




Genotypic Contrasting of Protein and Flavonoid Contributes to Differential Responses of Targeted Metabolites in Soybean Seeds

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Table S1. Characterization of soybean landraces and cultivars collected in the mountainous region of Northern Vietnam.

Soybean Cultivars	Notations	Local Cultivation	Geographic Coordinates	GenBank Registration Number	Genetic Redundancy	Tested Genotypes	Regions
DT84	DT84	Ha Noi	21°02'20"N 105°45'58"E	GBVN006669	Cultivar (Hybrid line 3-33 mutant (DT80 x DH4))	Glycine max	Hong River delta (HRDR), Northwestern

(Table) contd.....

Soybean Cultivars	Notations	Local Cultivation	Geographic Coordinates	GenBank Registration Number	Genetic Redundancy	Tested Genotypes	Regions
Dau Tuong Den	DTD	Ha Noi, Vinh Phuc	20°56'58"N 105°50'36"E, 21°21'49"N 105°32'54"E	GBVN008025	Landrace	<i>Glycine max</i>	Hong River delta (HRDR)
Vang Muong Khuong	VMK	Lao Cai	22°46'15"N 104°6'12"E	GBVN006659	Landrace	<i>Glycine max</i>	Northwestern (NWR)
Vang Cao Bang	VCB	Cao Bang	22°41'08"N 106°15'47"E	GBVN0013541	Landrace	<i>Glycine max</i>	Northeastern (NTR)
Vang Ha Giang	VHG	Ha Giang	22°44'35"N 104°40'39"E	GBVN0014154	Landrace	<i>Glycine max</i>	Northeastern (NTR)
Vang Quang Ninh	VQN	Quang Ninh	21°15'04"N 107°11'37"E	GBVN0013523	Landrace	<i>Glycine max</i>	Northeastern (NTR)
Cuc Ha Bac Dang 1	CHB	Hoa Binh	20°40'18"N 105°0'19"E	GBVN004979	Landrace	<i>Glycine max</i>	Northwestern (NWR)
Cuc Huu Lung Lang Son	CHLS	Lang Son	21°30'34"N 106°20'34"E	GBVN004975	Landrace	<i>Glycine max</i>	Northeastern (NTR)
Cuc Vo Nhai	CVN	Thai Nguyen	21°45'09"N 106°04'29"E	-	Landrace	<i>Glycine max</i>	Northeastern (NTR)
Dau Tuong Song Ma	DTSM	Son La	21°3'24"N 103°45'0"E	GBVN006645	Landrace	<i>Glycine max</i>	Northwestern (NWR)

Note: A population of 10 soybean genotypes plant introductions (PIs) including Vietnamese landraces and cultivars soybean species were randomly collected from Plant Resource Center (PRC, <http://prc.org.vn>) and the mountainous provinces in northern Vietnam.

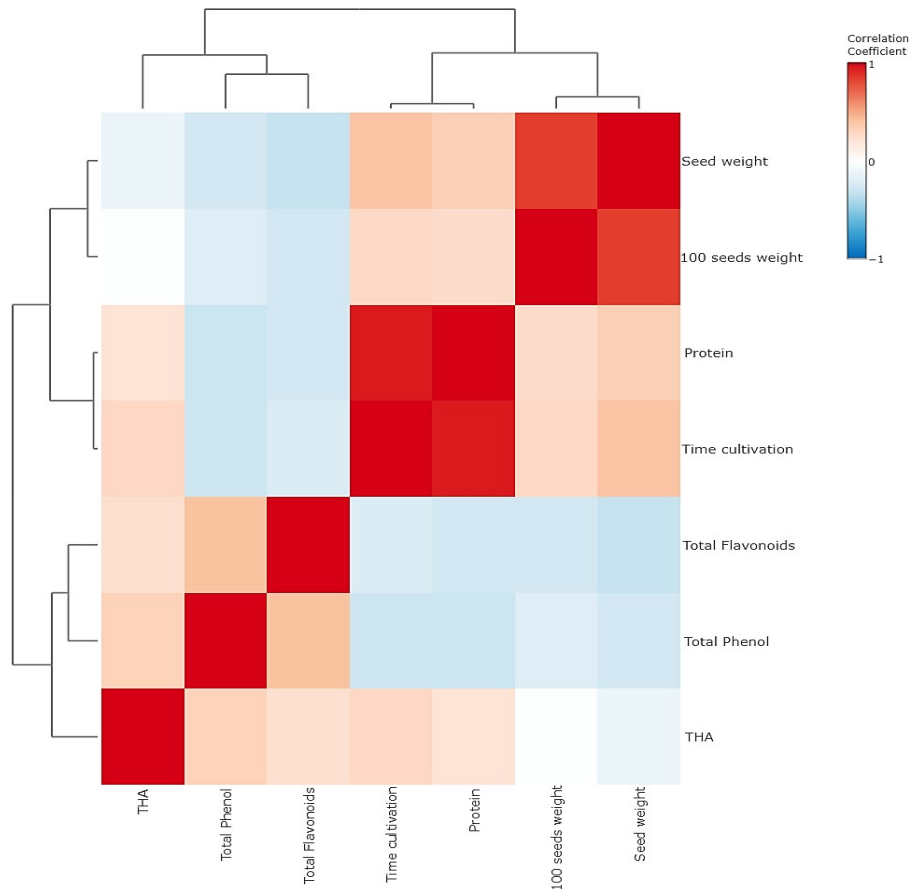


Fig. (S1). Heatmap visualization represents the correlation between nutrient compounds and cultivars. The color indicates a relationship between the different seed nutrition compositions and physiological characteristics as determined by Pearson correlation. The levels of correlation exhibited a range from blue to red color, which is relevant low to high correlations. The data represents mean \pm SE (n = 3).

