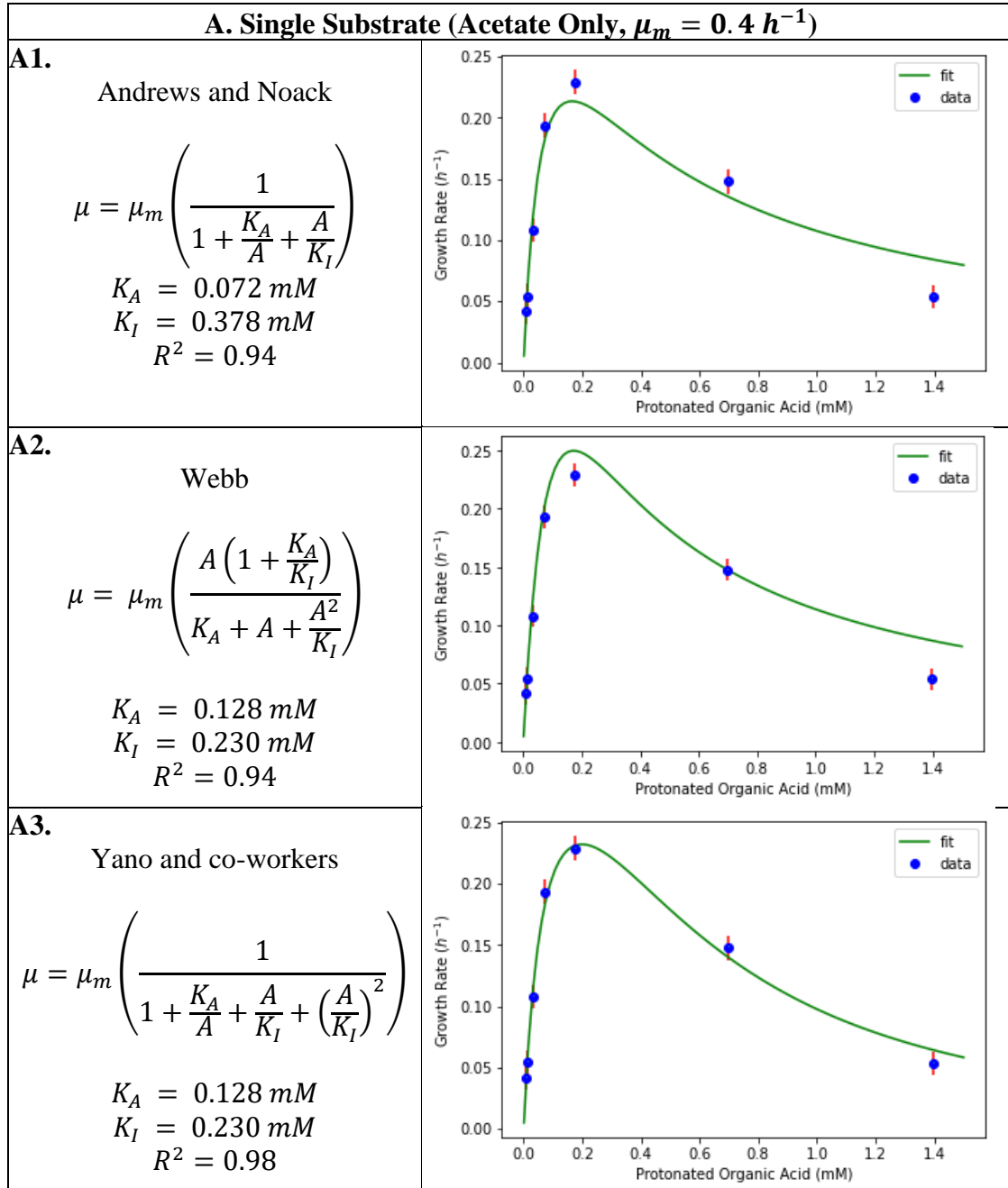**Supplemental Table S1. (A)** Parameterized inhibition model fits for acetate as sole substrate.

