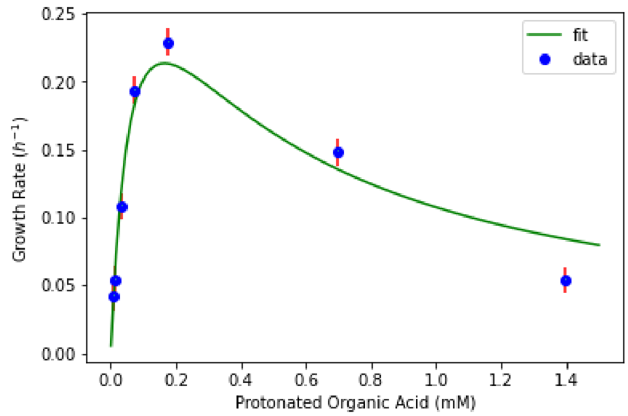
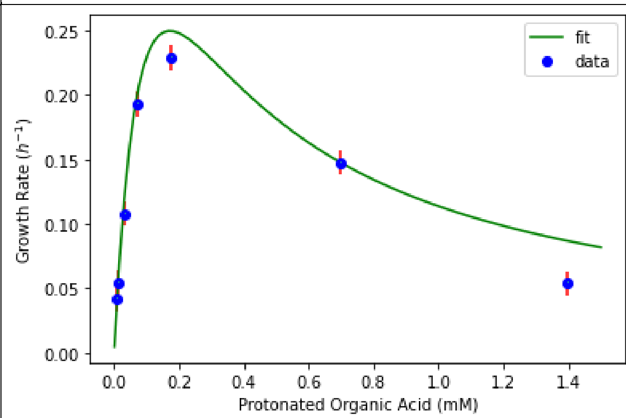
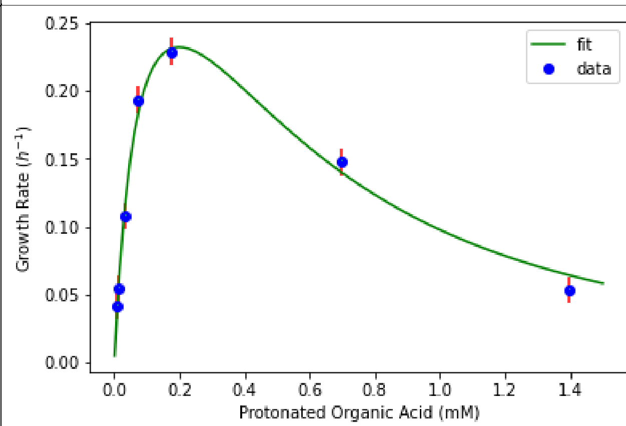
Supplementary material sheet 1. (A) Parameterized inhibition model fits for acetate as sole substrate. **(B)** Parameterized inhibition model fits for acetate as a product with glucose as the main substrate. References for model equations can be found in Han and Levenspiel, 1988.

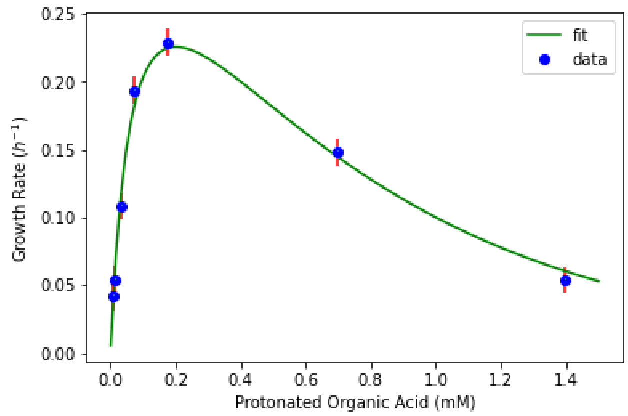
A. Single Substrate (Acetate Only, $\boldsymbol{\mu_m = 0.4\ h^{-1}}$)	
A1. Andrews and Noack $\mu = \mu_m \left(\frac{1}{1 + \frac{K_A}{A} + \frac{A}{K_I}} \right)$ $K_A = 0.072\ mM$ $K_I = 0.378\ mM$ $R^2 = 0.94$	
A2. Webb $\mu = \mu_m \left(\frac{A\left(1 + \frac{K_A}{K_I}\right)}{K_A + A + \frac{A^2}{K_I}} \right)$ $K_A = 0.128\ mM$ $K_I = 0.230\ mM$ $R^2 = 0.94$	
A3. Yano and co-workers $\mu = \mu_m \left(\frac{1}{1 + \frac{K_A}{A} + \frac{A}{K_I} + \left(\frac{A}{K_I}\right)^2} \right)$ $K_A = 0.128\ mM$ $K_I = 0.230\ mM$ $R^2 = 0.98$	

A4.

