Supporting Information

Luo *et al.* 10.1073/pnas.0810731105

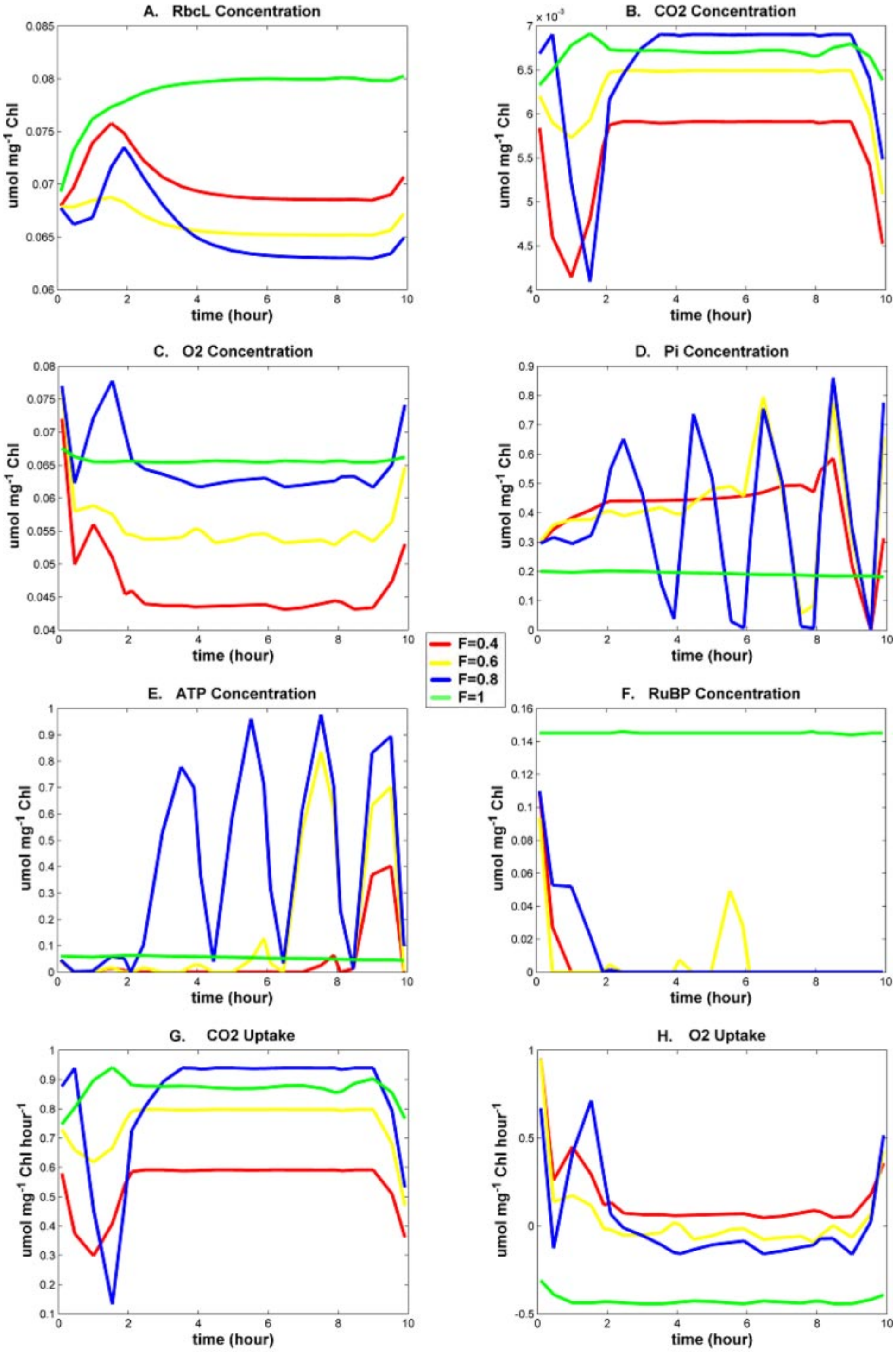

Fig. S1. Objective function is set as maximum PGA production rate of photosynthetic metabolism in the chloroplast of C_3 plants by the Dynamic Flux Balance Analysis (DFBA) method in the different levels of water stress. *F* represents water stress. Green represents the normal condition (*F* = 1), blue represents the mild (*F* = 0.8), yellow represents the moderate (*F* = 0. 6), red represents the severe (0.4).

