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Supplementary Material

A phenotypic marker for quantifying heat stress impact during microsporogenesis in rice (*Oryza sativa* L.)

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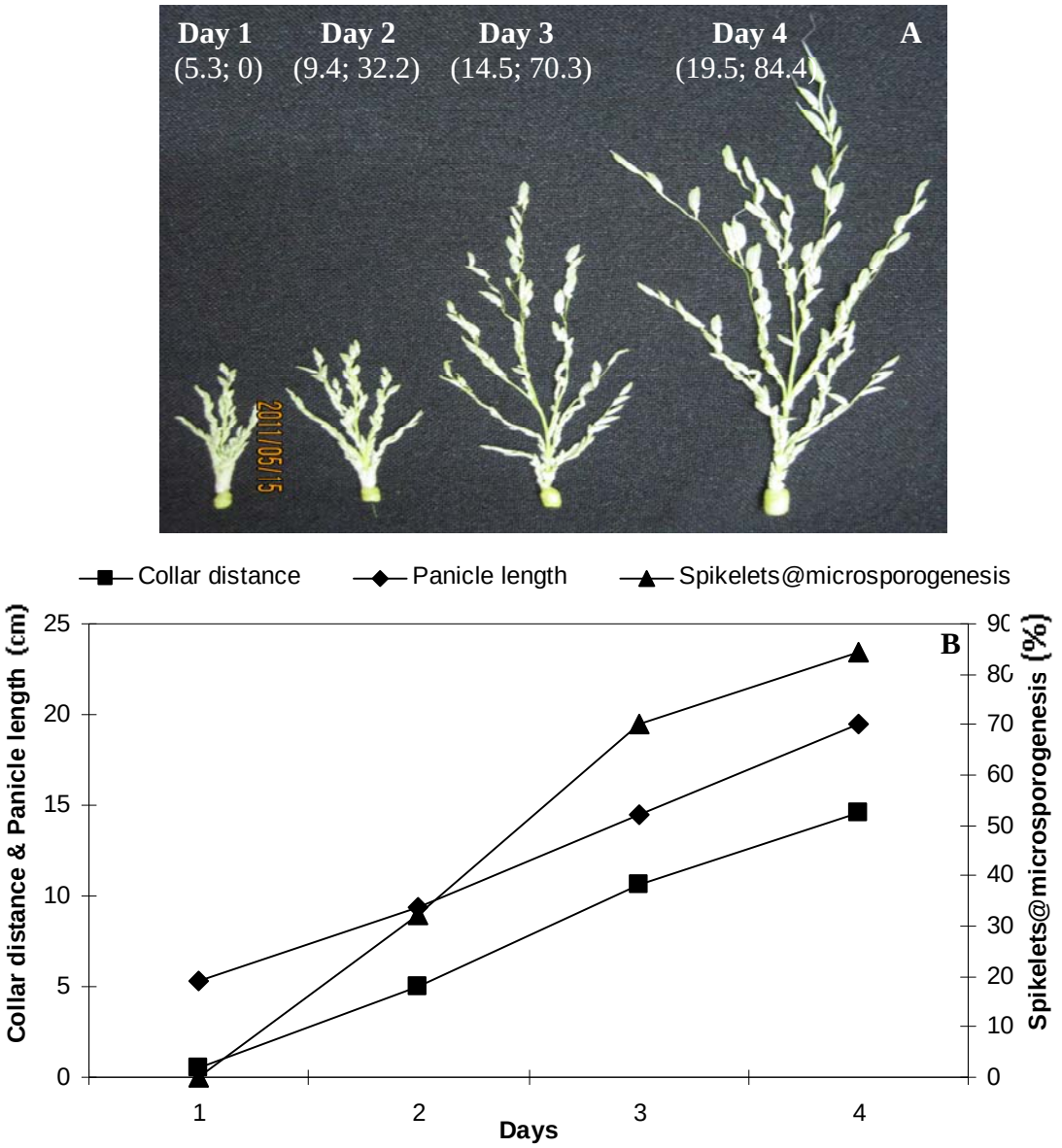


Fig. S1. Rate of growth of N22 panicle identified using the morphological marker, i.e., –8 to –9 cm between the collar of the fully opened leaf and the yet-to-emerge flag leaf collar. A: Numbers in parentheses are the length of the panicle in cm and the proportion of spikelets that are at 4 mm or higher. Day 1 with "0" proportion indicates that none of the spikelets are at or beyond 4 mm in length while Day 4 with "84.5" indicates that 85% of all spikelets in the panicle have passed through the 4 mm stage, which is the right stage when tetrad formation and early microspore formation take place in N22. B: Collar growth (collar distance) and panicle growth rate are similar; hence, collar distance can be used as a proxy for panicle growth rate.