Aiba and co-workers

$$\mu = \mu_m \left(\frac{A}{K_A + A} \right) e^{-\frac{A}{K_I}}$$

$$K_A = 0.0723\ mM$$
$$K_I = 0.760\ mM$$
$$R^2 = 0.98$$

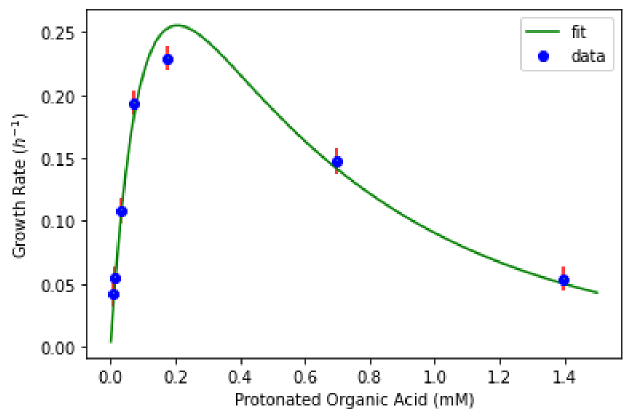


A5.

Tessier-Type

$$\mu = \mu_m \left[e^{-\frac{A}{K_I}} - e^{-\frac{A}{K_A}} \right]$$

$$K_A = 0.0885\ mM$$
$$K_I = 0.672\ mM$$
$$R^2 = 0.97$$

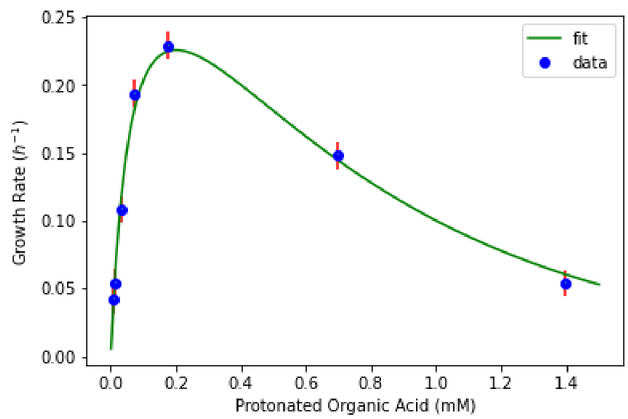


A6.

Webb (with σ)

$$\mu = \mu_m \left(\frac{A}{A + K_A \left(1 + \frac{\sigma}{K_I} \right)} \right) e^{1.17\sigma A}$$

$$K_A = 0.846\ mM$$
$$K_I = 1.23\ mM$$
$$\sigma = -1.12\ mM$$
$$R^2 = 0.98$$



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A7.

Wayman and Tseng

$$\mu = \mu_m \left(\frac{A}{K_A + A}\right), A < A'$$

$$\mu = \mu_m \left(\frac{A}{K_A + A}\right) - K_I(A - A'),$$
$$A > A'$$

$A' = 0.139\ mM$

$K_A = 0.124\ mM$

$K_I = 0.659\ mM$

$R^2 = 0.88$

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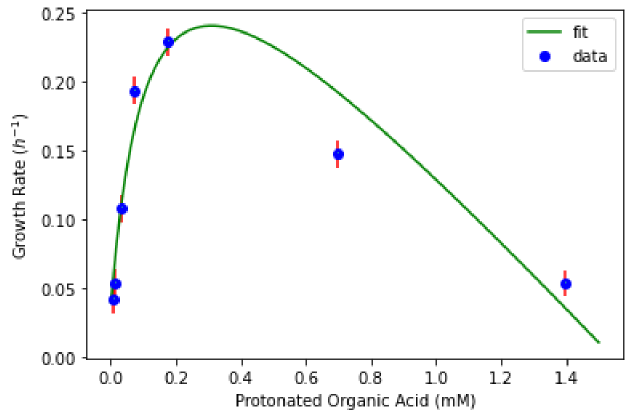

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A8.

