

Article

# Rapid tryptophan assay as a screening procedure for quality protein maize

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**Table S1.** Tryptophan levels of representative maize samples determined both in enzyme hydrolyzed solutions [27] and in the biuret supernatants.

Sample	16-hour enzymatic hydrolysis <sup>1</sup>	Proposed micro-method <sup>1</sup>	Mean tryptophan level <sup>1</sup>	Difference between tryptophan levels
HT-17/81	0.37	0.39	0.380	0.02
HT-38/80	0.37	0.35	0.360	-0.02
HD 22/81	0.43	0.45	0.440	0.02
L-2	0.43	0.46	0.445	0.03
HT-39/88	0.45	0.42	0.435	-0.03
HD-18/87	0.47	0.45	0.460	-0.02
L-3	0.47	0.46	0.465	-0.01
HT-40/89	0.48	0.44	0.460	-0.04
L-1	0.49	0.46	0.475	-0.03
L-5	0.49	0.47	0.480	-0.02
HT-34/89	0.5	0.5	0.500	0
L-4	0.5	0.47	0.485	-0.03
O-65/88	0.69	0.71	0.700	0.02
O-26/86	0.72	0.77	0.745	0.05
O-53/87	0.73	0.79	0.760	0.06
O-37/88	0.74	0.77	0.755	0.03
O-67/86	0.74	0.8	0.770	0.06
O-42/88	0.75	0.78	0.765	0.03
O-21/86	0.77	0.79	0.780	0.02
O-43/88	0.77	0.8	0.785	0.03
O-21/86	0.77	0.81	0.790	0.04
O-13/87	0.81	0.83	0.820	0.02
Lizin 125	0.81	0.8	0.805	-0.01
O-415	0.82	0.83	0.825	0.01
O-18/87	0.82	0.86	0.840	0.04

<sup>1</sup> % tryptophan in crude protein.

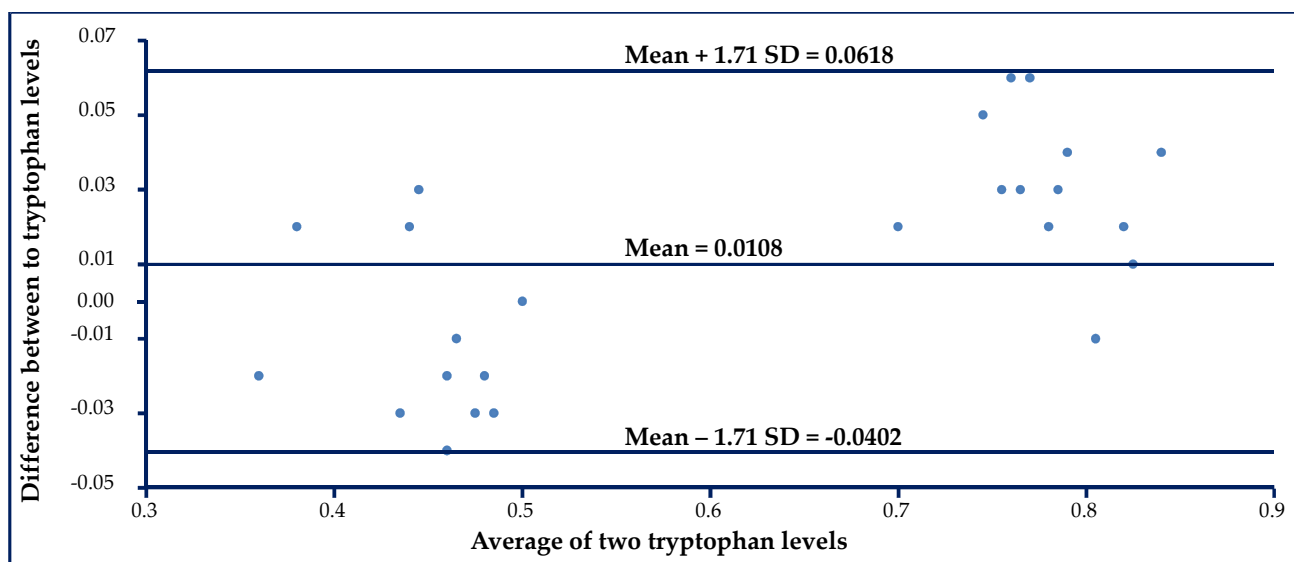


Figure S1. Agreement between two tryptophan measurements (Bland-Altman plot).