(B) Parameterized inhibition model fits for acetate as a product with glucose as the main

substrate. References for model equations can be found in Han and Levenspiel, 1988.
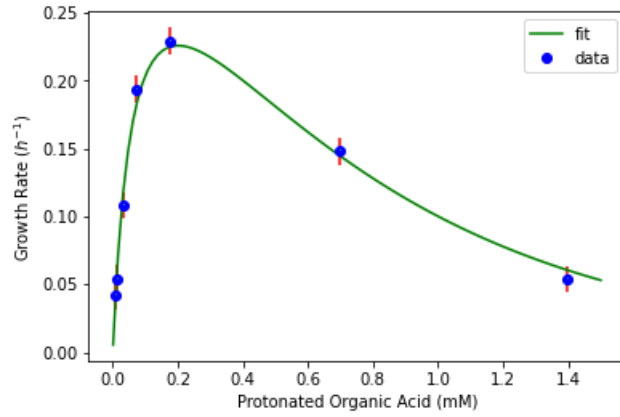
A. Single Substrate (Acetate Only, $\mu_m = 0.4\ h^{-1}$)	
A1. Andrews and Noack $\mu = \mu_m\left(\dfrac{1}{1+\dfrac{K_A}{A}+\dfrac{A}{K_I}}\right)$ $K_A = 0.072\ mM$ $K_I = 0.378\ mM$ $R^2 = 0.94$	
A2. Webb $\mu = \mu_m\left(\dfrac{A\left(1+\dfrac{K_A}{K_I}\right)}{K_A+A+\dfrac{A^2}{K_I}}\right)$ $K_A = 0.128\ mM$ $K_I = 0.230\ mM$ $R^2 = 0.94$	
A3. Yano and co-workers $\mu = \mu_m\left(\dfrac{1}{1+\dfrac{K_A}{A}+\dfrac{A}{K_I}+\left(\dfrac{A}{K_I}\right)^2}\right)$ $K_A = 0.128\ mM$ $K_I = 0.230\ mM$ $R^2 = 0.98$	