Classic model

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

$K_A = 0.0644\ mM$

$K_I = 0.421\ mM$

$R^2 = 0.92$

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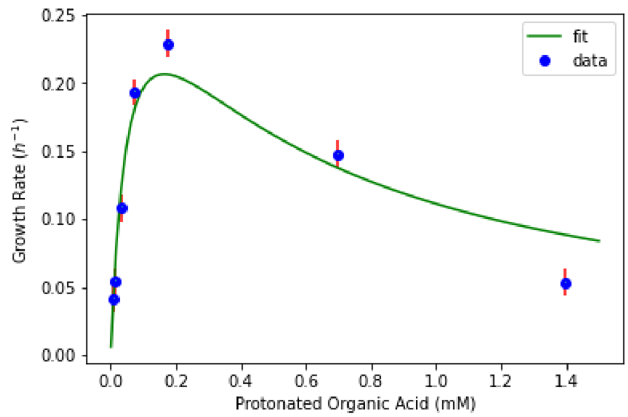

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B. Multiple Substrate (Acetate and Glucose, $\boldsymbol{\mu_m = \mu_G = 0.65\ h^{-1}, \mu_A = 0.4\ h^{-1}, K_G = 0.005\ mM}$)

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B1.

Dagley and Hinshelwood

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

$K = 0.696\ mM^{-1}$

$R^2 = 0.97$

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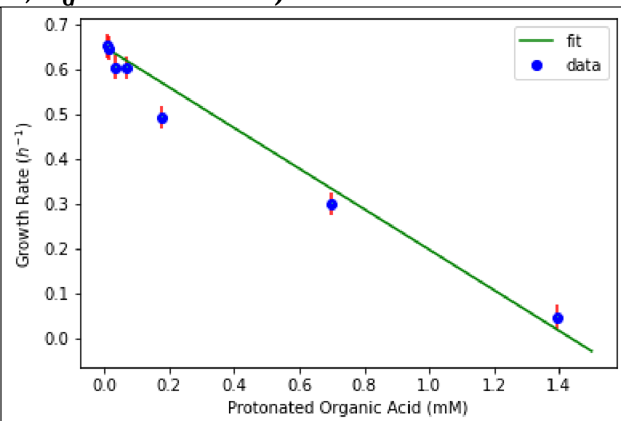

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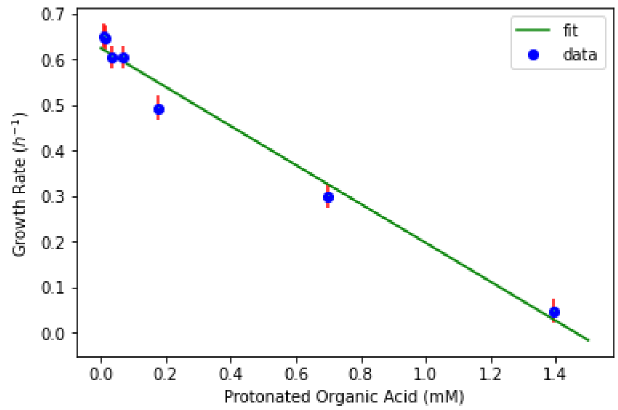
B2.

Holzberg and co-workers

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

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

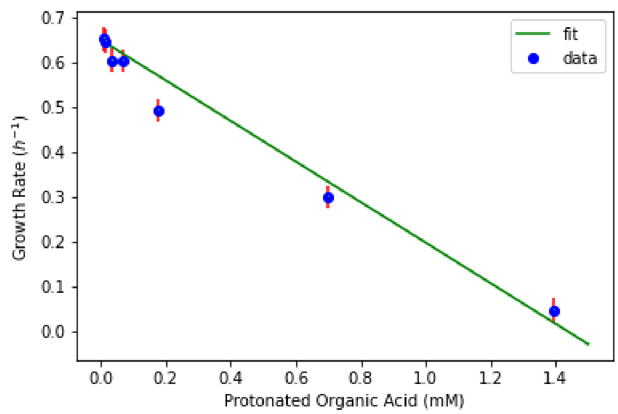


B3.