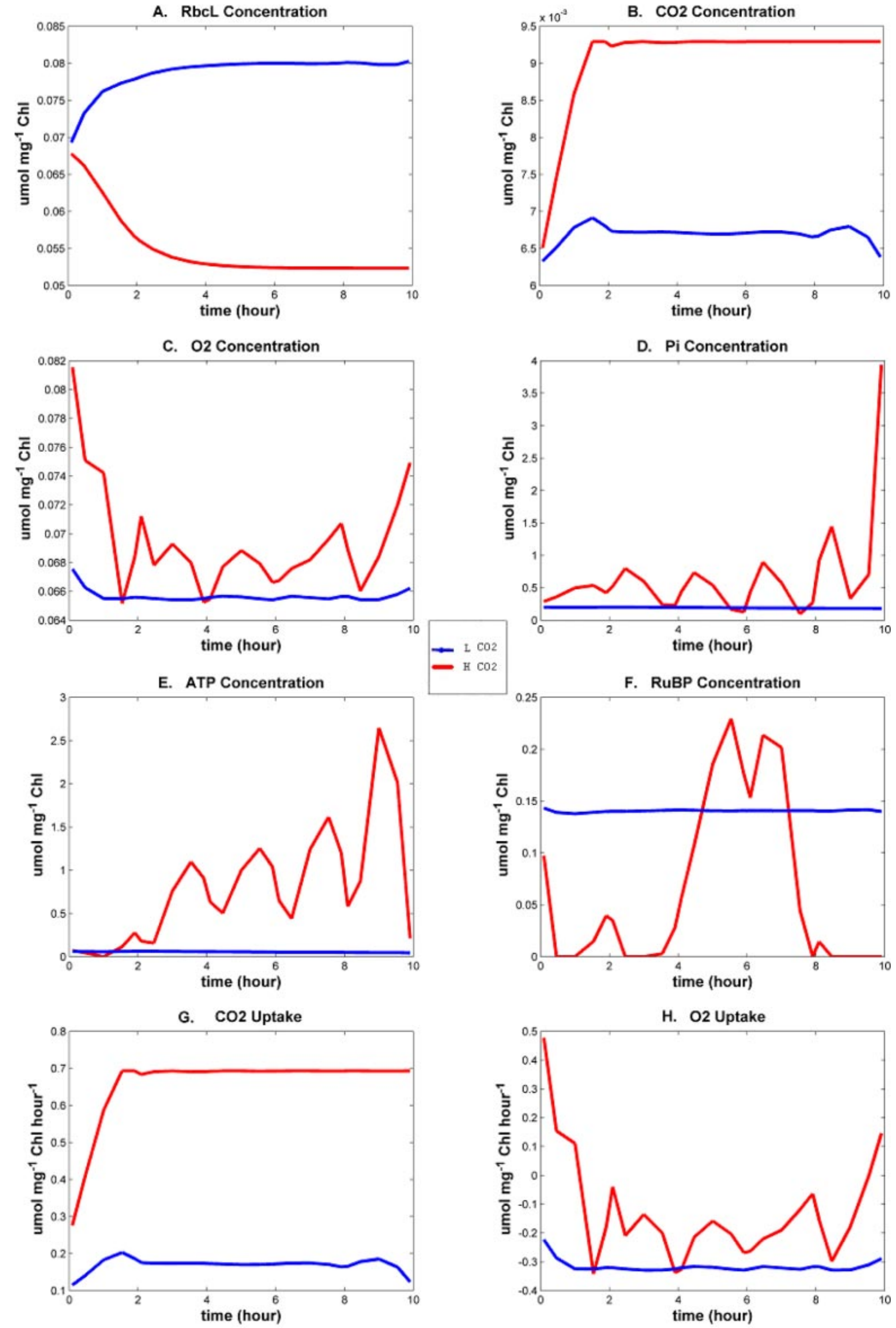

Fig. S2. Objective function is set as maximum PGA production rate of photosynthetic metabolism in the chloroplast of C_3 plants by the DFBA method in the normal (blue) and double concentration of CO_2 (red).