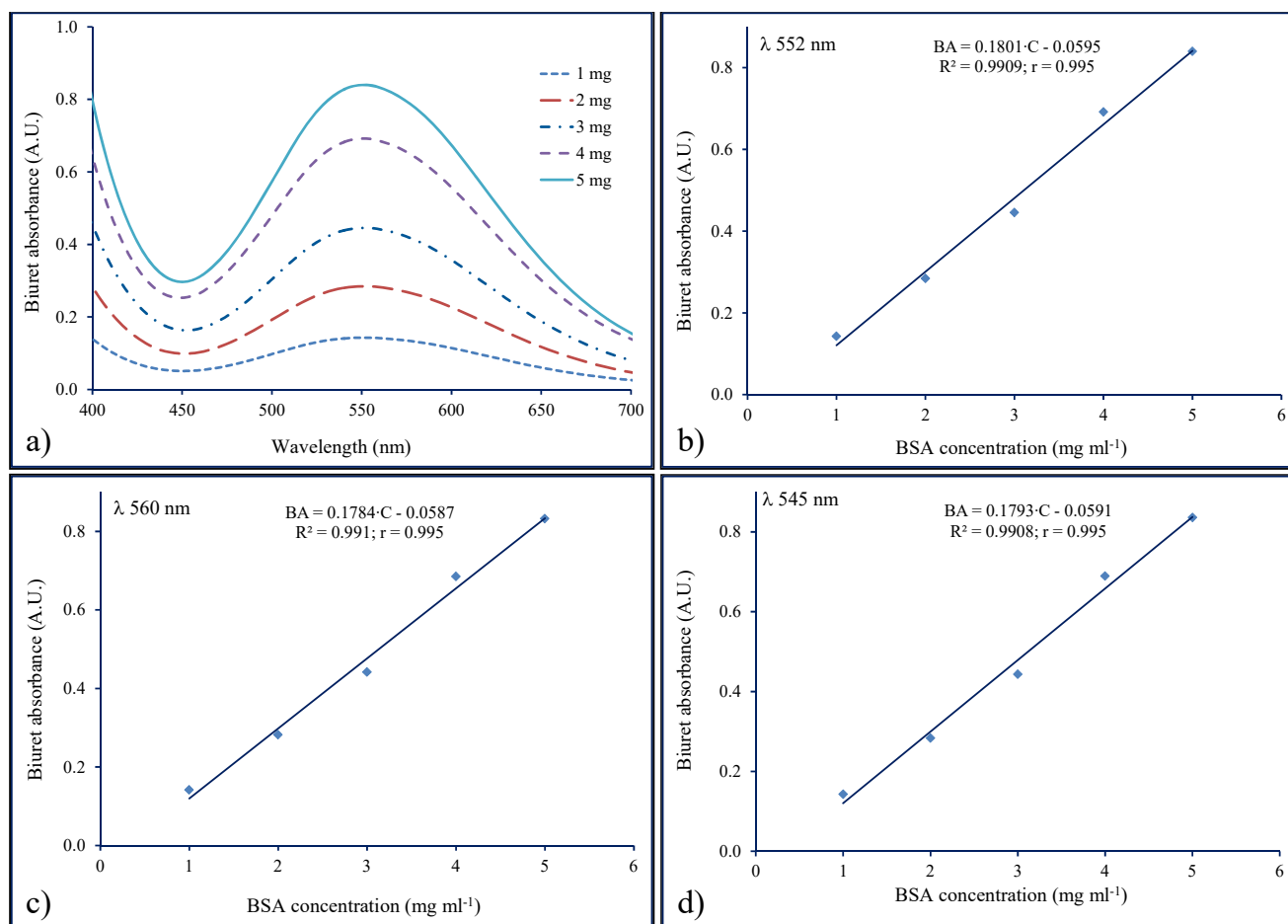


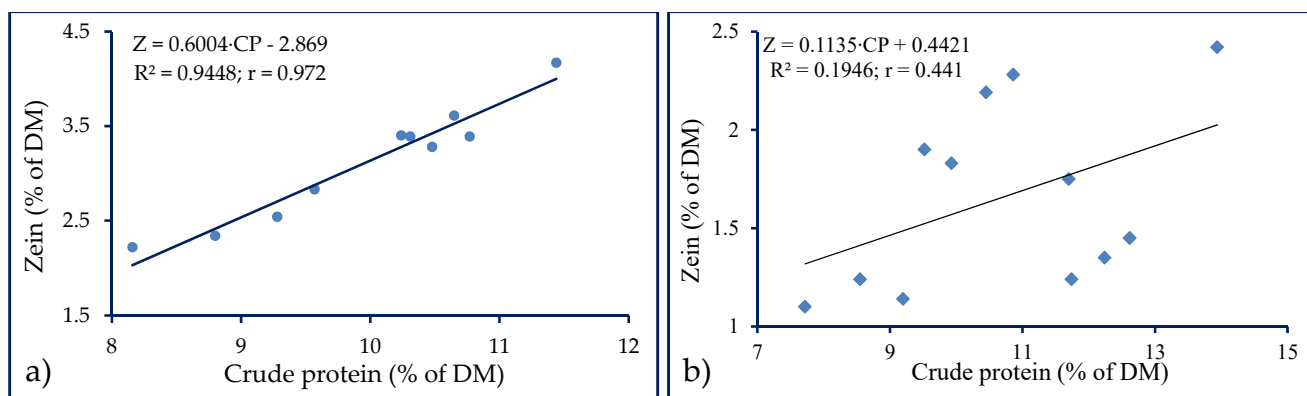
Figure S2. Standard curves in protein determination using bovine serum albumin (BSA). Here, a) absorbance spectra of different concentrations of BSA (1-5 mg mL<sup>-1</sup>); b) calibration curve with absorbance values at 552 nm; c) calibration curve with absorbance values at 560 nm; d) calibration curve with absorbance values at 545 nm, respectively.

**Table S2.** Chemical composition of 25 representative maize samples illustrating their nutritional quality.

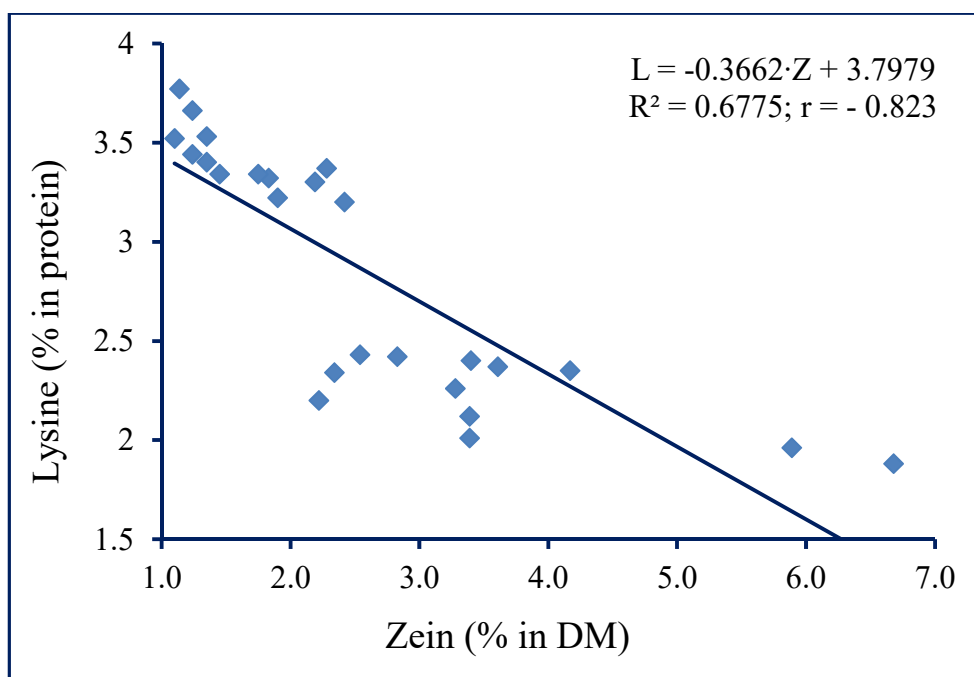
Sample *	Tryptophan (mg % in DM)	Crude protein (% in DM)	Zein (% in DM)	Lysine (mg% in DM )	Lysine (% in crude protein )	Tryptophan (% in crude protein)
HD 22/81	35.09	8.16	2.22	179.5	2.20	0.43
HT-39/88	39.60	8.80	2.34	205.9	2.34	0.45
HT-40/89	44.54	9.28	2.54	225.5	2.43	0.48