Ghose and Tyagi

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

$$A^* = 1.44\ mM$$
$$R^2 = 0.97$$

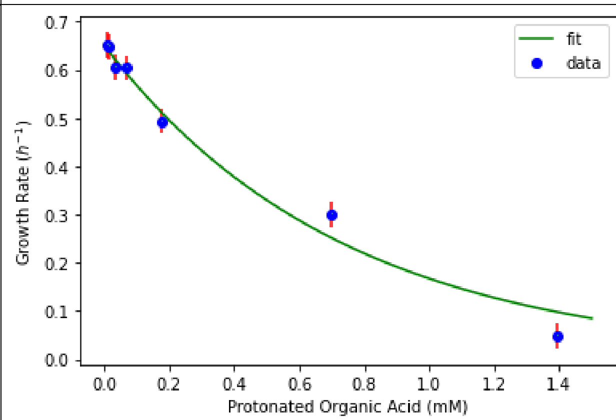


B4.

Aiba and co-workers

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

$$K = 1.356\ mM^{-1}$$
$$R^2 = 0.98$$

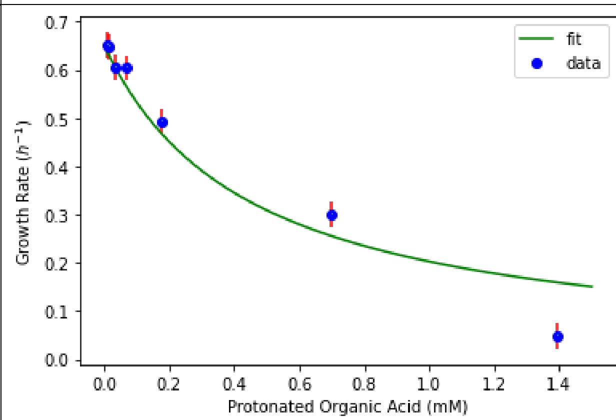


B5.

Jerusalimsky and Neronova

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

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

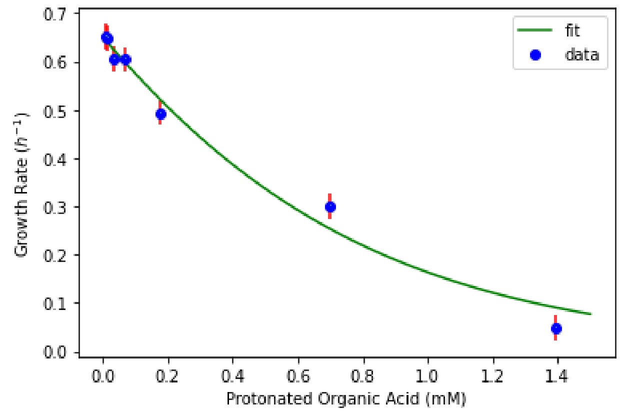


B6.

Aiba and co-workers dual substrate derivative

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

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

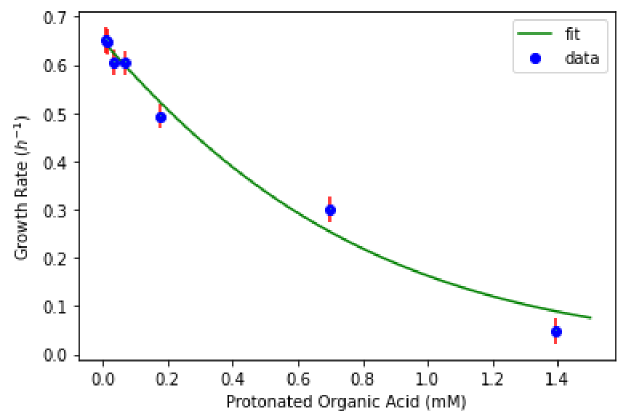


B7.

