**1a. Growth rate predictions (h-1) for *C. beijerinckii***

carbon\_sources = {

'Glucose': 0.35,

'Lactate': 0.21,

'Acetate': 0.00,

'CO2/H2': 0.00,

'Glucose + Acetate': 0.42,

'Lactate + Acetate': 0.28,

'Glycerol + Acetate': 0.25

}

1b. Growth rate predictions (h-1) for *C. carboxidivorans*

carb\_sources = {

'Glucose': 0.22,

'CO2/H2': 0.15,

'Acetate': 0.00,

'CO2/H2 + Glucose': 0.28,

'CO + CO2/H2': 0.18,

'Syngas': 0.16

}

**2. Steady-state metabolic fluxes in co-culture system**

import { BarChart, Bar, XAxis, YAxis, CartesianGrid, Tooltip, Legend } from 'recharts';

const data = [

{

name: 'CO₂ uptake (Ccar)',

flux: -5.2,

fill: '#8884d8'

},

{

name: 'H₂ uptake (Ccar)',

flux: -10.4,

fill: '#8884d8'

},

{

name: 'Acetate prod (Ccar)',

flux: 4.8,

fill: '#8884d8'

},

{

name: 'Acetate uptake (Cbei)',

flux: -3.2,

fill: '#82ca9d'

},

{

name: 'Lactate uptake (Cbei)',

flux: -2.5,

fill: '#82ca9d'

},

{

name: 'Butyrate prod (Cbei)',

flux: 2.1,

fill: '#82ca9d'

},

{

name: 'CO₂ recycling',

flux: 1.8,

fill: '#ffc658'

},

{

name: 'H₂ recycling',

flux: 2.2,

fill: '#ffc658'

}

];

export default () => (

<div className="w-full">

<BarChart width={800} height={400} data={data} margin={{top: 20, right: 30, left: 20, bottom: 5}}>

<CartesianGrid strokeDasharray="3 3"/>

<XAxis dataKey="name" angle={45} textAnchor="start" height={100}/>

<YAxis label={{ value: 'Flux (mmol/L/h)', angle: -90, position: 'insideLeft' }}/>

<Tooltip/>

<Legend />

<Bar dataKey="flux" name="Metabolic Flux"/>

</BarChart>

</div>

);

**3. Co-culture feasibility heatmap**

const generateHeatmapData = () => {

const growthRates = [0.01, 0.02, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.09, 0.10];

const speciesRatios = [0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9];

// Simulate feasibility scores based on experimental predictions

return speciesRatios.map(ratio => ({

ratio,

values: growthRates.map(rate => {

let score;

// Optimal region

if ((ratio >= 0.3 && ratio <= 0.5) && (rate >= 0.02 && rate <= 0.05)) {

score = 1;

}

// Suboptimal but feasible

else if ((ratio >= 0.2 && ratio <= 0.7) && (rate >= 0.01 && rate <= 0.07)) {

score = 0.6;

}

// Marginal

else if ((ratio >= 0.1 && ratio <= 0.8) && (rate >= 0.01 && rate <= 0.08)) {

score = 0.3;

}

// Infeasible

else {

score = 0;

}

return score;

})

}));

};

export default () => {

const data = generateHeatmapData();

return (

<div className="w-full p-4">

<div className="text-center font-bold mb-4">Growth Feasibility Heatmap</div>

<div className="flex">

<div className="mr-4 flex flex-col justify-between text-sm">

<div>0.9</div>

<div>0.8</div>

<div>0.7</div>

<div>0.6</div>

<div>0.5</div>

<div>0.4</div>

<div>0.3</div>

<div>0.2</div>

<div>0.1</div>

</div>

<div>

<div className="flex">

{[0.01, 0.02, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.09, 0.10].map((rate, i) => (

<div key={i} className="text-sm transform -rotate-45 origin-left ml-8">{rate.toFixed(2)}</div>

))}

</div>

<div className="flex mt-8">

{data.map((row, i) => (

<div key={i} className="flex flex-col">

{row.values.map((value, j) => (

<div

key={j}

className="w-8 h-8 border border-gray-200"

style={{

backgroundColor: value === 1 ? '#006400' :

value === 0.6 ? '#90EE90' :

value === 0.3 ? '#FFB6C1' : '#FFFFFF'

}}

/>

))}

</div>

))}

</div>

<div className="mt-4 text-sm">Growth Rate (h⁻¹)</div>

</div>

</div>

<div className="transform -rotate-90 origin-left translate-y-20 text-sm">Species Ratio (C. carboxidivorans fraction)</div>

<div className="mt-8 flex justify-center items-center gap-4">

<div className="flex items-center">

<div className="w-4 h-4 bg-[#006400] mr-2"></div>

<span className="text-sm">Optimal</span>

</div>

<div className="flex items-center">

<div className="w-4 h-4 bg-[#90EE90] mr-2"></div>

<span className="text-sm">Feasible</span>

</div>

<div className="flex items-center">

<div className="w-4 h-4 bg-[#FFB6C1] mr-2"></div>

<span className="text-sm">Marginal</span>

</div>

<div className="flex items-center">

<div className="w-4 h-4 bg-white border border-gray-200 mr-2"></div>

<span className="text-sm">Infeasible</span>

</div>

</div>

</div>

);

};