HD-18/87	44.98	9.57	2.83	231.6	2.42	0.47
L-2	45.79	10.65	3.61	252.4	2.37	0.43
HT-38/80	47.43	12.82	5.89	251.3	1.96	0.37
L-5	50.52	10.31	3.39	207.2	2.01	0.49
L-3	50.62	10.77	3.39	228.3	2.12	0.47
HT-34/89	51.20	10.24	3.40	245.8	2.40	0.50
L-1	51.35	10.48	3.28	236.8	2.26	0.49
L-4	57.20	11.44	4.17	268.8	2.35	0.50
HT-17/81	59.09	15.97	6.68	300.2	1.88	0.37
O-21/86	59.44	7.72	1.10	271.7	3.52	0.77
O-65/88	65.69	9.52	1.90	306.5	3.22	0.69
O-18/87	70.11	8.55	1.24	312.9	3.66	0.82
O-67/86	73.48	9.93	1.83	329.7	3.32	0.74
O-415	75.44	9.20	1.14	346.8	3.77	0.82
O-37/88	77.33	10.45	2.19	344.9	3.30	0.74
O-43/88	85.09	11.05	1.35	375.7	3.40	0.77
O-53/87	85.41	11.70	1.75	390.8	3.34	0.73
Lizin 125	87.97	10.86	2.28	366.0	3.37	0.81
O-42/88	88.05	11.74	1.24	403.9	3.44	0.75
O-21/86	97.17	12.62	1.45	421.5	3.34	0.77
O-13/87	99.14	12.24	1.35	432.1	3.53	0.81
O-26/86	100.36	13.94	2.42	446.1	3.20	0.72