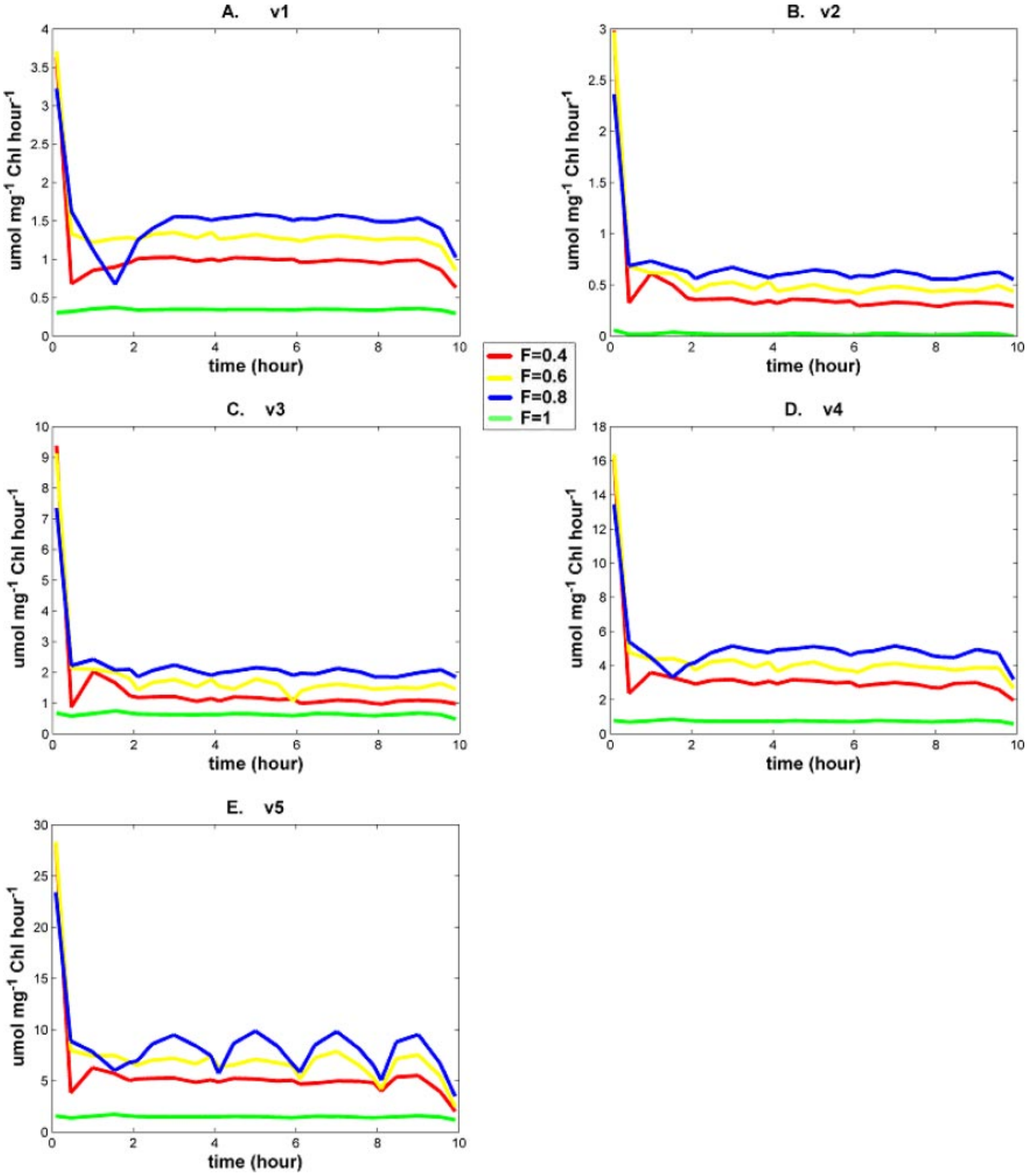

Fig. S3. Velocity of five fluxes under water deficit conditions. Objective function is set as maximum PGA production rate of photosynthetic metabolism in the chloroplast of C_3 plants by the DFBA method. *F* represents water stress. Green represents the normal condition ($F = 1$), blue represents the mild ($F = 0.8$), yellow represents the moderate ($F = 0.\ 6$); red represents the severe (0.4).

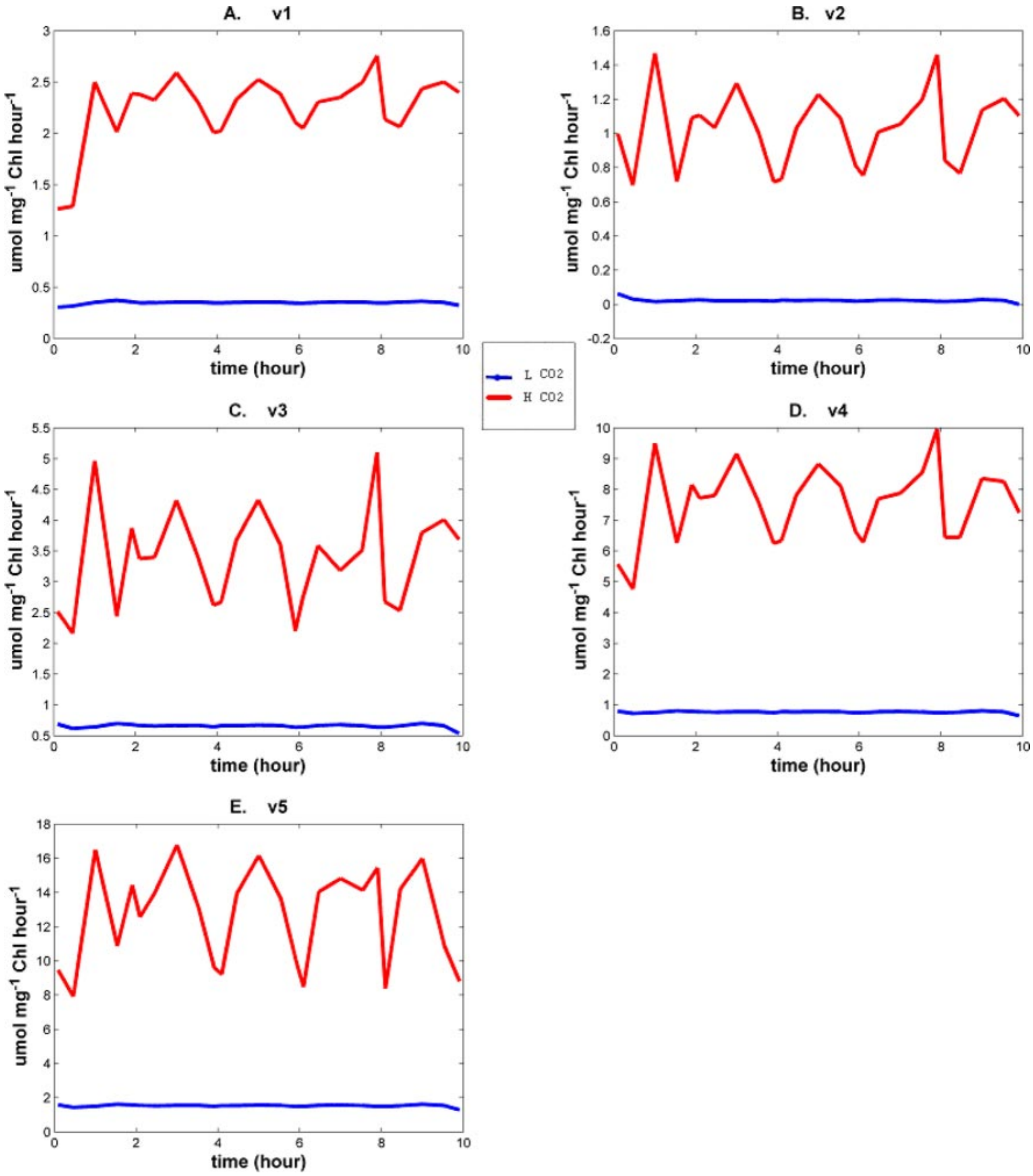

Fig. S4. Velocity of five fluxes under the double concentration of CO_2 condition. Objective function is set as maximum PGA production rate of photosynthetic metabolism in the chloroplast of C_3 plants by the DFBA method. Blue represents the normal condition, red represents double concentration of CO_2.

