Variation on protein content in different accessions of Nepalese underutilized crops

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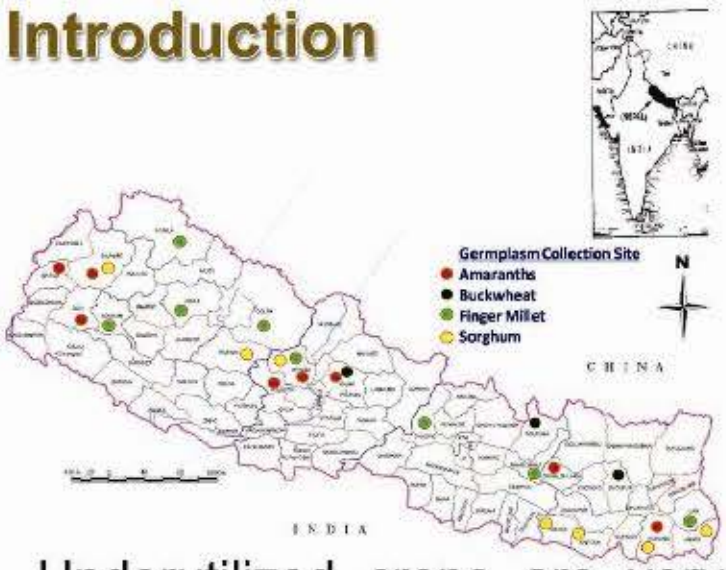
Introduction



Underutilized crops are very important crops for supplementary diet among rural and marginalized people of Nepal. Among them amaranths, buckwheat, barnyard millet and sorghum are cultivated in marginal land for household purposes in Nepal which may contribute significant dietary nutrition. Therefore, this study was conducted to identify the variation on total protein and tryptophan content among different Nepalese accessions of amaranths, buckwheat, barnyard millet, finger millet and sorghum.

Materials and method

Fourteen accessions of amaranths, four accessions of buckwheat, one accession of barnyard millet and seven accessions of sorghum were grown at Khumaltar, Lalitpur, Nepal condition were used to analyze the protein content on their consumable part-grain seed. Thirty miligram of ground seed was used with 5 samples per accessions. Total crude protein was measured using Micro Kjeldahl Method following the protocol of AOAC International (AOAC, 2005).

Results

Protein and tryptophan content in Nepalese amaranths varied from 11.01% to 14.50% and 0.154% to 0.204% of grain biomass respectively (Table 1). Nepalese buckwheat varied from 12.06% to 12.87% in protein and 1.24% to 1.91% in tryptophan content of total grain biomass (Table 2). Barnyard millet contents 10.37% protein and 0.096% tryptophan in grain biomass. The protein content in Nepalese finger millet grain varied from 7.25% to 9.375% and tryptophan content varied from 0.081% to 0.172% of total grain biomass (Table 3). Similarly, Nepalese sorghum varied from 11.25% to 12.81% in protein and 0.083% to 0.198% in tryptophan of total grain biomass (Table 4).

Table 1. Variation on total protein and tryptophan content in Nepalese Amaranths

NPGR Acc No.	District	% Protein in seed	% Tryptophan in Seed
5980	Baglung	12.75	0.164
2171	Baitadi	12.6875	0.154
2170	Baitadi	14.3125	0.169
467	Baitadi	14.5	0.178
2176	Bajhang	11.8125	0.171
7863	Doti	13.375	0.171
6550	Kaski	13.6875	0.162
6549	Kaski	14.1875	0.168
5984	Morang	13.5	0.148
5982	Morang	14.25	0.202
5983	Morang	12.8125	0.204
5981	Myagdi	13.875	0.178
5931	Okhaldhunga	13.75	0.181
5936	NA	12.5625	0.172

Table 2. Variation on total protein and tryptophan content in Nepalese Buckwheat

NPGR Acc No.	District	% Protein in seed	% Tryptophan in Seed
Kavre Bitter (Tartary)	Dolakha	12.875	0.221
494 (Tartary)	Bhojpur	12.8125	0.245
493 (Common)	Bhojpur	11.5	0.183
492 (Common)	Kaski	12.0625	0.15

Table 3. Variation on total protein and tryptophan content in Nepalese Finger Millet

NPGR Acc No.	District	% Protein in seed	% Tryptophan in Seed
2687	Achham	7.5	0.09
2390	Dhading	7.5	0.095
2362	Dolakha	8.375	0.096
2640	Humla	8.375	0.081
2641	Humla	8.9375	0.109
2642	Humla	8.6875	0.115
2449	Ilam	6.6875	0.172
2719	Jumla	7.875	0.097
2598	Myagdi	9.375	0.085
2606	Myagdi	8.5625	0.086
2608	Myagdi	7.25	0.086
2413	Ramechhap	8.0625	0.091
Kabre Kodo-1	Released Variety	8.84375	0.09425

Table 4. Variation on total protein and tryptophan content in Nepalese Sorghum

NPGR Acc No.	District	% Protein in seed	% Tryptophan in Seed
6265	Myagdi	12.625	0.191
7534	Jhapa	11.25	0.122
7723	Morang	12.25	0.083
7881	Bajhang	12.375	0.148
8128	Saptari	12.625	0.198
8129	Siraha	12.8125	0.157
8952	Rukum	12.125	0.104

Photo 1. Variation on Nepalese Sorghum

Photo 3. Variation on Nepalese Amaranths collected form different parts of country

Photo 4. Variation on Nepalese Common Buckwheat

Photo 5. Variation on Nepalese Finger Millet

Discussion

Amaranths accession NPGR# 467 showed higher protein content as well as superior to other accessions for agronomic characteristics. Therefore, this accession was forwarded for multi-location yield trial at Jumla and Dolakha along with other superior accessions NPGR# 2170, NPGR# 6549 and NPGR# 5982. Similarly, amaranths is superior on protein content than other underutilized crops, however, tryptophan content was higher in buckwheat and amaranths. Therefore, promotion of amaranths will aid to remove protein deficiency in poor farm household.

Conclusion

Germplasm enhancement is very easy and important step to utilize the existing variation in plant breeding. Therefore, the variation observed in total protein and tryptophan content can be used in selection of high protein content accessions on underutilized crops for varietal improvement.

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