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

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

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

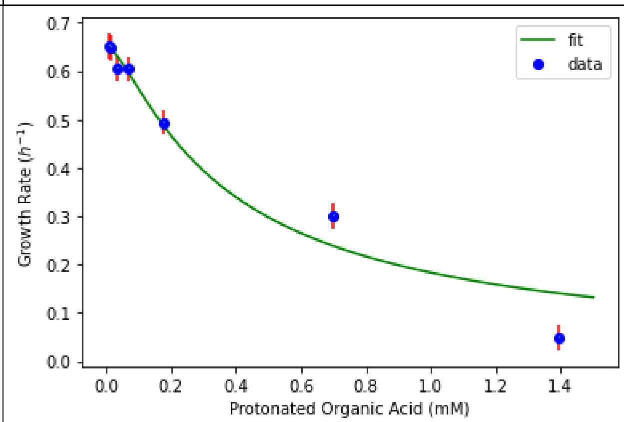


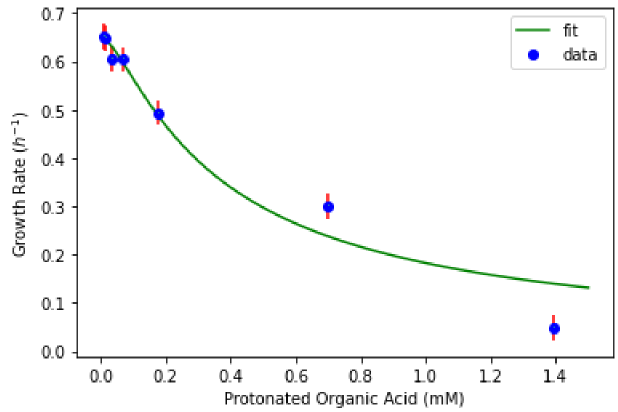
B8.

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.

<table>
<tr><th colspan="2">A. Single Substrate (Lactate Only, $\mu_m = 0.5$)</th></tr>
<tr><td>

A1.

Andrews and Noack

$$\mu = \mu_m \left(\frac{1}{1 + \frac{K_L}{L} + \frac{L}{K_I}} \right)$$

$K_L = 0.0037\ mM$
$K_I = 0.239\ mM$
$R^2 = 0.89$

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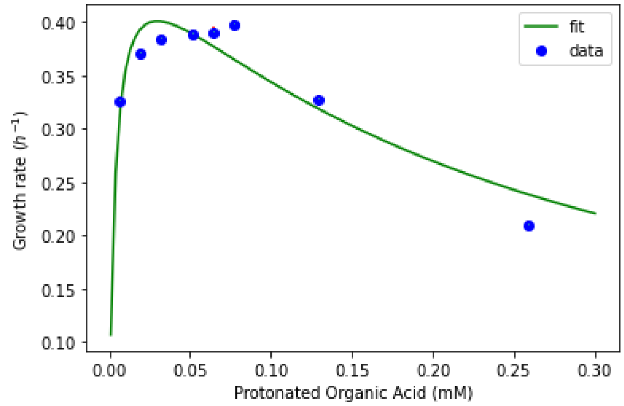

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A2.

Webb

$$\mu = \mu_m \left(\frac{L\left(1 + \frac{K_L}{K_I}\right)}{K_L + L + \frac{L^2}{K_I}} \right)$$

$K_L = 0.00393\ mM$
$K_I = 0.227\ mM$
$R^2 = 0.89$

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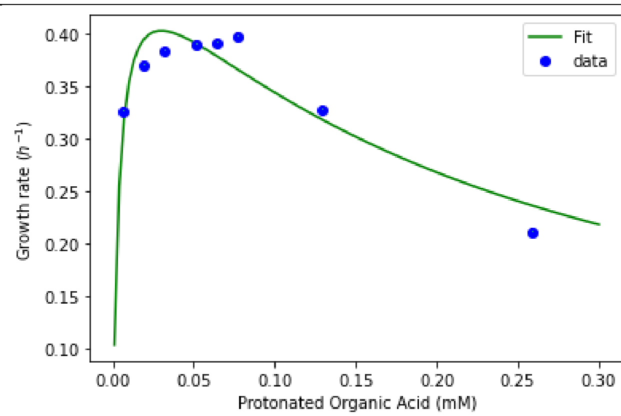

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A3.