A4. Aiba and co-workers $$\mu = \mu_m \left(\frac{A}{K_A + A} \right) e^{-\frac{A}{K_I}}$$ $K_A = 0.0723\ mM$ $K_I = 0.760\ mM$ $R^2 = 0.98$	
A5. Tessier-Type $$\mu = \mu_m \left[e^{-\frac{A}{K_I}} - e^{-\frac{A}{K_A}} \right]$$ $K_A = 0.0885\ mM$ $K_I = 0.672\ mM$ $R^2 = 0.97$	
A6. Webb (with σ) $$\mu = \mu_m \left(\frac{A}{A + K_A \left(1 + \frac{\sigma}{K_I} \right)} \right) e^{1.17\sigma A}$$ $K_A = 0.846\ mM$ $K_I = 1.23\ mM$ $\sigma = -1.12\ mM$ $R^2 = 0.98$	
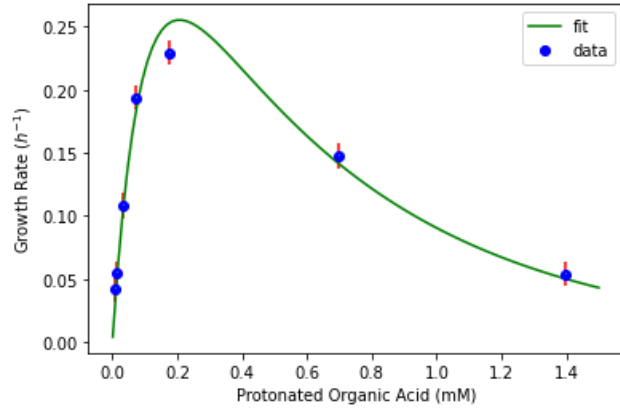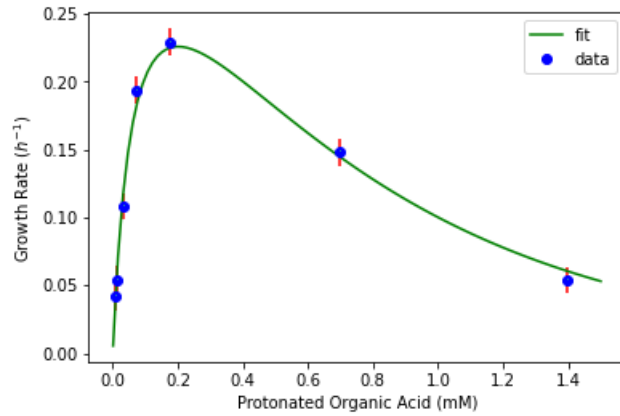
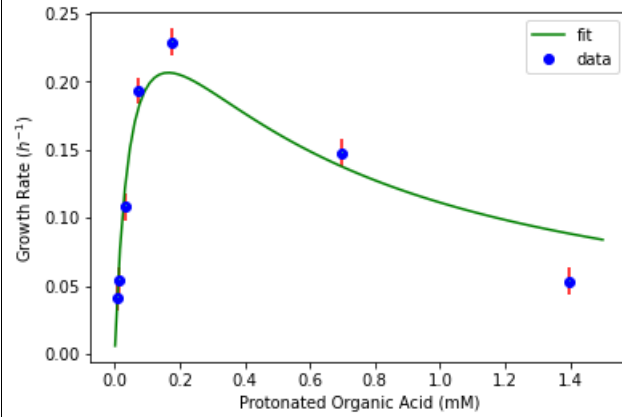|	
A7. Wayman and Tseng $$\mu = \mu_m \left(\frac{A}{K_A + A} \right), A < A'$$ $$\mu = \mu_m \left(\frac{A}{K_A + A} \right) - K_I(A - A'),$$ $$A > A'$$ $$A' = 0.139 \, mM$$ $$K_A = 0.124 \, mM$$ $$K_I = 0.659 \, mM$$ $$R^2 = 0.88$$	
A8. Classic model $$\mu = \mu_m \left(\frac{A}{K_A + A} \right)\left(\frac{K_I}{K_I + A} \right)$$ $$K_A = 0.0644 \, mM$$ $$K_I = 0.421 \, mM$$ $$R^2 = 0.92$$	
B. Multiple Substrate (Acetate and Glucose, $\mu_m = \mu_G = 0.65 \, h^{-1}, \mu_A = 0.4 \, h^{-1}, K_G = 0.005 \, mM$)	
B1. Dagley and Hinshelwood $$\mu = \mu_m \left(\frac{G}{K_G + G} \right)(1 - KA)$$ $$K = 0.696 \, mM^{-1}$$ $$R^2 = 0.97$$	
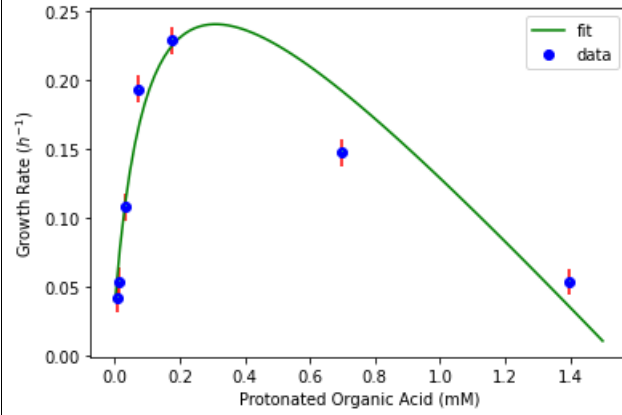
B2.
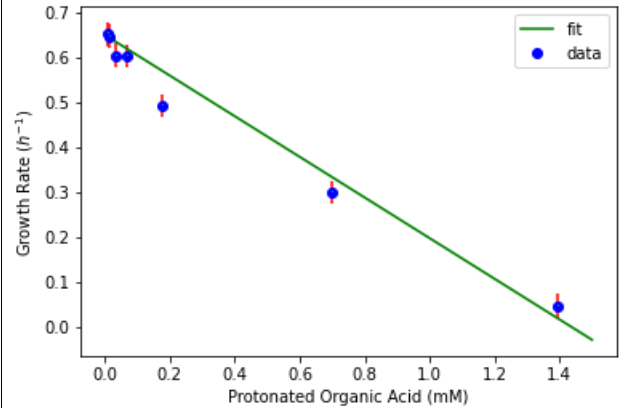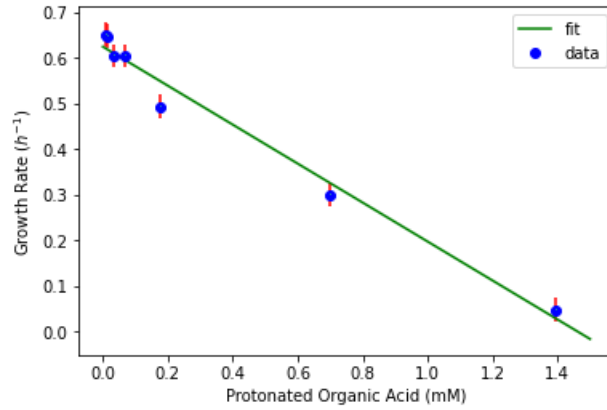
Holzberg and co-workers

$$\mu = \mu_m - K(A - K_I)$$

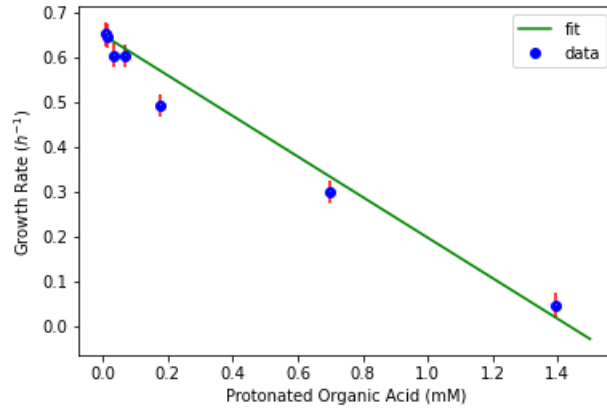$$K = 0.427 \, h^{-1}$$
$$K_I = -0.060 \, mM$$
$$R^2 = 0.98$$

B3.

