

Table 4 Essential Amino acid profile (g per 100 g protein)

Grain	His	Ile	Leu	Lys	Met	Cys	Phe	Thr	Trp	Val
Quinoa	1.4-5.4	0.8-7.4	2.3-9.4	2.4-7.8	0.3-9.1	0.1-2.7	2.7-10.3	2.1-8.9	0.6-1.9	0.8-6.1
Sorghum	2.07	3.45	12.03	2.31	1.52	1.06	5.1	2.96	1.03	4.51
Pearl millet	2.15	3.45	8.52	3.19	2.11	1.23	4.82	3.55	1.33	4.79
Finger millet	2.37	3.7	8.86	2.83	2.74	1.48	5.7	3.84	0.91	5.65
Foxtail millet	2.14	4.55	11.96	1.42	2.69	1.92	6.27	3.89	1.32	5.49
Little millet	2.35	4.14	8.08	2.42	2.21	1.85	6.14	4.24	1.35	5.31
Wheat	2.65	3.83	6.81	3.13	1.75	2.35	4.75	3.01	1.4	5.11
Rice	2.45	4.29	8.09	3.7	2.6	1.84	5.36	3.28	1.27	6.06

His:Histidine; Ile: Isoleucine; Leu: Leucine; Lys: Lysine; Met: Methionine; Cys: Cysteine; Phe: Phenylalanine; Thr: Threonine; Trp: Tryptophan; Val: Valine

Source (Table 1–4):
Indian Food Composition Tables, NIN (2007 & 2017);
USDA nutrient database (2013, 2015)

Table 5 Crop use and tolerance to abiotic stresses

Crops	Crop use			Salinity tolerance					Temp. tolerance		Drought tolerance	Submerge tolerance
	Food	Feed	Biofuel	< 6 dS/m	6-8 dS/m	8-16 dS/m	16-30 dS/m	Sea level	Heat	Cold		
Quinoa	✓	✓			✓	✓	✓	✓	✓	✓		
Sorghum	✓	✓	✓		✓				✓		✓	✓
Pearl millet	✓	✓	✓		✓				✓		✓	✓
Finger millet	✓	✓		✓					✓		✓	
Barnyard millet	✓	✓		✓					✓		✓	✓
Kodo millet	✓	✓		✓					✓		✓	✓
Proso millet	✓	✓		✓					✓		✓	✓
Little millet	✓	✓			✓				✓		✓	✓
Foxtail millet	✓	✓	✓		✓				✓		✓	✓
Wheat	✓	✓	✓									
Rice	✓	✓	✓	✓								✓

Source: Chellapilla et al., 2024; Kaur et al., 2024; Jacobsen et al., 2003; Pradhan et al., 2025; Sanjay Kumar et al., 2024

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Nutritional Profiles of Quinoa and Millets



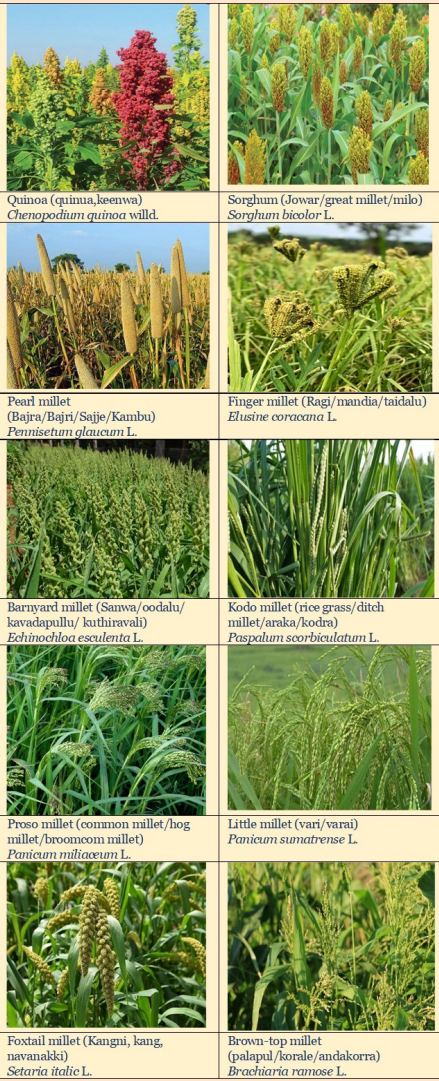
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Introduction

Quinoa (*Chenopodium quinoa* Willd.) is a pseudocereal traditionally cultivated by Andean cultures and has gained global recognition as a functional food. Known for its resilience to challenging environmental conditions and its remarkable nutritional and biological properties, quinoa is often referred to as "Mother grain" and considered as



insights for developing diverse, nutrition-sensitive cropping systems that can support food and nutritional security in the face of climate change.