Yano and co-workers

$$\mu = \mu_m \left(\frac{1}{1 + \frac{K_L}{L} + \frac{L}{K_I} + \left(\frac{L}{K_I}\right)^2} \right)$$

$K_L = 0.0040\ mM$
$K_I = 0.343\ mM$
$R^2 = 0.92$

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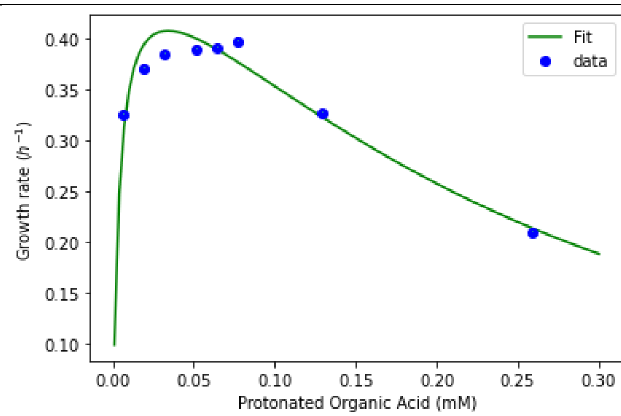

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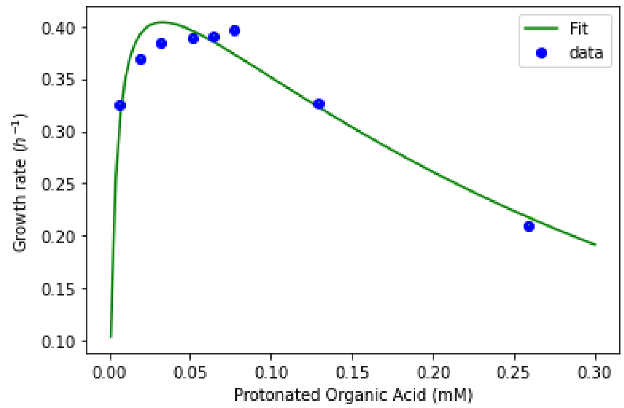
A4.

Aiba and co-workers

$$\mu = \mu_m \left(\frac{L}{K_L + L}\right) e^{-\frac{L}{K_I}}$$

$$K_L = 0.00382\ mM$$
$$K_I = 0.317\ mM$$
$$R^2 = 0.93$$

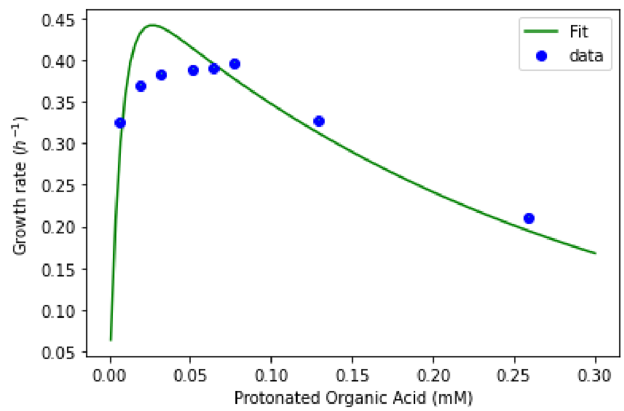


A5.

Tessier-Type

$$\mu = \mu_m \left[e^{-\frac{L}{K_I}} - e^{-\frac{L}{K_L}}\right]$$

$$K_L = 0.00712\ mM$$
$$K_I = 0.275\ mM$$
$$R^2 = 0.64$$

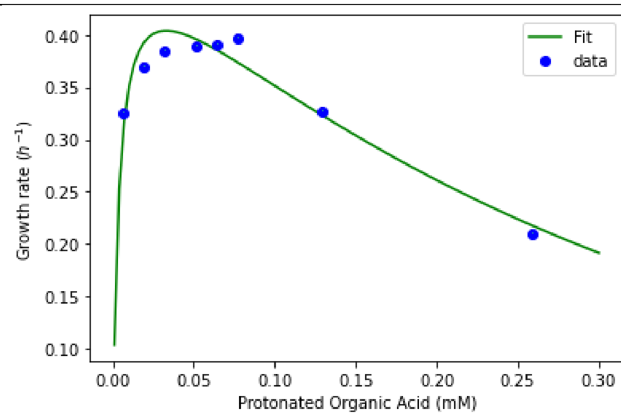


A6.

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.

