Supplementary Materials

Table S1. Detailed analysis of variance (ANOVA) statistics, including coefficients of variation (CV), F statistics, degrees of freedom (df), exact p-values, and complementary non-parametric analyses for the evaluated seed physiological quality variables.

Variable	CV (%)	Statistic	df	p-value
G (%)	3.35	$F = 11.24$	4, 15	0.0002
AA (%)	9.41	$F = 3.49$	4, 15	0.0333
SDM (g)	3.58	$F = 8.86$	4, 15	0.0007
EC ($\mu S\ cm^{-1}\ g^{-1}$)	5.99	$F = 11.80$	4, 15	0.0002
FSE (%), original scale	4.30	$F = 0.52$	4, 15	0.7206
FSE, arcsine$\sqrt{}$-transformed	—	$F = 0.61$	4, 15	0.6624
FSE, Kruskal–Wallis	—	$\chi^2 = 2.85$	4	0.5832
SDM, Kruskal–Wallis	—	$\chi^2 = 12.72$	4	0.0128

Note: n = 4 field replicates per treatment for all variables. SDM and FSE showed deviations from normality of ANOVA residuals (Shapiro-Wilk, $p < 0.05$); Kruskal-Wallis tests were performed as non-parametric confirmation. For SDM, both parametric and non-parametric tests indicated significant treatment effects. For FSE, neither test detected significant differences among treatments.

Table S2. Eigenvalues, percentage of variance explained, and cumulative variance of the principal components obtained from the principal component analysis (PCA).

Principal component	Eigenvalue	Variance explained (%)	Cumulative variance (%)
PC1	1.7241	34.48	34.48
PC2	1.4363	28.73	63.21
PC3	1.1951	23.90	87.11
PC4	0.4669	9.34	96.45
PC5	0.1776	3.55	100.00

Table S3. Principal component loadings for the evaluated seed physiological quality variables.

Variable	PC1	PC2	PC3	PC4	PC5
G	0.5781	0.4122	-0.2834	0.1849	-0.6175
AA	0.6827	-0.0319	0.2603	0.3296	0.5971
SDM	0.0061	0.7605	0.0537	-0.5622	0.3204
EC	0.4270	-0.4951	-0.3018	-0.6939	0.0000
FSE	-0.1317	0.0748	-0.8706	0.2442	0.3993