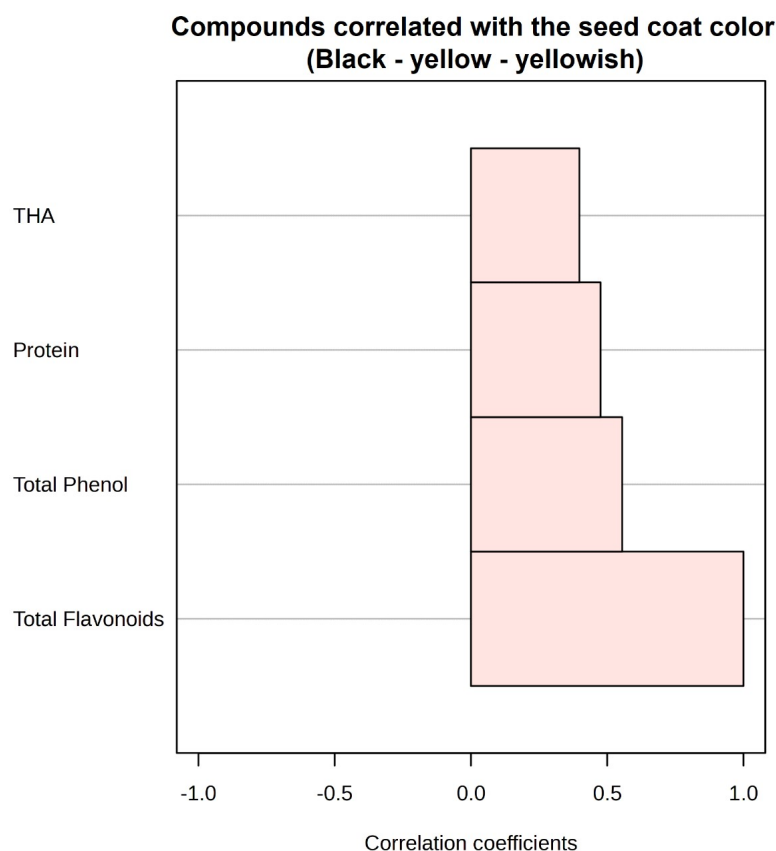


Fig. (S2). Correlation coefficient between nutrient compounds response to seed colors. The color indicates a relationship between the different seed nutrition compositions and physiological characteristics as determined by Pearson correlation. The levels of correlation exhibited coefficient scores a range from -1 to 1, which is relevant low to high correlations. The data represents mean \pm SE (n = 3).

Table S2. Classification and feature selection of the cultivar based on the seed of protein, THA, phenolic, and flavonoid concentration in landraces and cultivars.

-	CHBD1	CHLLS	CVN	DT84	DTD	DTSM	VCB	VHG	VMK	VQN	Class.error
CHBD1	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.667
CHLLS	0.0	0.0	0.0	1.0	0.0	0.0	2.0	0.0	0.0	0.0	1.0
CVN	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DT84	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DTD	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	1.0	0.0	0.333
DTSM	0.0	1.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0
VCB	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0	1.0	1.0
VHG	1.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0	1.0
VMK	1.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0
VQN	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0

Note: Values are mean \pm SE for n = 3. The data normalize using Metaboanalyst 6.0 software. The OOB error is 0.7.

Table S3. Correlation between protein, THA, phenolic, and flavonoid response to seed weight.

-	THA	Total Phenol	Total Flavonoids	Time Cultivation	Total Protein	100 Seeds Weight	Seed Weight
THA	1	0.32	0.23	0.28	0.21	-0.01	-0.12
Total phenol	0.32	1	0.41	-0.29	-0.30	-0.20	-0.27
Total flavonoids	0.23	0.41	1	-0.23	-0.36	-0.26	-0.33
Time cultivation	0.28	-0.29	-0.23	1	0.96	0.27	0.39

(Table) contd.....

-	THA	Total Phenol	Total Flavonoids	Time Cultivation	Total Protein	100 Seeds Weight	Seed Weight
Total protein	0.21	-0.30	-0.26	0.96	1	0.25	0.33
100 seeds weight	-0.01	-0.20	-0.26	0.27	0.25	1	0.85
Seed weight	-0.12	-0.27	-0.33	0.39	0.33	0.85	1

Table S4. Sequences of oligonucleotide primers used for the qPCR.

No	Name	Gene ID	Forward Sequence of Primers (5'-3')	Reverse Sequence of Primers (5'-3')	Tm (°C)
1	GmActin	NM_001252731.3	F: 5'-TTCTCTCGCTCTCTGCCTTC- 3'	R: 5'-TTGTGCCTCATCACCAACAT- 3'	58
2	GmPAL1	X52953.1	F: 5'-TAACTGGCAGACCCAACTCC- 3'	R: 5'-TTTGCTGAAGTGATGCAGG- 3'	60
3	GmCHS7	NM_001353380.1	F: 5'-TGCTCCAGACAGTGAAGTG- 3'	R: 5'-TGTGCAATCCAAAAGATGGA- 3'	60
4	GmCHS8	NM_001317656.2	F: 5'-GGTGAGCGTAGCTGAGATCC- 3'	R: 5'-TCTTTGAGCTCGGTCATGTG- 3'	60
5	Gmβ-conglycinin (7S)	ON409198.1	F: 5'-ATGCCATGCACATCAACACG- 3'	R: 5'-AACCGCGCTCTCATCATAGT- 3'	59
6	Gmglycinin (11S)	M10962.1	F: 5'-AGAGTCATGTTGGACGCAAG- 3'	R: 5'-GGGTGAGACTGTTGAGGGTG- 3'	60