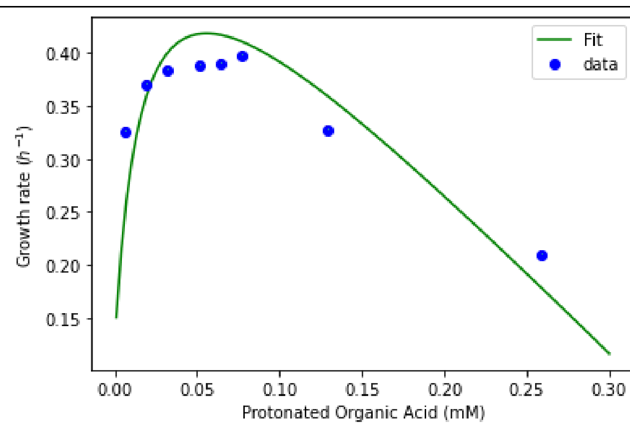
Wayman and Tseng

$$\mu = \mu_m \left(\frac{L}{K_L + L}\right), L < L'$$

$$\mu = \mu_m \left(\frac{L}{K_L + L}\right) - K_I(L - L'),$$
$$L > L'$$

L' = 0.078 mM

$$K_L = 0.0169\ mM$$
$$K_I = 3.21\ mM$$
$$R^2 = 0.66$$

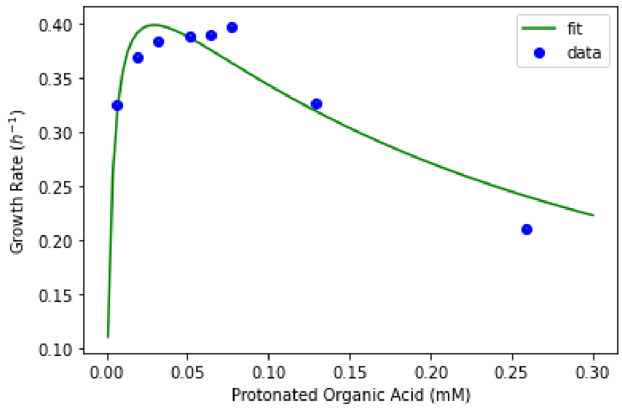


A8.

Classic Model

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

$$K_L = 0.0035\ mM$$
$$K_I = 0.246\ mM$$
$$R^2 = 0.89$$



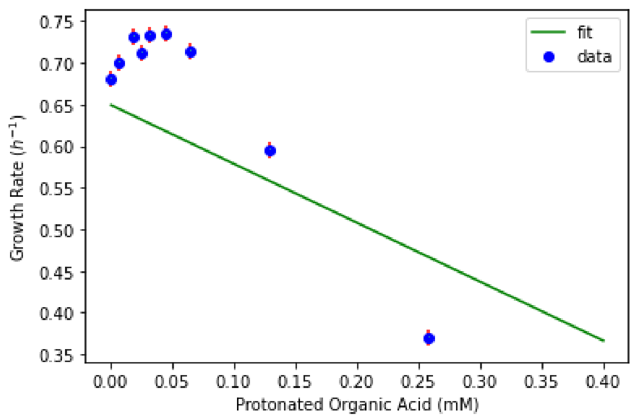
B. Multiple Substrate (Lactate and Glucose, $\boldsymbol{\mu_m = \mu_G = 0.65, \mu_L = 0.5, K_G = 0.005}$)

B1.

Dagley and Hinshelwood

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

$$K = 1.092\ mM$$
$$R^2 = 0.4$$

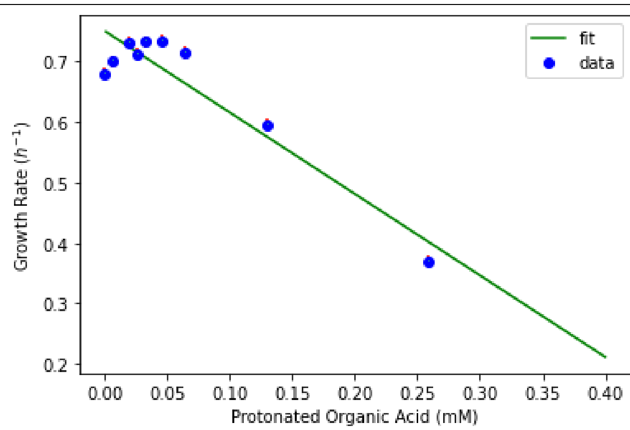


B2.

