

SUPPLEMENTARY MATERIAL

To the article "Description of morphological characteristics of wheat spike as a digital certificate in the SpikeDroidDB database"

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Table S1. Description of the spike digital passport. The characteristic abbreviation, name and units are given. See also Figure 1. The values of the morphological characteristics are averaged for frontal/back and two side projections independently.

Spike morphological traits			
Trait	Abbreviation	Definition	Units
Parameters of quadrangle model [1]			
Width of basal segment	q_{w_b}	$2 \cdot q_{y1}$	mm
Width of apical segment	q_{w_a}	$2 \cdot q_{y2}$	mm
Width of spike model	q_w	$q_{y1} + q_{y2}$	mm
Length of basal segment	q_{l_b}	q_{x1}	mm
Length of central segment	q_{l_c}	q_{x2}	mm
Length of apical segment	q_{l_a}	q_{x3}	mm
Spike model length	q_L	$q_{x1} + q_{x2} + q_{x3}$	mm
Area of the basal segment	q_{S_b}	$2 \cdot q_{S1}$	mm ²
Area of the central segment	q_{S_c}	$2 \cdot q_{S2}$	mm ²
Area of the apical segment	q_{S_a}	$2 \cdot q_{S3}$	mm ²
Spike model area	q_S	$2 \cdot (q_{S1} + q_{S2} + q_{S3})$	mm ²
Parameters of the spike body contour in the image [2]			
Perimeter	c_P	c_P	mm ²
Spike body area	c_{S_b}	c_{SA}	mm ²
Awns area	c_{S_a}	c_{AA}	mm ²
Circularity	c_{Ci}	c_{Ci}	dimensionless
Roundness	c_{Ro}	c_{Ro}	dimensionless
Solidity	c_{So}	c_{So}	dimensionless
Rugosity	c_{Ru}	c_{Ru}	dimensionless
Color traits			
Spike body color red component	$c_{C_B R}$		dimensionless
Spike body color green component	$c_{C_B G}$		dimensionless
Spike body color blue component	$c_{C_B B}$		dimensionless
Awns color red component	$c_{C_A R}$		dimensionless
Awns color green component	$c_{C_A G}$		dimensionless
Awns color blue component	$c_{C_A B}$		dimensionless

Table S2. Statistics for the spike digital passport traits demonstrating significant differences between *T. carthlicum* and *T. aestivum* species. The number of degrees of freedom for ANOVA is 1.

Trait	Projection	ANOVA F	ANOVA p (same)	Tukey's pairwise p (same)	Mann-Witney pairwise p (same)
Awns area, c_{S_a}	Frontal	59.36	10^{-6}	10^{-6}	$9 \cdot 10^{-4}$
Circularity, c_{Ci}	Frontal	7.355	0.015	0.015	0.03509
Roundness, c_{Ro}	Frontal	22.36	$2 \cdot 10^{-4}$	$9 \cdot 10^{-4}$	0.001233
Solidity, c_{So}	Frontal	6.288	0.023	0.023	0.01693
Awns area, c_{S_a}	Side	36.39	$2 \cdot 10^{-5}$	$2 \cdot 10^{-5}$	$9 \cdot 10^{-4}$
Spike body color red component, $c_{C_B R}$	Frontal	384.1	$1 \cdot 10^{-12}$	$1 \cdot 10^{-12}$	$9 \cdot 10^{-4}$
Spike body color green component, $c_{C_B G}$	Frontal	540.5	$1 \cdot 10^{-13}$	$1 \cdot 10^{-13}$	$9 \cdot 10^{-4}$
Spike body color blue component, $c_{C_B B}$	Frontal	556.1	$7 \cdot 10^{-14}$	$1 \cdot 10^{-13}$	$9 \cdot 10^{-4}$
Awns color red component, $c_{C_A R}$	Frontal	65.19	$5 \cdot 10^{-7}$	$5 \cdot 10^{-7}$	$9 \cdot 10^{-4}$
Awns color green component, $c_{C_A G}$	Frontal	45.42	$5 \cdot 10^{-6}$	$5 \cdot 10^{-6}$	$9 \cdot 10^{-4}$
Awns color blue component, $c_{C_A B}$	Frontal	22.01	$2 \cdot 10^{-4}$	$2 \cdot 10^{-4}$	$9 \cdot 10^{-4}$
Spike body color red component, $c_{C_B R}$	Side	398.2	$1 \cdot 10^{-12}$	$1 \cdot 10^{-12}$	$9 \cdot 10^{-4}$
Spike body color green component, $c_{C_B G}$	Side	509	$1 \cdot 10^{-13}$	$2 \cdot 10^{-13}$	$9 \cdot 10^{-4}$
Spike body color blue component, $c_{C_B B}$	Side	466.9	$3 \cdot 10^{-13}$	$4 \cdot 10^{-13}$	$9 \cdot 10^{-4}$
Awns color red component, $c_{C_A R}$	Side	85.59	$8 \cdot 10^{-8}$	$8 \cdot 10^{-8}$	$9 \cdot 10^{-4}$
Awns color green component, $c_{C_A G}$	Side	59.74	$9 \cdot 10^{-7}$	$9 \cdot 10^{-7}$	$9 \cdot 10^{-4}$
Awns color blue component, $c_{C_A B}$	Side	27.23	$8 \cdot 10^{-5}$	$8 \cdot 10^{-5}$	$9 \cdot 10^{-4}$

Komyshev E.G., Genaev M.A., Kruchinina Yu.V., Koval V.S., Goncharov N.P., Afonnikov D.A. Evaluation of the spike diversity of seven hexaploid wheat species and an artificial amphidiploid using a quadrangle model obtained from 2D images. *Plants*. 2024;13(19):2736. doi 10.3390/plants13192736

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