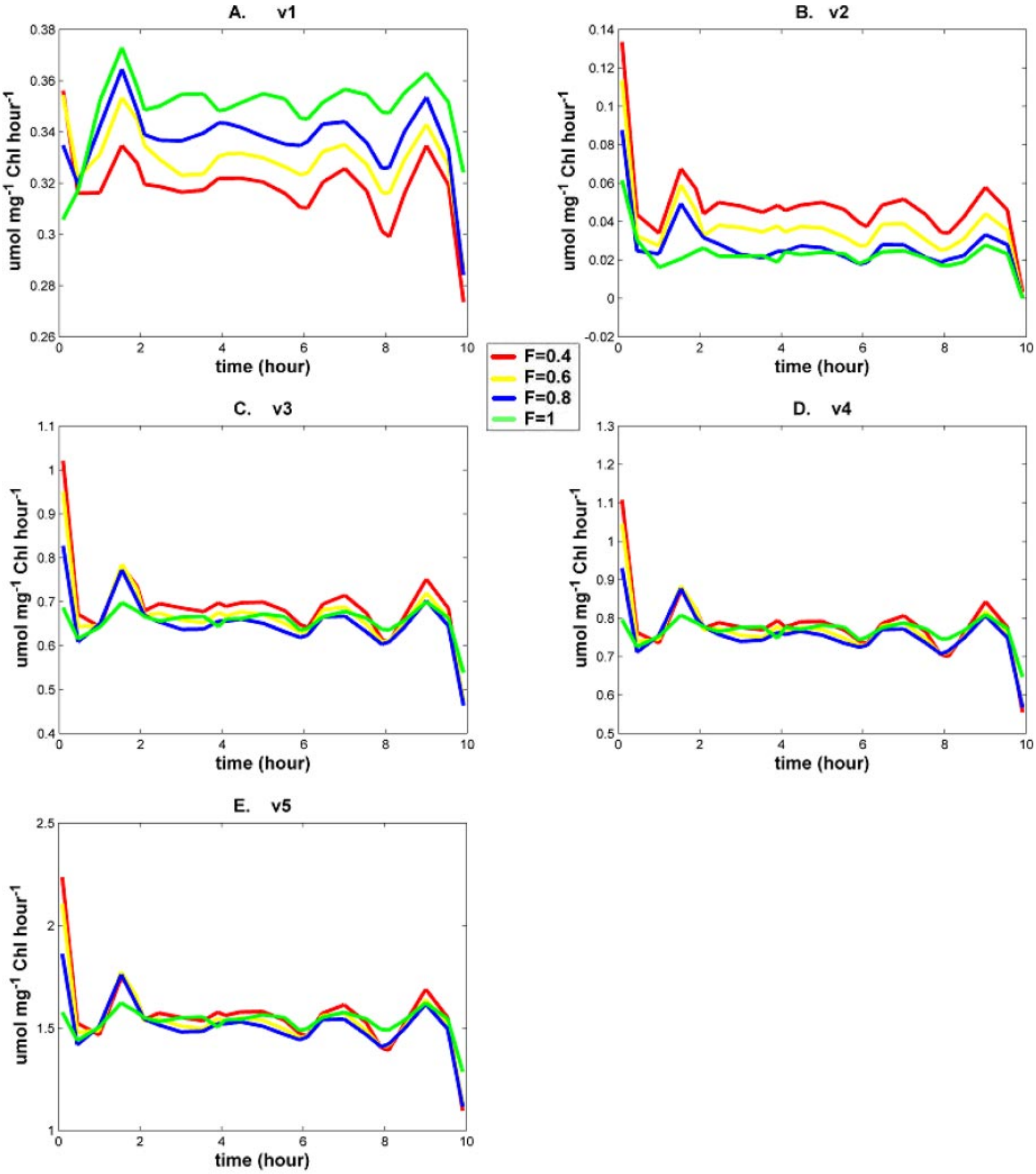

Fig. S5. Velocity of five fluxes under water deficit conditions. Objective function is set as minimum fluctuation of the profile of metabolites concentration of photosynthetic metabolism in the chloroplast of C_3 plants by the M_DFBA method. *F* represents water stress. Green represents the normal condition ($F = 1$), blue represents the mild ($F = 0.8$), yellow represents the moderate ($F = 0.6$), red represents the severe (0.4).

