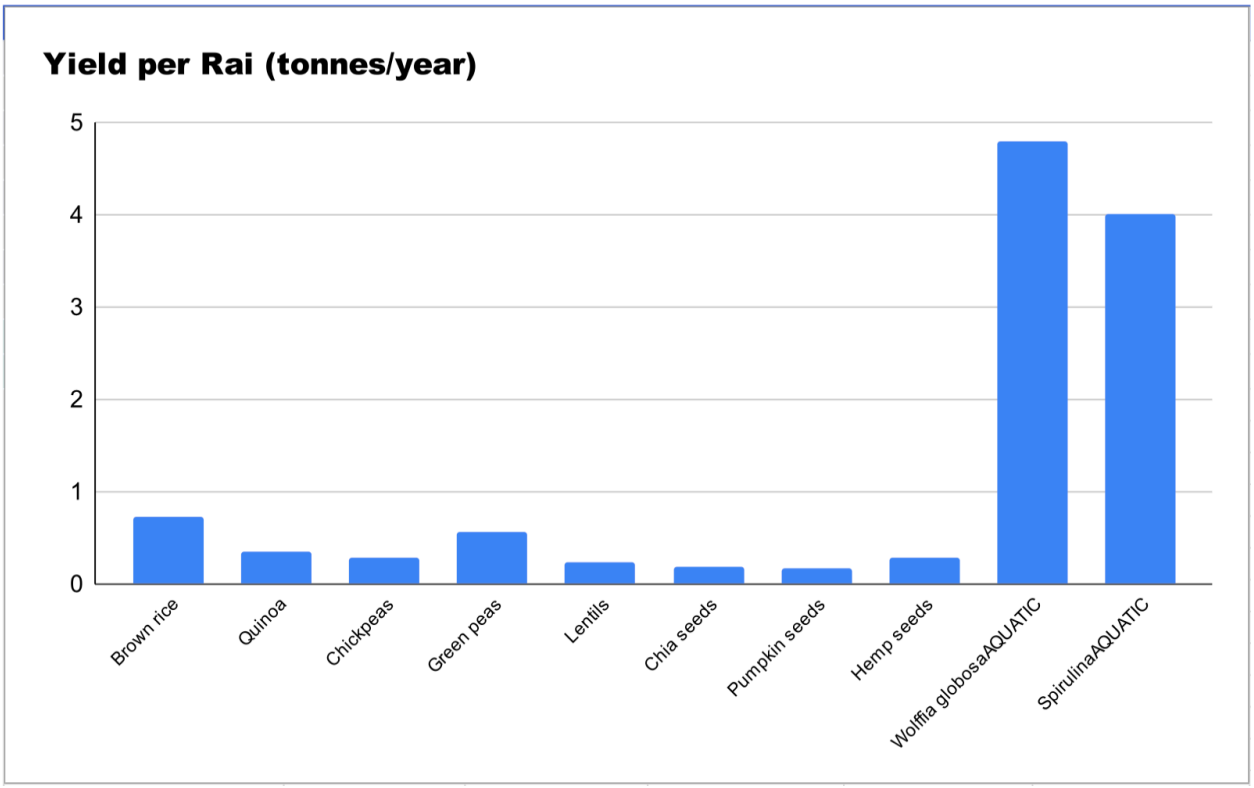
Charts & Graphs

Plant Based and Superfoods Protein Content (% of dry weight)	
Plants	Protein percentage of dry weighty
Brown Rice	8%
Quinoa	14%
Chickpeas	20%
Green Peas	25%
Lentils	26%
Chia Seeds	17%
Pumpkin Seeds	30%
Hemp Seeds	32%
Wolffia Globosa (ไข่ผำ)	45%
Spirulina	60%

Summary

Wolffia Globosa and Spirulina has much higher portein content as a percentage of dry weight than many other High Protein Plant-Based food options by a factor of 2-4x on average.