Ghose and Tyagi

$$\mu = \mu_m \left(1 - \frac{A}{A^*}\right)\left(\frac{G}{K_G + G}\right)$$
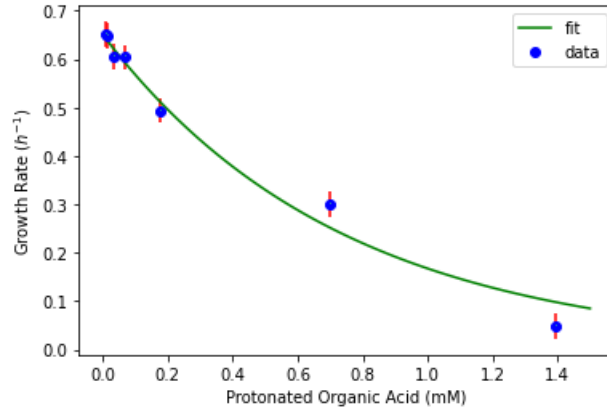
$$A^* = 1.44 \, mM$$
$$R^2 = 0.97$$

B4.

Aiba and co-workers

$$\mu = \mu_m \left(\frac{G}{K_G + G}\right) e^{-KA}$$
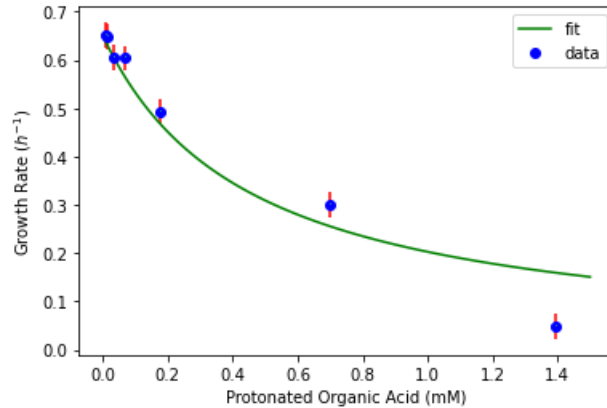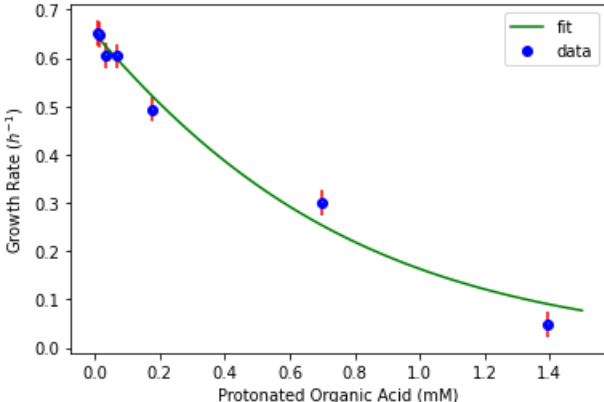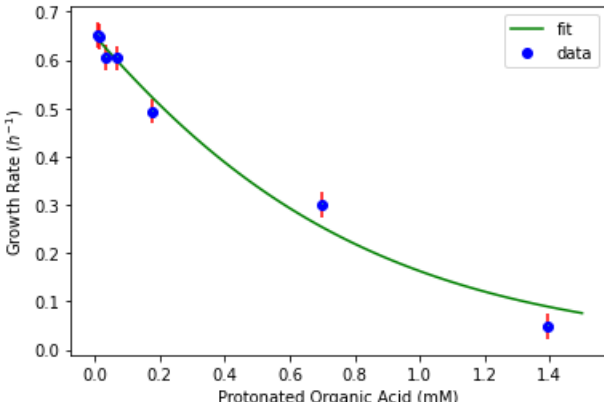
$$K = 1.356 \, mM^{-1}$$
$$R^2 = 0.98$$

B5.

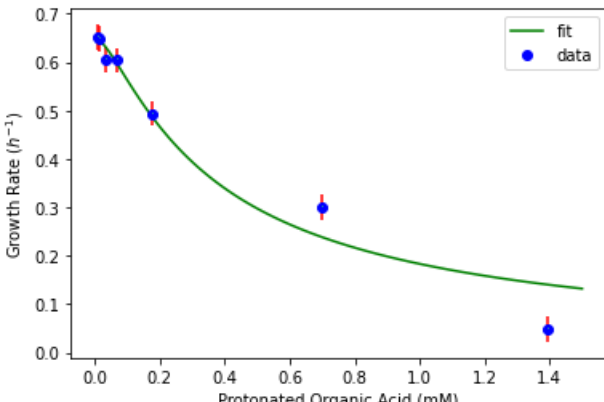Jerusalimsky and Neronova

$$\mu = \mu_m \left(\frac{G}{K_G + G}\right)\left(\frac{K_I}{K_I + A}\right)$$

$$K_I = 0.453 \, mM$$
$$R^2 = 0.95$$

B6.