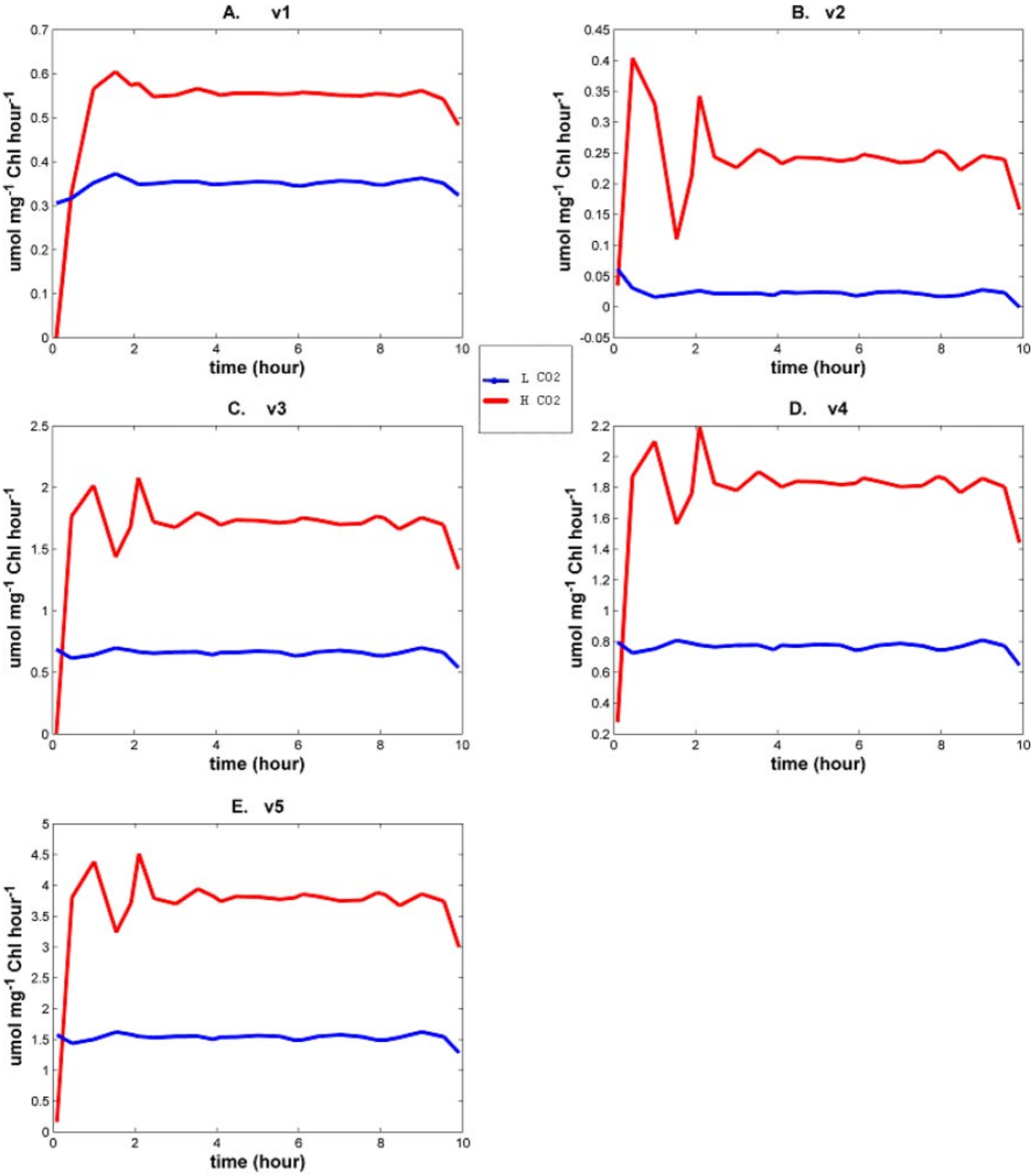

Fig. S6. Velocity of five fluxes under the double concentration of CO_2 condition. Objective function is set as minimum fluctuation of the profile of metabolites concentration of photosynthetic metabolism in the chloroplast of C_3 plants by the M_DFBA method. Blue represents the normal condition, red represents double concentration of CO_2.

