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Effects of different planting densities on photosynthesis in maize determined via prompt fluorescence, delayed fluorescence and P700 signals

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Table S1. Planting density of the maize in field.

Planting Density (plants ha^{-1})	Treatment	Row Spacing(m)	Plant Spacing(m)
45000	D1	0.6	0.43
67500	D2	0.6	0.27
90000	D3	0.6	0.2
112500	D4	0.6	0.15

Table S2. Formulae and glossary of terms used by the JIP-test for Chl a fluorescence transient OJIP analysis.

Term/Formula	
Ft	Fluorescence at time t after the onset of actinic illumination
$F_O \cong F_{20\mu s}$ or $F_{50\mu s}$	Minimal fluorescence, when all PSII RCs are open
$F_L=F_{150\mu s}$	Fluorescence intensity at the L-step (150 μs) of OJIP
$F_K=F_{300\mu s}$	Fluorescence intensity at the K-step (300 μs) of OJIP
$F_J=F_{2ms}$	Fluorescence intensity at the J-step (2 ms) of OJIP
$F_I=F_{30ms}$	Fluorescence intensity at the I-step (30 ms) of OJIP
$F_P=F_M$	Maximal recorded fluorescence intensity, at peak P of OJIP
$F_V=F_M-F_O$	Maximal variable fluorescence
$V_t=(F_t-F_O)/(F_M-F_O)$	Relative variable fluorescence at time t
$V_K=(F_K-F_O)/(F_M-F_O)$	Relative variable fluorescence at the K-step
$V_J=(F_J-F_O)/(F_M-F_O)$	Relative variable fluorescence at the J-step
$W_t=(F_t-F_O)/(F_J-F_O)$	Relative variable fluorescence FV to the amplitude F_J-F_O
$W_L=W_{150\mu s}=(F_{150\mu s}-F_O)/(F_J-F_O)$	Relative variable fluorescence at the L-step to the amplitude F_J-F_O
$W_K=W_{300\mu s}=(F_{300\mu s}-F_O)/(F_J-F_O)$	Relative variable fluorescence at the K-step to the amplitude F_J-F_O
$M_O=4(F_{300\mu s}-F_O)/(F_M-F_O)$	Approximated initial slope (in ms-1) of the fluorescence transient normalized on the maximal variable fluorescence F_V
$W_{OK}=(F_t-F_O)/(F_K-F_O)$	Ratio of variable fluorescence F_t-F_O to the amplitude F_K-F_O
$W_{OJ}=(F_t-F_O)/(F_J-F_O)$	Ratio of variable fluorescence F_t-F_O to the amplitude F_J-F_O
$W_{OI}=(F_t-F_O)/(F_I-F_O)$	Ratio of variable fluorescence F_t-F_O to the amplitude F_I-F_O
$\varphi P_t=PHI(P_t)=TR_t/ABS=1-F_t/F_M$	Quantum yield for primary photochemistry at any time t
$\varphi P_O=PHI(P_O)=TR_O/ABS=1-F_O/F_M$	Maximum quantum yield for primary photochemistry

$\psi E_o=PSI_o=ET_o/TR_o=(1-V_J)$	Probability that an electron moves further than Q_A^-
$\varphi E_o=PHI(E_o)=ET_o/ABS=(1-F_o/F_M)/(1-V_J)$	Quantum yield for electron transport (ET)
$\varphi D_o=PHI(D_o)=1-\varphi P_o=F_o/F_M$	Quantum yield (at t = 0) of energy dissipation
$\varphi R_o=RE_o/ABS=\varphi P_o\times\psi E_o\times\delta R_o=\varphi P_o\times(1-V_I)$	Quantum yield for reduction of the end electron acceptors on the PSI acceptor side (RE)
$\delta R_o=RE_o/ET_o=(1-V_I)/(1-V_J)$	Probability that an electron is transported from the reduced intersystem electron acceptors to the final electron acceptors of PSI (RE)
$\gamma RC=CHlRC/CHltotal=RC/(ABS+RC)$	Probability that a PSII Chl molecule functions as RC
$ABS/CS=CHl/CS$	Absorption flux per Cs
$TR_o/CS=\varphi P_o\times(ABS/CS)$	Trapped energy flux per Cs
$RC/CS=\varphi P_o\times(VJ/M_o)\times(ABS/CS)$	Q_A^-reducing RCs per Cs
$PIABS=\frac{\gamma RC}{1-\gamma RC}\times\frac{\varphi Po}{1-\varphi Po}\times\frac{\psi Eo}{1-\psi Eo}$	Performance index (potential) for energy conservation from photons absorbed by PSII to the reduction of the intersystem electron acceptors