Aiba and co-workers dual substrate derivative

$$\mu = \left[\mu_G\left(\frac{G}{K_G + G}\right) + \mu_A\left(\frac{A}{K_A + A}\right)\right]e^{-\alpha A}$$

$$K_A = 1.54\ mM$$
$$\alpha = 1.60\ mM^{-1}$$
$$R^2 = 0.98$$

B7.

Aiba and co-workers dual substrate derivative (single μ)

$$\mu = \mu_m\left[\left(\frac{G}{K_G + G}\right) + \left(\frac{A}{K_A + A}\right)\right]e^{-\alpha A}$$

$$K_A = 2.06\ mM$$
$$\alpha = 1.67\ mM^{-1}$$
$$R^2 = 0.98$$

B8.

Classic model dual substrate derivative

$$\mu = \left[\mu_G\left(\frac{G}{K_G + G}\right) + \mu_A\left(\frac{A}{K_A + A}\right)\right]\left(\frac{K_I}{K_I + A}\right)$$

$$K_A = 0.145\ mM$$
$$K_I = 0.224\ mM$$
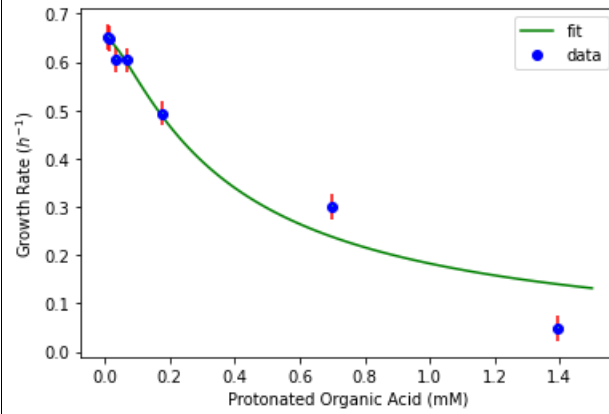$$R^2 = 0.96$$

B9.

Classic model dual substrate
derivative
(single μ)

$$\mu = \mu_m \left[\left(\frac{G}{K_G + G} \right) + \left(\frac{A}{K_A + A} \right) \right] \left(\frac{K_I}{K_I + A} \right)$$