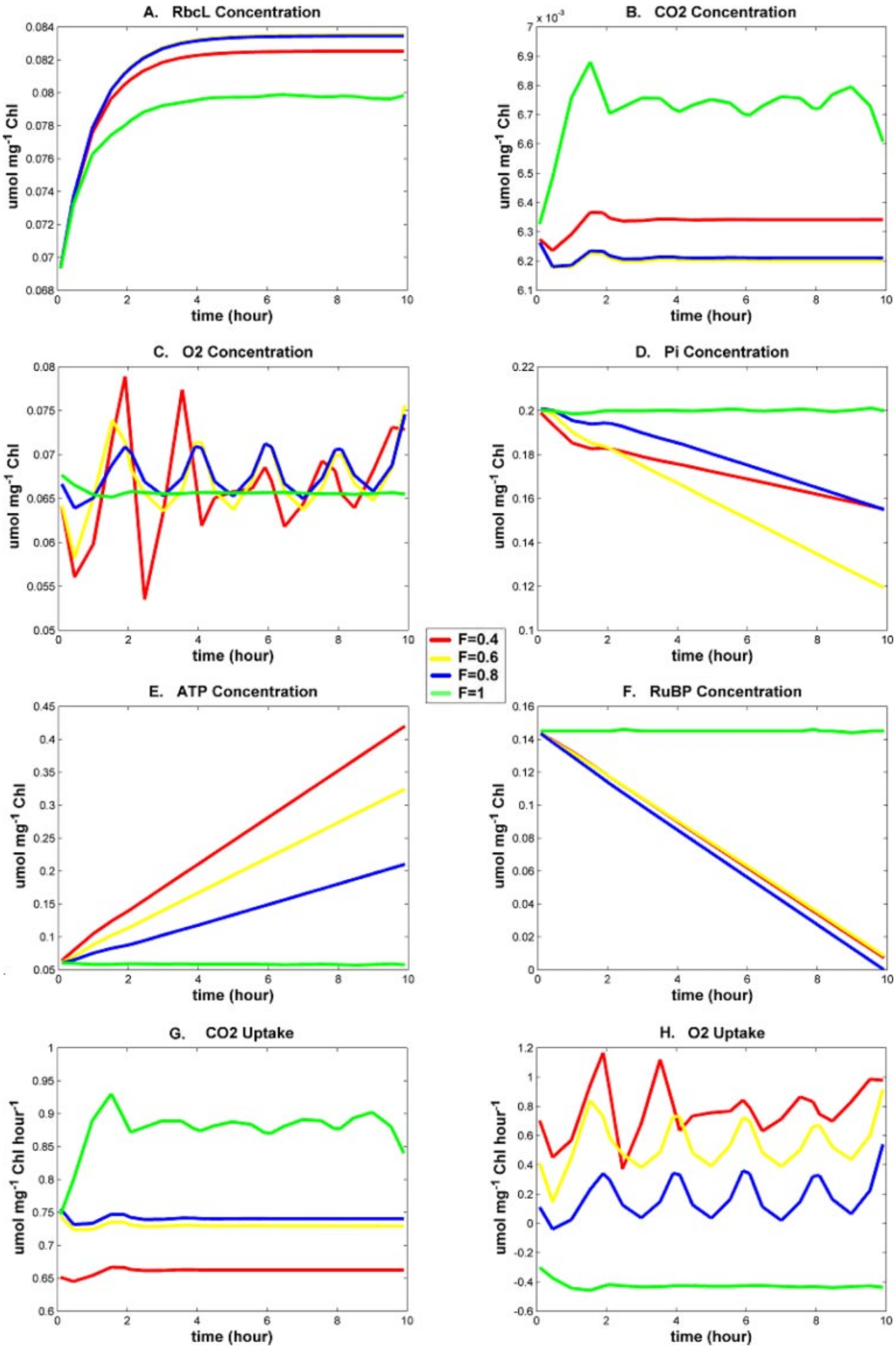

Fig. S7. Objective function is set as minimum fluctuation of the profile of the fluxes of photosynthetic metabolism in the chloroplast of C_3 plants by the M_DFBA method in the different levels of water stress. *F* represents water stress. Green represents the normal condition ($F = 1$), blue represents the mild ($F = 0.8$), yellow represents the moderate ($F = 0.6$); red represents the severe (0.4).

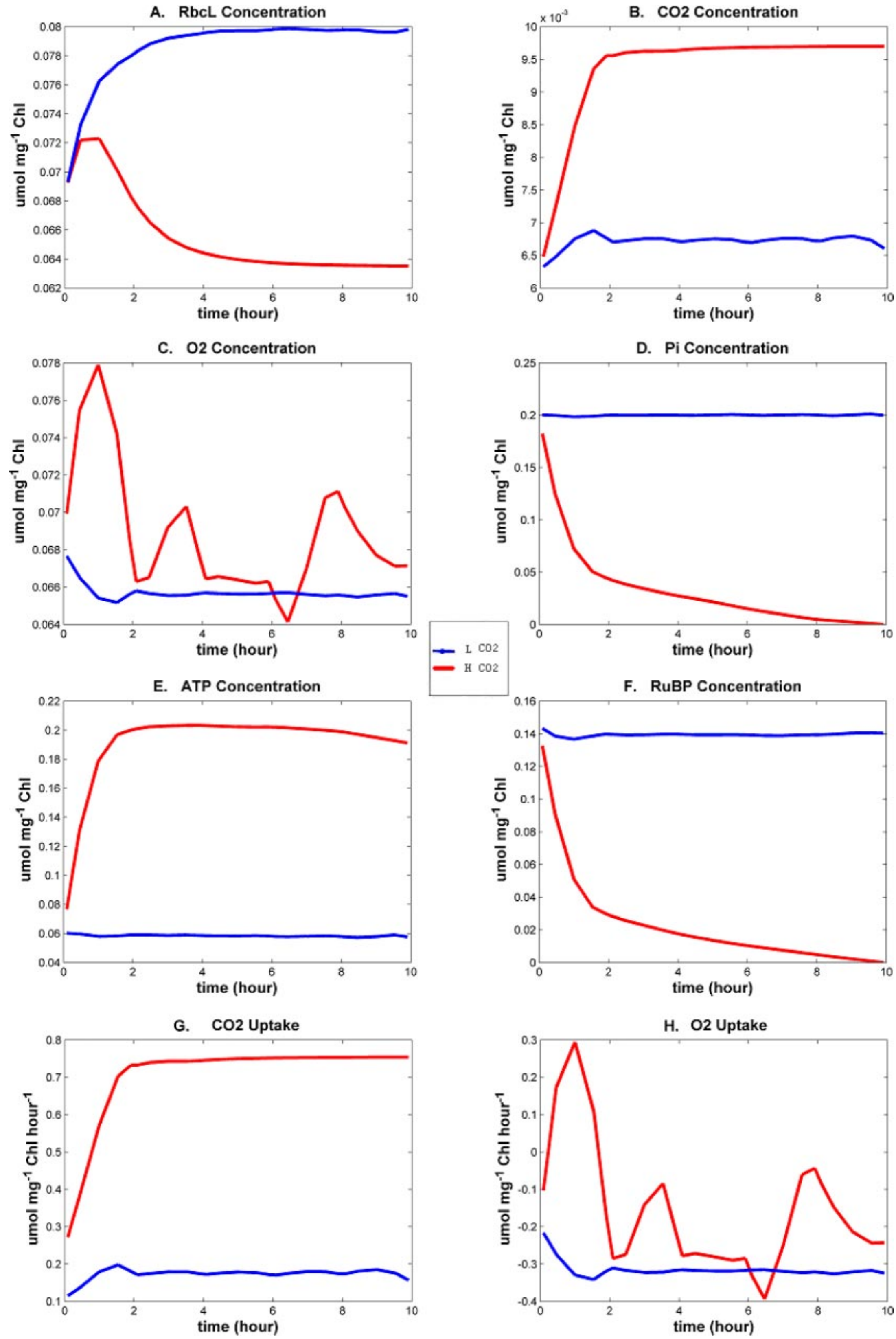

Fig. S8. Objective function is set as minimum fluctuation of the profile of the fluxes of photosynthetic metabolism in the chloroplast of C_3 plants by the M_DFBA method in the normal (blue) and double concentration of CO_2 (red).

