70.415%)**					
Days	D6	D8	D10	D12	Days	D6	D8	D10	D12	Days	D4	D6	D8	D10	D12
D6	100	1.83	0	0	D6	96.26	0	1.83	0	D4	77.36	4.31	0.61	1.24	1.85
D8	0	92.61	5.56	0	D8	1.87	88.89	3.72	0	D6	16.98	68.52	9.87	8.65	0
D10	0	5.56	83.33	5.56	D10	0	9.28	83.33	5.56	D8	0	4.94	70.38	4.94	2.46
D12	0	0	11.11	94.44	D12	1.87	1.83	11.11	94.44	D10	3.79	18.52	13.58	60.49	20.37
										Days	D4	D6	D8	D10	D12