$$K_A = 0.186 \ mM$$
$$K_I = 0.180 \ mM$$
$$R^2 = 0.96$$
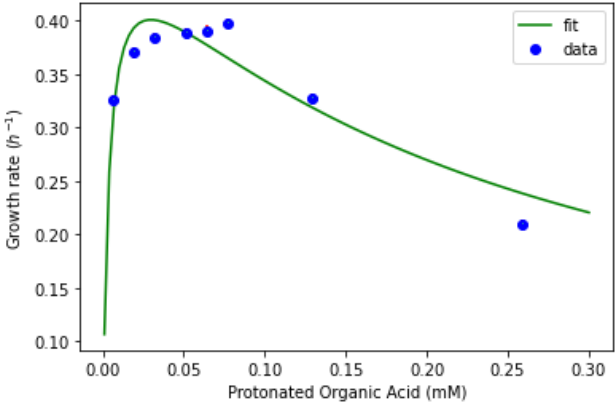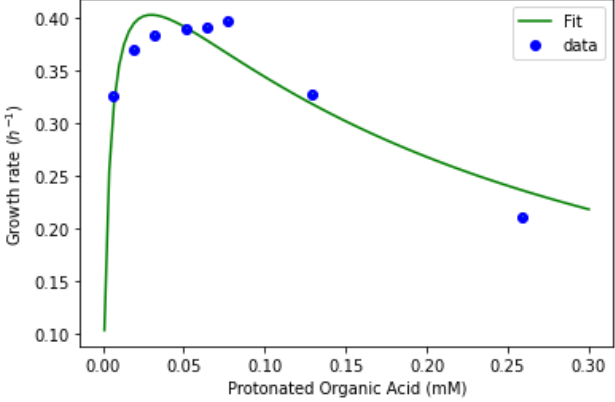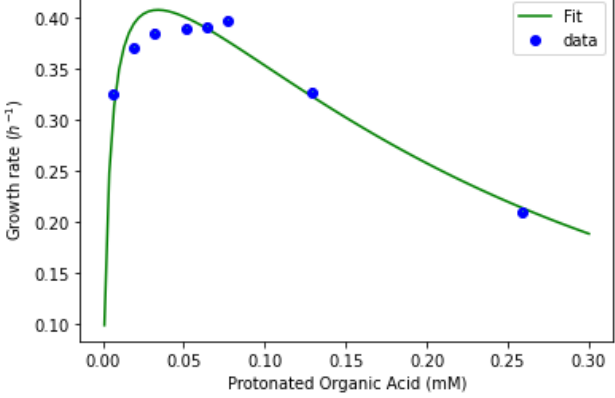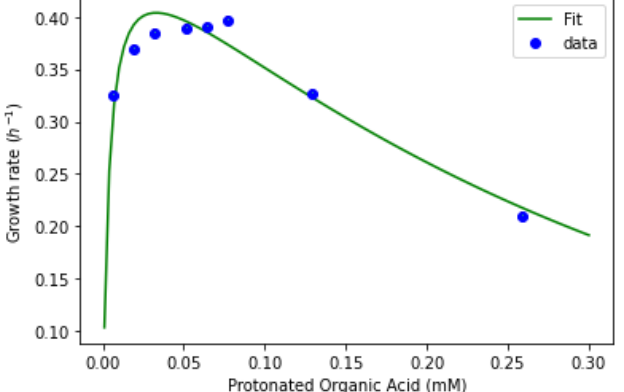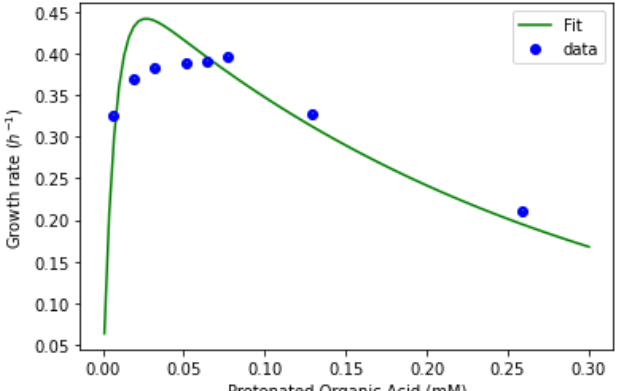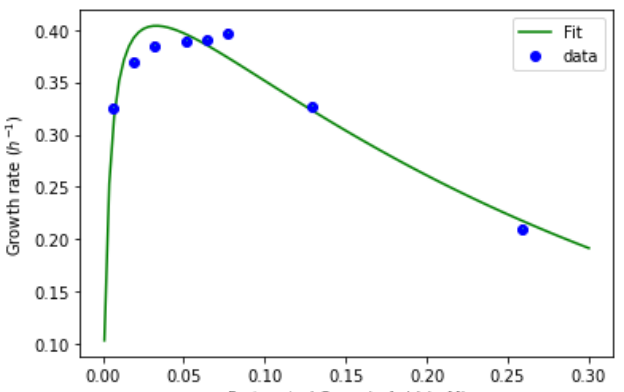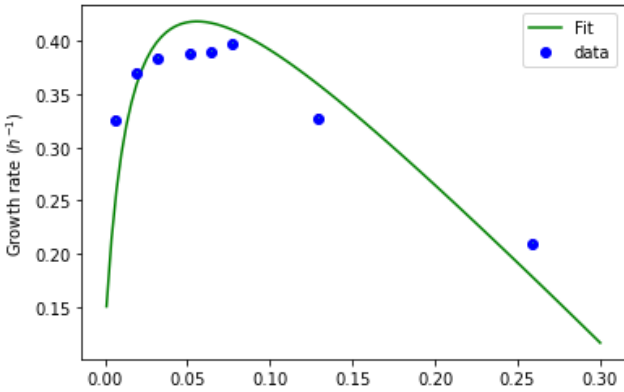
Supplemental Table S2. (A) Parameterized inhibition model fits for lactate as sole substrate.

(B) Parameterized inhibition model fits for lactate as a dual substrate with glucose. References

for model equations can be found in Han and Levenspiel, 1988.