Fig. S2. Field growth chambers used to study high night-time temperature responses.

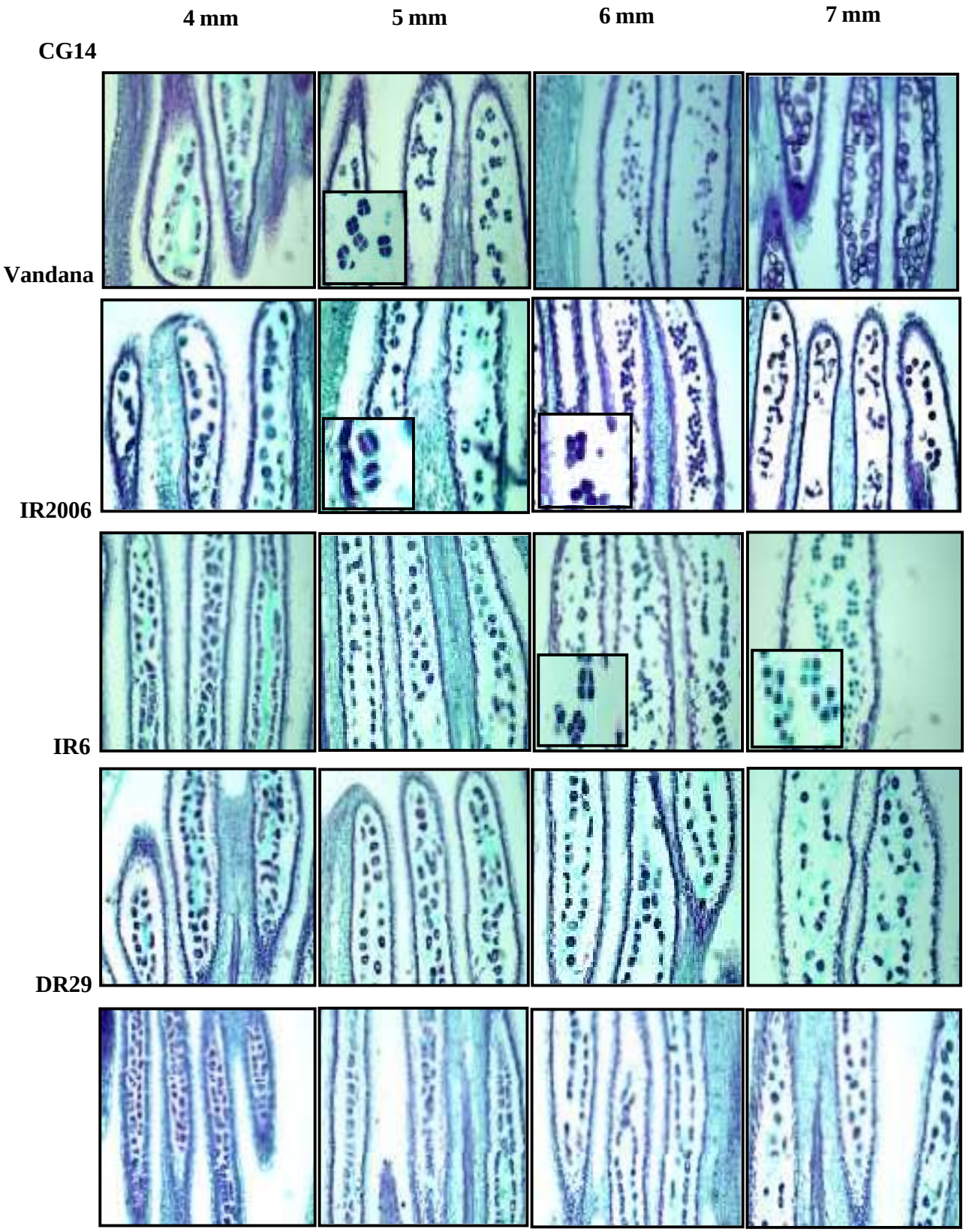
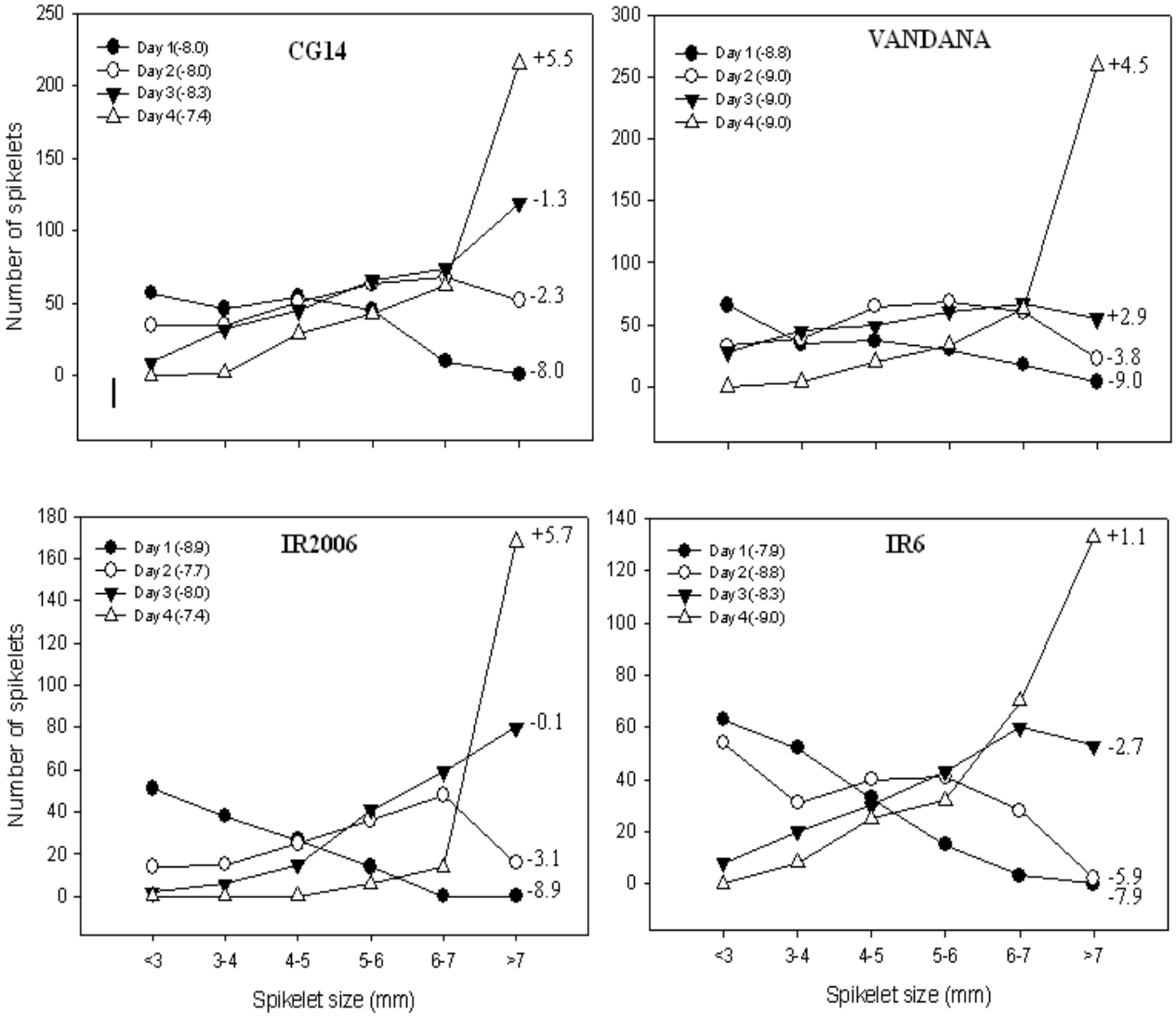

4 mm
5 mm
6 mm
7 mm
CG14
Vandana
IR2006
IR6
DR29

Fig. S3. Spikelet size of remaining five rice genotypes coinciding with tetrad formation during the microsporogenesis stage from plants grown under glasshouse conditions. Pollen mother cells on route to tetrad formation are shown in inset.


