Table 3. Properties of intercellular transport of C_4 acids and CO_2 during C_4 photosynthesis. (After OSMOND, 1971a)

Parameter	Equation symbol and units		*Z. mays*	*A. edulis*
Net photosynthesis per leaf volume	P	μmol/s/cm^3	0.185	0.180
Surface of bundle sheath cells	$2\pi rl$	cm^2/cm^3	125	220
Required C_4 acid flux, total surface [Eq. (1)]	J_M	μmol/s/cm^2	1.48×10^{-3}	0.82×10^{-3}
Required C_4 acid flux, *via* plasmodesmata [a]	J_{MP}	μmol/s/cm^2	4.9×10^{-2}	2.7×10^{-2}
Pool size, C_4 acids involved in photosynthesis		μmol/cm^3	1.85	1.82
Estimated maximum C_4 acid concentration, mesophyll [b]	C_m	μmol/cm^3	38	60
Radius, chloroplast layer, mesophyll cells	r_m	cm	60×10^{-4}	80×10^{-4}
Radius, chloroplast layer, bundle sheath cells	r_b	cm	45×10^{-4}	25×10^{-4}
Calculated C_4 acid flux [c] [Eq. (2)]	J_C	μmol/s/cm^2	17.8×10^{-2}	5.2×10^{-2}
Required C_4 acid gradient [Eq. (2)] [d]	C_m–C_b	μmol/cm^3	10.5	31.3
Estimated $CO_2+HCO_3^-$ concentration [e]		μmol/cm^3	0.6	2.0
Calculated back-flux $CO_2+HCO_3^-$ [Eq. (2)] [f]		μmol/s/cm^2	3.5×10^{-3}	2.2×10^{-3}

[a] Assuming plasmodesmata 3×10^{-2} of total surface (TYREE, 1970); equation 2.
[b] Assuming C_4 acids restricted to cytoplasm (10%) of mesophyll cells.
[c] Assuming $D=8\times10^{-6}$/s/cm^2 (WEAST, 1963), bundle sheath cell C_4 acid concentration zero.
[d] Assuming plasmodesmata flux and $D=8\times10^{-6}$/s/cm^2.
[e] Assuming $CO_2+HCO_3^-$ restricted to cytoplasm and chloroplasts of bundle sheath cells.
[f] Assuming $D=10^{-5}$/s/cm^2 (NOBEL, 1974) and mesophyll cell $CO_2+HCO_3^-$ concentration zero.

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