A. Single Substrate (Lactate Only, $\mu_m = 0.5$)	
A1. Andrews and Noack $$\mu = \mu_m \left(\frac{1}{1 + \frac{K_L}{L} + \frac{L}{K_I}} \right)$$ $K_L = 0.0037\ mM$ $K_I = 0.239\ mM$ $R^2 = 0.89$	
A2. Webb $$\mu = \mu_m \left(\frac{L\left(1 + \frac{K_L}{K_I}\right)}{K_L + L + \frac{L^2}{K_I}} \right)$$ $K_L = 0.00393\ mM$ $K_I = 0.227\ mM$ $R^2 = 0.89$	
A3. Yano and co-workers $$\mu = \mu_m \left(\frac{1}{1 + \frac{K_L}{L} + \frac{L}{K_I} + \left(\frac{L}{K_I}\right)^2} \right)$$ $K_L = 0.0040\ mM$ $K_I = 0.343\ mM$ $R^2 = 0.92$	

A4. Aiba and co-workers $$\mu = \mu_m \left(\frac{L}{K_L + L} \right) e^{-\frac{L}{K_I}}$$ $K_L = 0.00382 \; mM$ $K_I = 0.317 \; mM$ $R^2 = 0.93$	
A5. Tessier-Type $$\mu = \mu_m \left[e^{-\frac{L}{K_I}} - e^{-\frac{L}{K_L}} \right]$$ $K_L = 0.00712 \; mM$ $K_I = 0.275 \; mM$ $R^2 = 0.64$	
A6. Webb (with σ) $$\mu = \mu_m \left(\frac{L}{L + K_L \left(1 + \frac{\sigma}{K_I}\right)} \right) e^{1.17L\sigma}$$ $K_L = 0.00050 \; mM$ $K_I = -0.41 \; mM$ $\sigma = -2.70 \; mM$ $R^2 = 0.93$	
A7. Wayman and Tseng $$\mu = \mu_m \left(\frac{L}{K_L + L} \right), L < L'$$ $$\mu = \mu_m \left(\frac{L}{K_L + L} \right) - K_I(L - L'),$$ $$L > L'$$ L' = 0.078 mM $K_L = 0.0169 \; mM$ $K_I = 3.21 \; mM$ $R^2 = 0.66$	

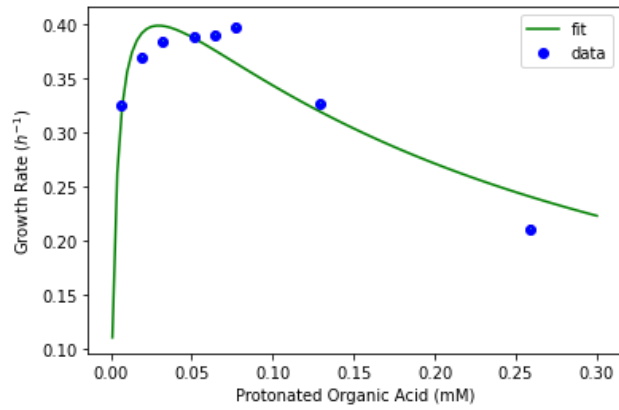|	
A8. Classic Model $$\mu = \mu_m \left(\frac{L}{L + K_L} \right) \left(\frac{K_I}{K_I + L} \right)$$ $K_L = 0.0035 \ mM$ $K_I = 0.246 \ mM$ $R^2 = 0.89$	

