

f equations

$$A_c = \left\{ \begin{array}{l} \frac{V_{c,\max} \times (C_i - \Gamma_*)}{C_i + K_c \left(1 + \frac{O_i}{K_o}\right)} \text{ for C3 plants} \\ V_{c,\max} \text{ for C4 plants} \end{array} \right\}$$

$$A_j = \left\{ \begin{array}{l} \frac{J_x \times (C_i - \Gamma_*)}{4C_i + 8\Gamma_*} \text{ for C3 plants} \\ \alpha(4.6\varphi) \text{ for C4 plants} \end{array} \right\}$$

$$A_p = \left\{ \begin{array}{l} K_p \frac{C_i}{P_{\text{atm}}} \text{ for C4 plants} \end{array} \right\}$$

$$\theta_{c_j} A_i^2 - (A_c + A_j) A_i + A_c A_j = 0$$

$$\theta_{i_p} A^2 - (A_i + A_p) A + A_i A_p = 0$$

$$A_n = A - R_d$$

$$C_s = \max\left(1e - 6, C_a - \frac{1.4 P_{\text{atm}} A_n}{g_b}\right), d = \frac{1.6 A_n}{C_s / P_{\text{atm}}}$$

$$b = -(2(g_o + d) + \frac{(g_1 d)^2}{g_b \times vpd})$$

$$c = g_o^2 + \left(2g_o + d \left(1 - \frac{g_i^2}{vpd}\right)\right) d$$

$$g_s^2 + b g_s + c = 0$$

$$C_i = C_a - A_n P_{\text{atm}} \frac{(1.4 g_s + 1.6 g_b)}{(g_s \times g_b)} \quad \left| \quad f(x; \theta, \theta_c, F) = 0 \right.$$

h equations

$$A_c = \left\{ \begin{array}{l} \frac{V_{c,\max} \times (C_i - \Gamma_*)}{C_i + K_c \left(1 + \frac{O_i}{K_o}\right)} \text{ for C3 plants} \\ V_{c,\max} \text{ for C4 plants} \end{array} \right\}$$

$$A_j = \left\{ \begin{array}{l} \frac{J_x \times (C_i - \Gamma_*)}{4C_i + 8\Gamma_*} \text{ for C3 plants} \\ \alpha(4.6\varphi) \text{ for C4 plants} \end{array} \right\}$$

$$A_p = \left\{ \begin{array}{l} K_p \frac{C_i}{P_{\text{atm}}} \text{ for C4 plants} \end{array} \right\}$$

$$\theta_{c_j} A_i^2 - (A_c + A_j) A_i + A_c A_j = 0$$

$$\theta_{i_p} A^2 - (A_i + A_p) A + A_i A_p = 0$$

$$A_n = A - R_d \quad \left| \quad y = h(x, \theta, \theta_c, F) \right.$$