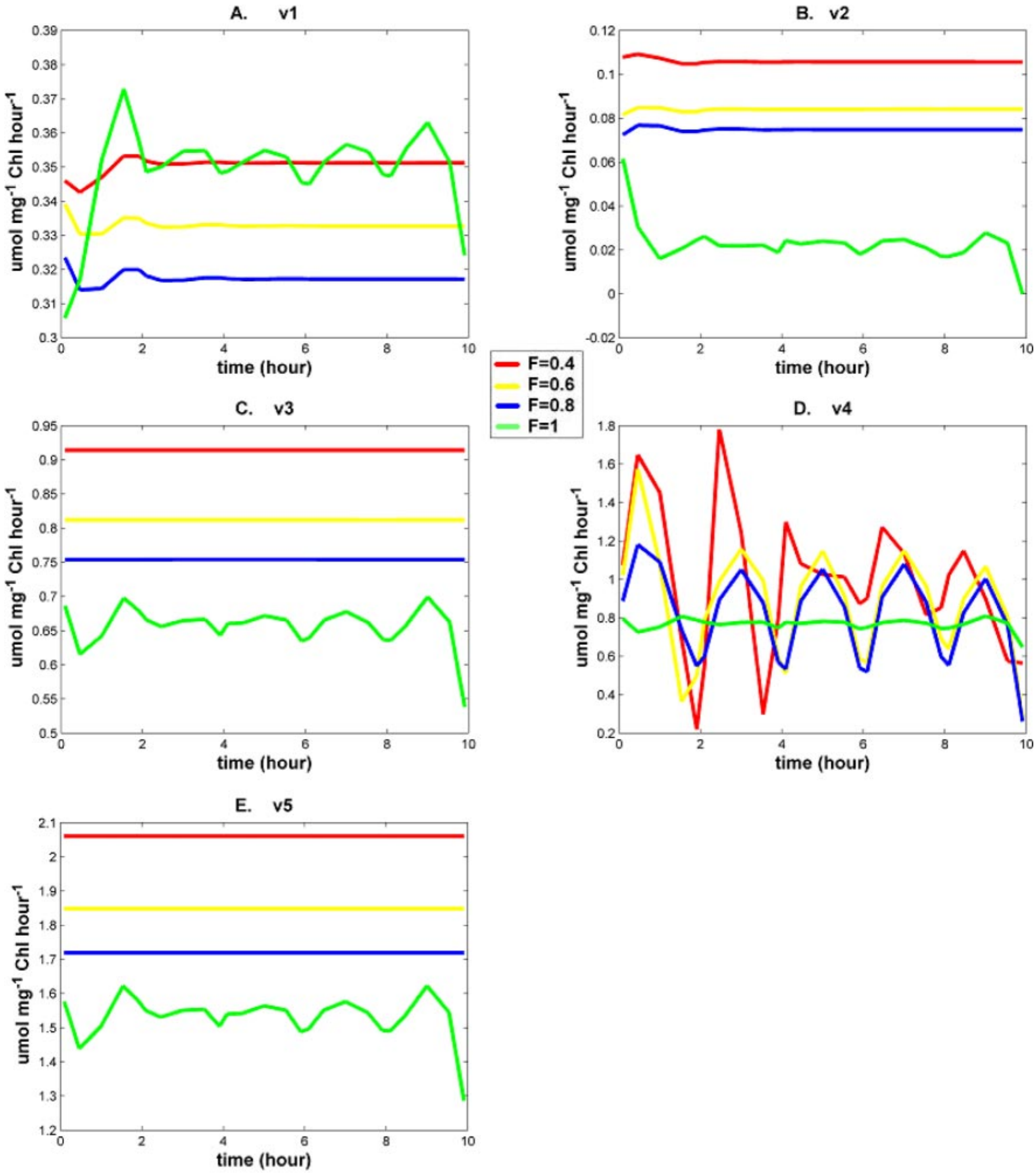

Fig. S9. Velocity of five fluxes under water deficit conditions. Objective function is set as minimum fluctuation of the profile of the fluxes of photosynthetic metabolism in the chloroplast of C_3 plants by the M_DFBA method. *F* represents water stress. Green represents the normal condition ($F = 1$), blue represents the mild ($F = 0.8$), yellow represents the moderate ($F = 0.6$), red represents the severe (0.4).