B. Multiple Substrate (Lactate and Glucose, $\mu_m = \mu_G = 0.65, \mu_L = 0.5, K_G = 0.005$)
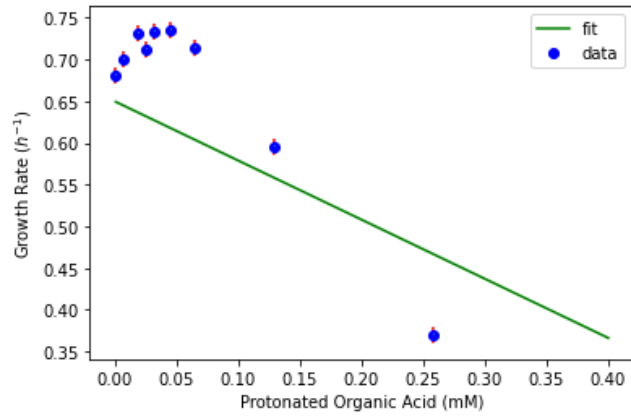
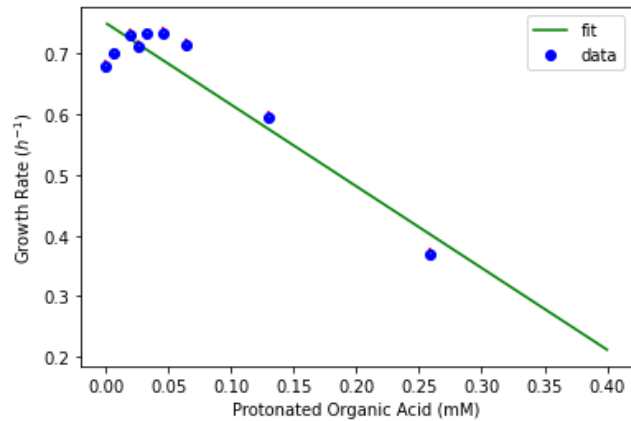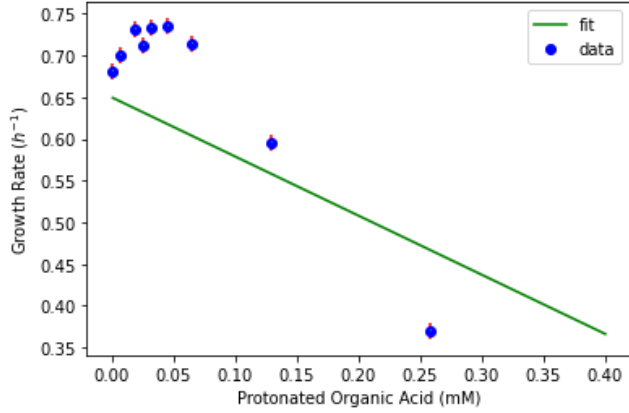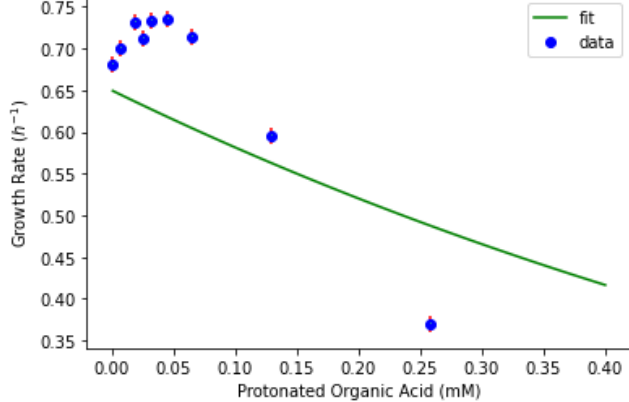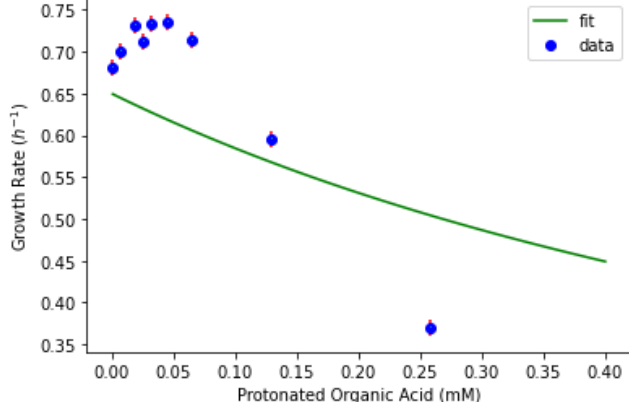|	
B1. Dagley and Hinshelwood $$\mu = \mu_m \left(\frac{G}{K_G + G} \right) (1 - KL)$$ $K = 1.092 \ mM$ $R^2 = 0.4$	
B2. Holzberg and co-workers $$\mu = \mu_m - K(L - K_I)$$ $K = 1.347 \ mM$ $K_I = 0.075 \ mM$ $R^2 = 0.88$	

B3.

Ghose and Tyagi

$$\mu = \mu_m \left(1 - \frac{L}{L^*}\right)\left(\frac{G}{K_G + G}\right)$$

$$L^* = 0.916 \, mM$$
$$R^2 = 0.40$$

B4.

Aiba and co-workers

$$\mu = \mu_m \left(\frac{G}{K_G + G}\right) e^{-KL}$$

$$K = 1.11 \, mM^{-1}$$
$$R^2 = 0.36$$

B5.

Jerusalimsky and Neronova

$$\mu = \mu_m \left(\frac{G}{K_G + G}\right)\left(\frac{K_I}{K_I + L}\right)$$

$$K_I = 0.894 \, mM$$
$$R^2 = 0.33$$

B6.

Aiba and co-workers dual substrate derivative (single μ)

$$\mu = \mu_m \left[\left(\frac{G}{K_G + G}\right) + \left(\frac{L}{K_L + L}\right)\right] e^{-\alpha L}$$

$$K_L = 0.0743 \, mM$$
$$\alpha = 4.44 \, mM^{-1}$$

$R^2 = 0.98$	
B7. Classic model dual substrate derivative (single μ) μ $= \mu_c \left[\left(\dfrac{G}{K_G + G} \right) + \left(\dfrac{L}{K_L + L} \right) \right] \left(\dfrac{K_I}{K_I + L} \right)$ $K_L = 0.0459 \ mM$ $K_I = 0.132 \ mM$ $R^2 = 0.96$	