Holzberg and co-workers

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

$$K = 1.347\ mM$$
$$K_I = 0.075\ mM$$
$$R^2 = 0.88$$

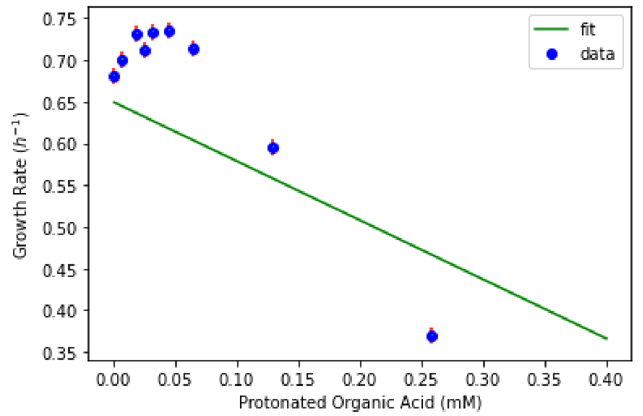


B3.

Ghose and Tyagi

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

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

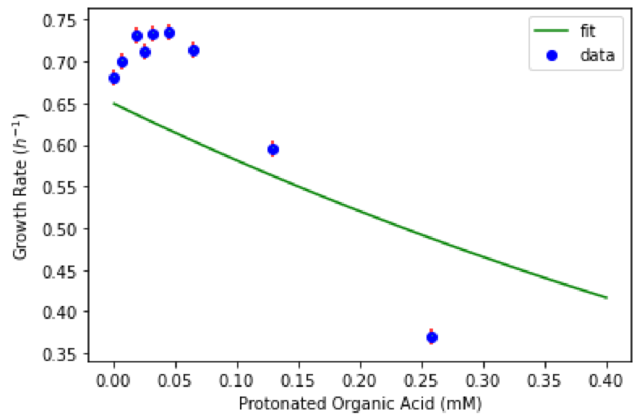


B4.

Aiba and co-workers

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

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

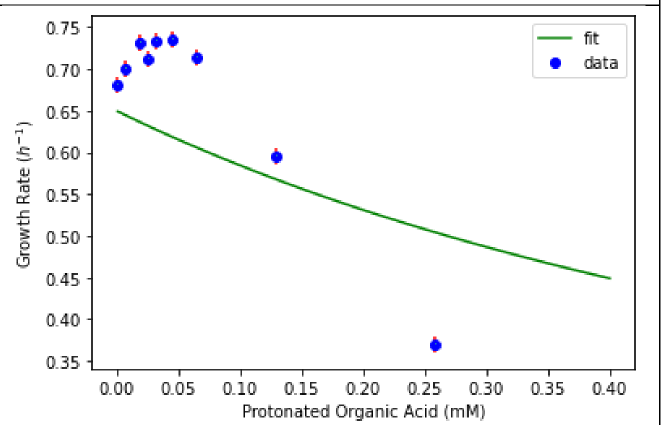


B5.

Jerusalimsky and Neronova

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

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

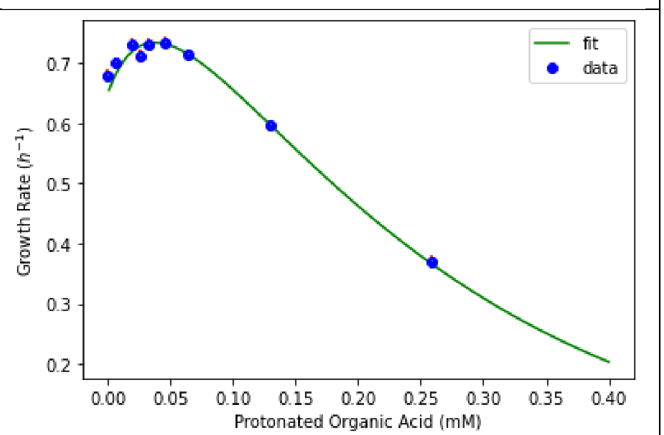


B6.

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) $\mu = \mu_c\left[\left(\frac{G}{K_G + G}\right) + \left(\frac{L}{K_L + L}\right)\right]\left(\frac{K_I}{K_I + L}\right)$ $K_L = 0.0459\ mM$ $K_I = 0.132\ mM$ $R^2 = 0.96$