CG14
Day 1(-8.0)
Day 2(-8.0)
Day 3(-8.3)
Day 4(-7.4)
+5.5
-1.3
-2.3
-8.0
VANDANA
Day 1(-8.8)
Day 2(-9.0)
Day 3(-9.0)
Day 4(-9.0)
+4.5
+2.9
-3.8
-9.0
IR2006
Day 1(-8.9)
Day 2(-7.7)
Day 3(-8.0)
Day 4(-7.4)
+5.7
-0.1
-3.1
-8.9
IR6
Day 1(-7.9)
Day 2(-8.8)
Day 3(-8.3)
Day 4(-9.0)
+1.1
-2.7
-5.9
-7.9
Number of spikelets
Spikelet size (mm)
<3
3-4
4-5
5-6
6-7
>7

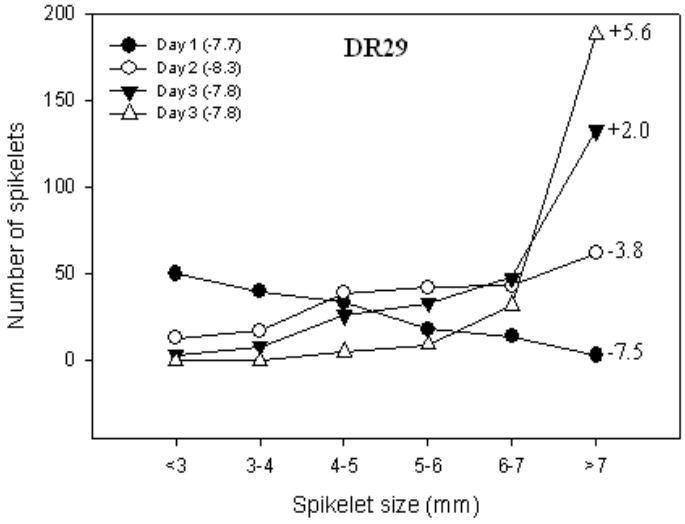


Fig. S4. Spikelet numbers categorized according to their sizes over four consecutive days after identifying the tiller at the right developmental stage. The number against the legend corresponding to the day in parenthesis are the distance between the collar of the fully opened leaf and the flag leaf collar, with minus indicating that the flag leaf collar was yet to emerge and positive sign indicating after emergence. Data presented is the sum of spikelets from two independent tillers on two separate plants.

Table S1. Mature rice grain lengths of mega-varieties grown across Southeast Asia, South Asia, Africa, and Latin America used for predicting the spikelet length at which microsporogenesis occurs

Sahel 329 is the only variety that has a mature grain length beyond the experimentally detected range of spikelet length coinciding with the microsporogenesis stage

Genotypes	Seed length (mm)
South East Asia	
KDML 105	9.10 (±0.032)
Ciherang	8.75 (±0.026)
NSIC Rc222	8.65 (±0.034)
TDK1	8.95 (±0.016)
South Asia	
BR 11	7.25 (±0.042)
SWARNA	7.70 (±0.042)
ADT36	7.80 (±0.035)
Africa	
Bouake 189	9.05 (±0.037)
Sahel 329	11.10 (±0.057)
Samba Mahsuri	7.10 (±0.021)
Sahel 134	8.65 (±0.047)
Moroberekan	9.20 (±0.042)
Sahel 108	8.80 (±0.026)
Nerica L-19	9.70 (±0.048)
Latin America	
Caiapo	9.00 (±0.000)
BG-90	8.20 (±0.026)
Epagri 108	9.75 (±0.042)
BR-IRGA 410	9.20 (±0.042)
Fedearroz 50	9.85 (±0.034)