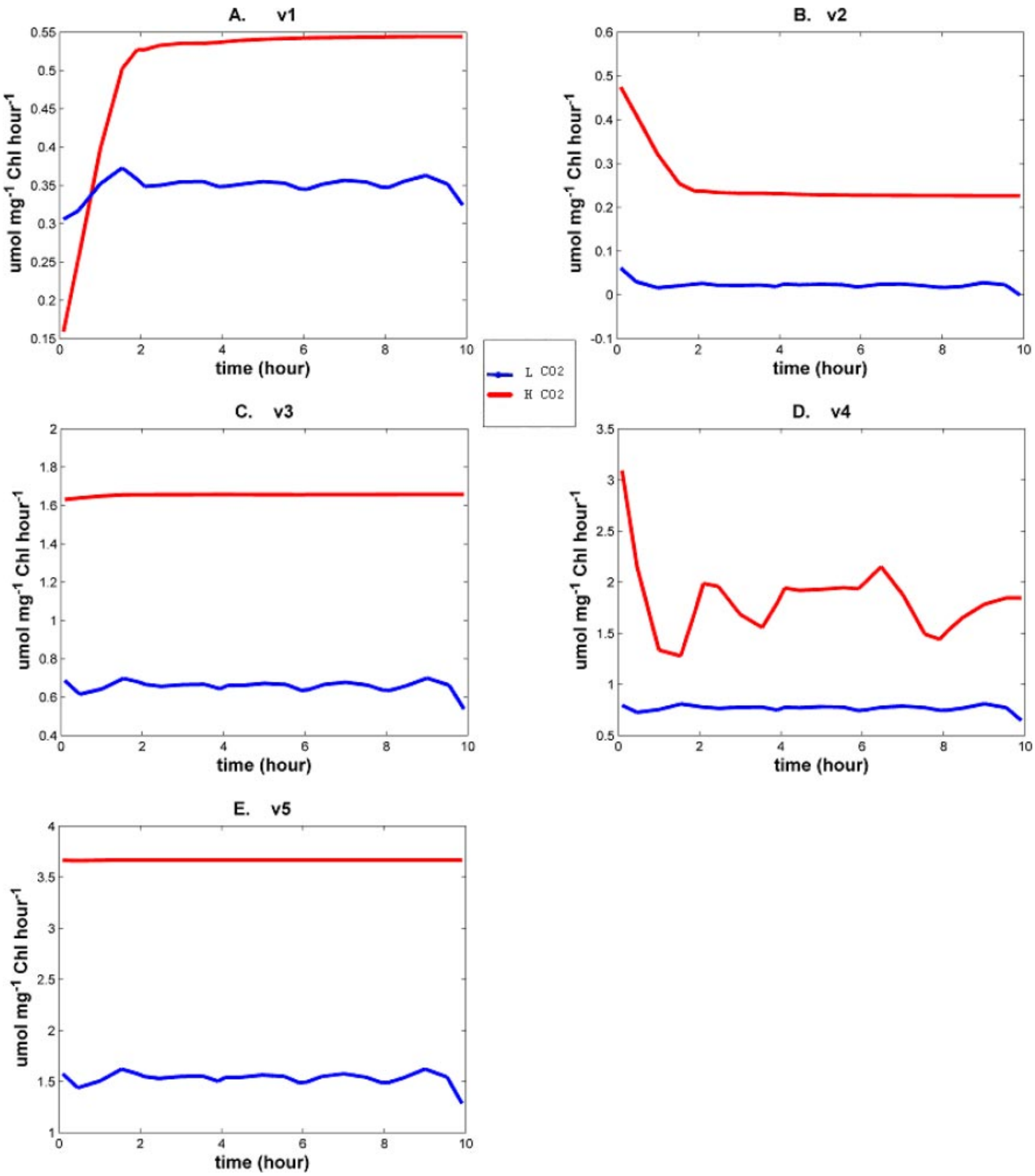

Fig. S10. Velocity of five fluxes under the double concentration of CO_2 condition. Objective function is set as minimum fluctuation of the profile of the fluxes of photosynthetic metabolism in the chloroplast of C_3 plants by the M_DFBA method. Blue represents the normal condition, red represents double concentration of CO_2.

Table S1. Parameters for equations

Variable	Note	Value	Reference
x^{CO2}	CO_2 concentration in chloroplast	$6.3*10^{-3}$ $\mu mol \cdot mg^{-1}$ Chl	(1)
ζ_{CO_2}	CO_2 diffusion coefficient	150 $\mu mol \cdot mg^{-1}$ $Chl \cdot h^{-1}$	(1)
Out_{CO_2}	CO_2 concentration in cytoplasm	$4.45*10^{-3}$ $\mu mol \cdot mg^{-1}$ Chl	(2)
x^{O2}	O_2 concentration in chloroplast	$6.8*10^{-2}$ $\mu mol \cdot mg^{-1}$ Chl	(2)
ζ_{O_2}	O_2 diffusion coefficient	50 $\mu mol \cdot mg^{-1}$ $Chl \cdot h^{-1}$	(3)
Out_{O_2}	O_2 concentration in cytoplasm	$7.2*10^{-2}$ $\mu mol \cdot mg^{-1}$ Chl	(2)
x^{Pi}	P_i concentration in chloroplast	0.2 $\mu mol \cdot mg^{-1}$ Chl	(4)
ζ_{P_i}	P_i diffusion coefficient	$2.4*10^{-3}$ $\mu mol \cdot mg^{-1}$ $Chl \cdot h^{-1}$	(5)
Out_{P_i}	P_i concentration in cytoplasm	0.28 $\mu mol \cdot mg^{-1}$ Chl	(4)
x^{ATP}	ATP concentration in chloroplast	$6*10^{-2}$ $\mu mol \cdot mg^{-1}$ Chl	(4)
x^{RuBP}	RuBP concentration in chloroplast	0.145 $\mu mol \cdot mg^{-1}$ Chl	(4)
x^{NADPH}	NADPH concentration in chloroplast	0.02 $\mu mol \cdot mg^{-1}$ Chl	(6)
X^{PGA}	PGA concentration in chloroplast	0.2 $\mu mol \cdot mg^{-1}$Chl	(4)
x^{rbcL}	rbcL concentration in chloroplast	0.068 $\mu mol \cdot mg^{-1}$ Chl	(7)
n	Constant	1.2	
K	Synthesis rate of rbcL protein	0.12 $\mu mol \cdot mg^{-1}$ $Chl \cdot h^{-1}$	(8)
R	Degradation rate of rbcL protein	1 $\mu mol \cdot mg^{-1}$ Chl $\cdot h^{-1}$	(8)
K_{L1}	Kinetic parameter of Rubisco	80	
K_{L2}	Kinetic parameter of Rubisco	40	

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