Plant Name ↕	Yield (t/ha/yr) ↕	Yield (t/rai/yr) ↕	Doubling Time ↕	Harvests/Year ↕	Efficiency Score ↕
Brown rice	4.5	0.72	90-120 days	2	6.2
Quinoa	2.2	0.35	60-90 days	2	5.8
Chickpeas	1.8	0.29	90-100 days	1	4.5
Green peas	3.5	0.56	60-70 days	2	6.8
Lentils	1.5	0.24	80-110 days	1	4.2
Chia seeds	1.2	0.19	90-120 days	1	3.8
Pumpkin seeds	1	0.16	90-100 days	1	3.5
Hemp seeds	1.8	0.29	90-120 days	1	4.6
Wolffia globosaAQUATIC	30	4.8	1.5-2 days	365	10
SpirulinaAQUATIC	25	4	2-5 days	365	9.7



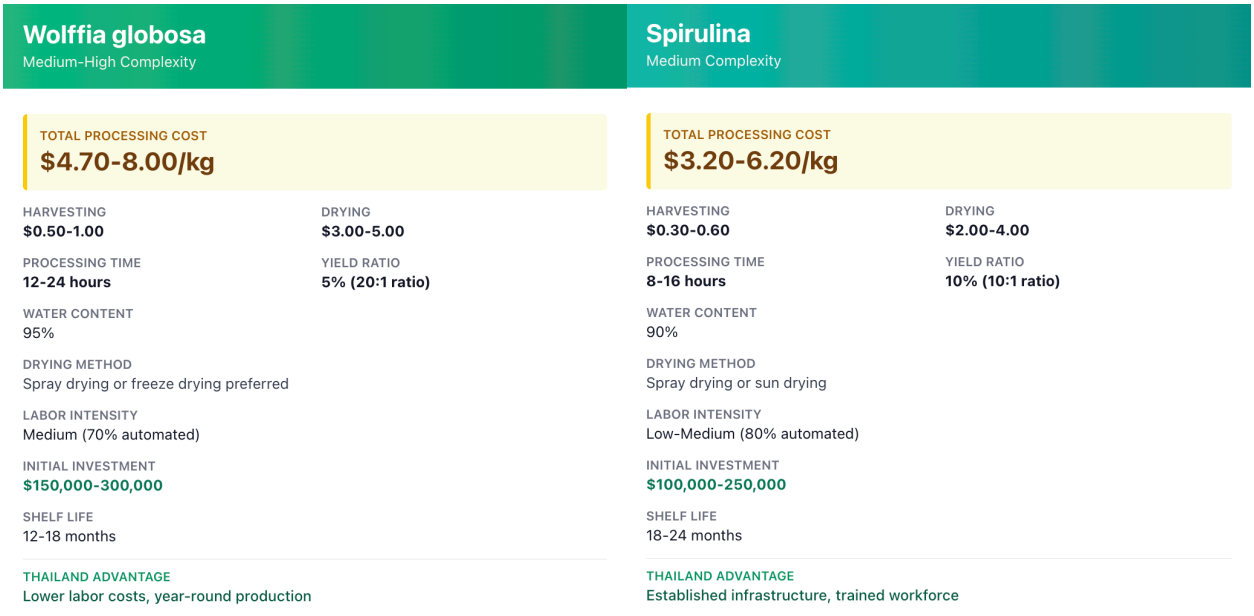
Summary

Wolffia Globosa or ไข่ผำ can be harvested all year round with minimal Doubling Time. For the same amount of Land or Real Estate, Wolffia Globosa yields much more volume than other High Protein Plant-Based food options. However, Spirulina also shares the same efficiency features.