\* O – opaque-2; Lizin - opaque-2; L – inbred line; HD – double hybrid; HT – trilinear hybrid.

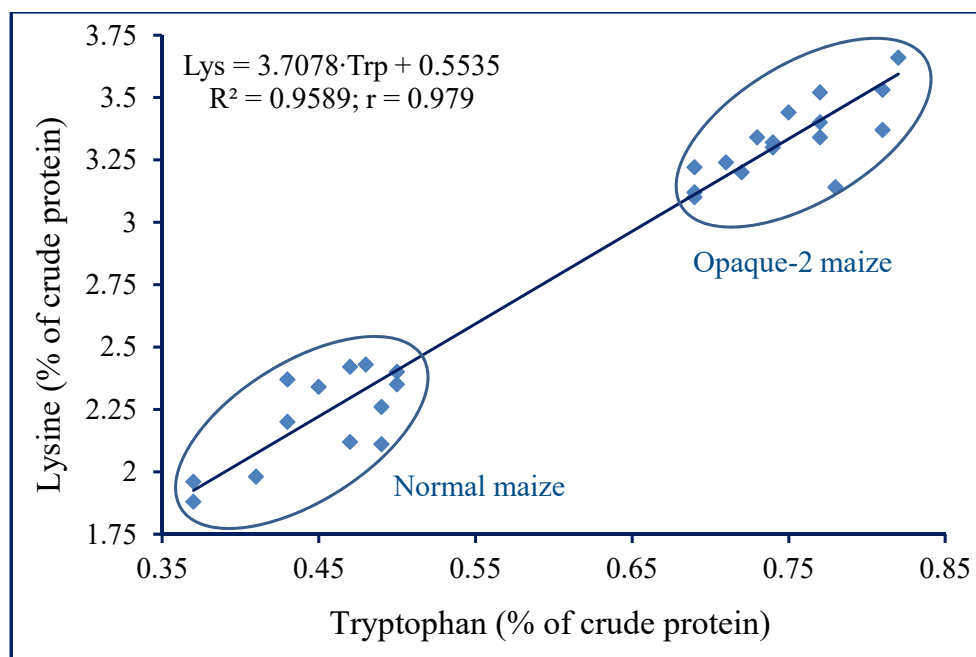
From the relationship between lysine and tryptophan in the maize seeds (Figure S4), it is believed that a tryptophan value could serve as a single parameter for maize evaluation. This study proves the feasibility of rapid tryptophan analysis and the importance of the correlation between tryptophan and lysine.



**Figure S3.** The relationship between zein and crude protein in some real samples. Here, a) the strong relationship between zein and crude protein in normal maize; b) the QPM samples contain low amounts of zein.



**Figure S4.** Relationship between lysine and zein in maize samples studied.



**Figure S5.** Relationship between lysine and tryptophan content of 30 different maize samples.