"A future sown thousand years ago." In addition to being rich in protein, lipids, fiber, vitamins, and minerals, quinoa stands out for its excellent balance of essential amino acids. Similarly, millets, considered as "ancient grains," were among the first crops to be domesticated. These "nutri-cereals" are packed with a wide array of essential vitamins, minerals, proteins, and fiber, and are typically the last crops to survive during droughts due to their hardiness. An overview of the nutritional profiles and abiotic stress tolerance of quinoa and millets offers valuable

Table 1 Nutritional content (g/ 100 g edible portion)						
Grain	Carbohydrate	Protein	Fat	Dietary fibre	Ash	Energy (kcal)
Quinoa	59.9-74.7	13.1-16.7	5.5 - 7.4	7.0-11.7	2.7-3.8	357-368
Sorghum	67.68	9.97	1.73	10.22	1.39	334
Pearl millet	61.78	10.96	5.43	11.49	1.37	347
Finger millet	66.8	7.3	1.92	11.18	2.04	320
Proso millet	70.4	12.5	1.1	2.2	-	341
Barnyard millet	65.55	6.2	2.2	10.1	-	307
Kodo millet	66.19	8.92	2.55	6.39	1.72	331
Foxtail millet	60.09	12.3	4.3	8	-	331
Little millet	65.55	10.13	3.89	7.72	1.34	346
Wheat	64.72	10.59	1.47	11.23	1.42	321
Rice	78.24	7.94	0.52	2.8	0.56	356

Table 2 Vitamin profile (per 100 g dry weight)							
Grain	Thiamine (B1) (mg)	Riboflavin (B2) (mg)	Niacine (B3) (mg)	Pantothenic acid (B5) (mg)	Pyridoxine (B6) (mg)	Biotin (B7 / B8) (µg)	Folic acid (B9) (µg)
Quinoa	0.3-0.4	0.3-0.4	1.1-1.5	0.62	0.5	0.62	173
Sorghum	0.35	0.14	2.1	0.27	0.28	0.7	39.42
Pearl millet	0.25	0.2	0.86	0.5	0.27	0.64	36.11
Finger millet	0.37	0.17	1.34	0.29	0.05	0.88	34.66
Proso millet	0.41	0.28	4.5	1.2			-
Barnyard millet	0.33	0.1	4.2	-			-
Kodo millet	0.29	0.2	1.49	0.63	0.07	1.49	39.49
Foxtail mlet	0.59	0.11	3.2	0.82			15
Little millet	0.26	0.05	1.29	0.6	0.04	6.03	36.2
Wheat	0.46	0.15	2.68	1.08	0.26	1.03	30.09
Rice	0.05	0.05	1.69	0.57	0.12	0.6	9.32

Table 3 Mineral profile (mg per 100 g edible portion)

Grain	Ca	Fe	Zn	Mg	P	K	Na	Cu
Quinoa	27.5-148.7	1.4-16.7	26.0-502.0	140.0-530.0	696.7-1475.0	11.0-31.0	2.8-4.8	1.0-9.5
Sorghum	27.6	3.95	133	274	328	5.42	1.96	0.45
Pearl millet	27.35	6.42	124	289	365	4.11	2.76	0.54
Finger millet	364	4.62	146	210	443	4.75	2.53	0.67
Proso millet	14	3.8		277			1.7	
Barnyard millet	20	5	82	280			3	
Kodo millet	27	0.6		189			1.2	
Foxtail millet	15.27	2.34	122	101	94	3.35	1.65	0.26
Little millet	16.06	1.26	91.41	130	105	4.77	1.82	0.34
Wheat	39.36	3.97	125	315	366	2.5	2.8	0.49
Rice	7.49	0.65	19.3	96	108	2.34	1.2	0.23