Metric	Wolffia Globosa	Spirulina	Comparison
Global Market Size (2024)	$15-20M	$700-800M	40-50x larger
Export Volumes (2024)	200-300 tonnes	15,000-20,000 tonnes	60-75x larger
Number of Products Globally	50-80	5,000+	65-100x more
Number of Products (Thailand)	15-25	200-300	10-15x more
Market Maturity	Emerging	Mature	N/A
Consumer Awareness	5-10%	60-70%	6-14x higher
Growth Rate (CAGR)	35-45%	8-10%	4-5x faster
Average Retail Price/kg	$40-80	$15-40	2-3x higher

Summary

Comparing Wolffia Globosa to Spirulina as a competitor, we can see that the market growth potential for ไข่ผำ is drastically more attractive than the saturated Spirulina market. We can also witness that the average selling price/kg for Wolffia Globosa is 2-3x greater than Spirulina



$ Detailed Cost Breakdown per Kilogram

Cost Component	Wolffia Globosa	Spirulina	Notes
Harvesting	$0.50–1.00/kg fresh	$0.30–0.60/kg fresh	Wolffia: More delicate handling Spirulina: Easier filtration
Drying (largest cost)	$3.00–5.00/kg dried	$2.00–4.00/kg dried	Wolffia: Higher water content (95%) Spirulina: Lower water content (90%)
Milling/Grinding	$0.30–0.50/kg	$0.20–0.40/kg	Wolffia: Fine powder required Spirulina: Standard processing
Quality Control	$0.40–0.60/kg	$0.30–0.50/kg	Wolffia: Emerging standards Spirulina: Established protocols
Packaging	$0.50–0.80/kg	$0.40–0.70/kg	Wolffia: Premium positioning Spirulina: Standard packaging
TOTAL COST/KG	**$4.70–8.00**	**$3.20–6.20**	**Wolffia: 25-30% higher costs** **Spirulina: Baseline cost**

Processing Steps Comparison

Step	Process	Wolffia Method	Spirulina Method	Duration
1	Harvesting	Net skimming or automated collection from ponds	Filtration through fine mesh or centrifugation	W: 2-4 hours S: 1-3 hours
2	Washing	Gentle rinse to remove debris	Multiple rinse cycles	W: 30-60 min S: 30-60 min
3	Dewatering	Pressing or centrifuge to reduce water	Pressing or centrifuge	W: 1-2 hours S: 1-2 hours
4	Drying	Spray drying (120-150°C) or freeze drying	Spray drying or sun drying in some regions	W: 4-8 hours S: 3-6 hours
5	Milling	Fine grinding to 100-200 mesh powder	Grinding to 80-120 mesh powder	W: 1-2 hours S: 1-2 hours
6	Quality Testing	Protein, contamination, moisture testing	Standard supplement testing protocols	W: 2-4 hours S: 2-3 hours
7	Packaging	Nitrogen-flushed bags or containers	Bags, bottles, or bulk containers	W: 1-2 hours S: 1-2 hours

💡 Key Processing Insights

Cost Drivers

- **Drying costs** are 50-65% of total processing cost
- Wolffia's 95% water content vs spirulina's 90% adds ~25% to drying cost
- Wolffia requires 20kg fresh to make 1kg dried (spirulina needs 10kg)
- Equipment investment similar: $100-300K for both

Thailand Cost Advantages

- Labor costs 40-60% lower than developed markets
- Year-round production eliminates seasonal fluctuations
- Abundant sunshine for optional sun-drying (spirulina)
- Proximity to Asian export markets reduces logistics costs

Wolffia Challenges

- 25-30% higher processing costs than spirulina
- Requires premium drying methods (spray/freeze drying)
- More delicate handling needed
- Offset by 2-3x higher retail prices ($40-80 vs $15-40/kg)

Profitability Analysis

- Wolffia: $4.70-8.00 cost → $40-80 retail = 5-10x markup
- Spirulina: $3.20-6.20 cost → $15-40 retail = 3-6x markup
- Wolffia offers better margins despite higher processing costs
- Premium positioning justifies investment in quality processing

Summary

Wolfia Globosa is 35% more expensive to process than Spirulina (our potential competitor), however, the selling price is 200%-300% more expensive than Spirulina. Considering the unsaturated market and increasing interest in ไข่ผำ or Wolffia Globosa, Wolffia Globosa has potential to disrupt other High Protein Superfoods markets due to efficiency of production and strong health benefits.