Subscript "o" indicates that the parameter refers to the onset of illumination, when all RCs are assumed to be open.

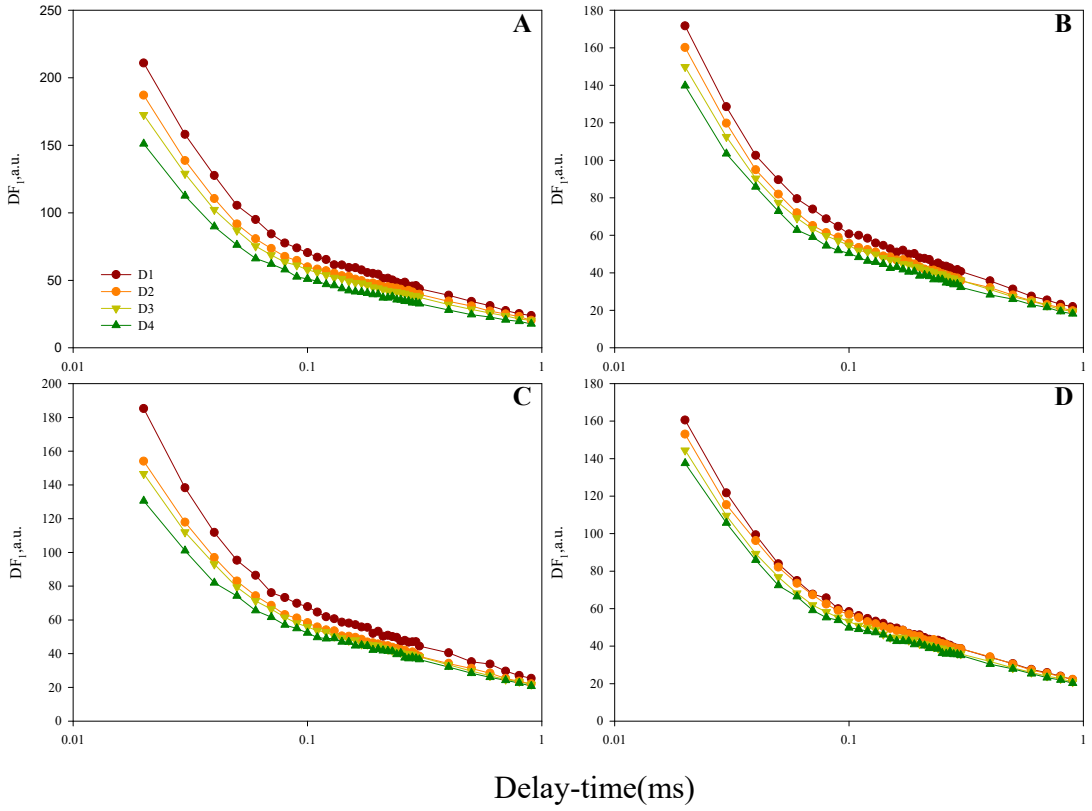

Figure S1. Kinetics of delayed fluorescence DF (in arbitrary units) at the characteristic steps I1 (7 ms JIP-time) of the two maize hybrids under different planting densities. A--B: 2019 data; C--D: 2020 data. (A, C): Absolute values of Zhengdan958. (C, D): Absolute values of Xianyu335. Signals are plotted on a logarithmic time scale.