Comprehensive Benchmark Results: Quantum vs Classical Solvers
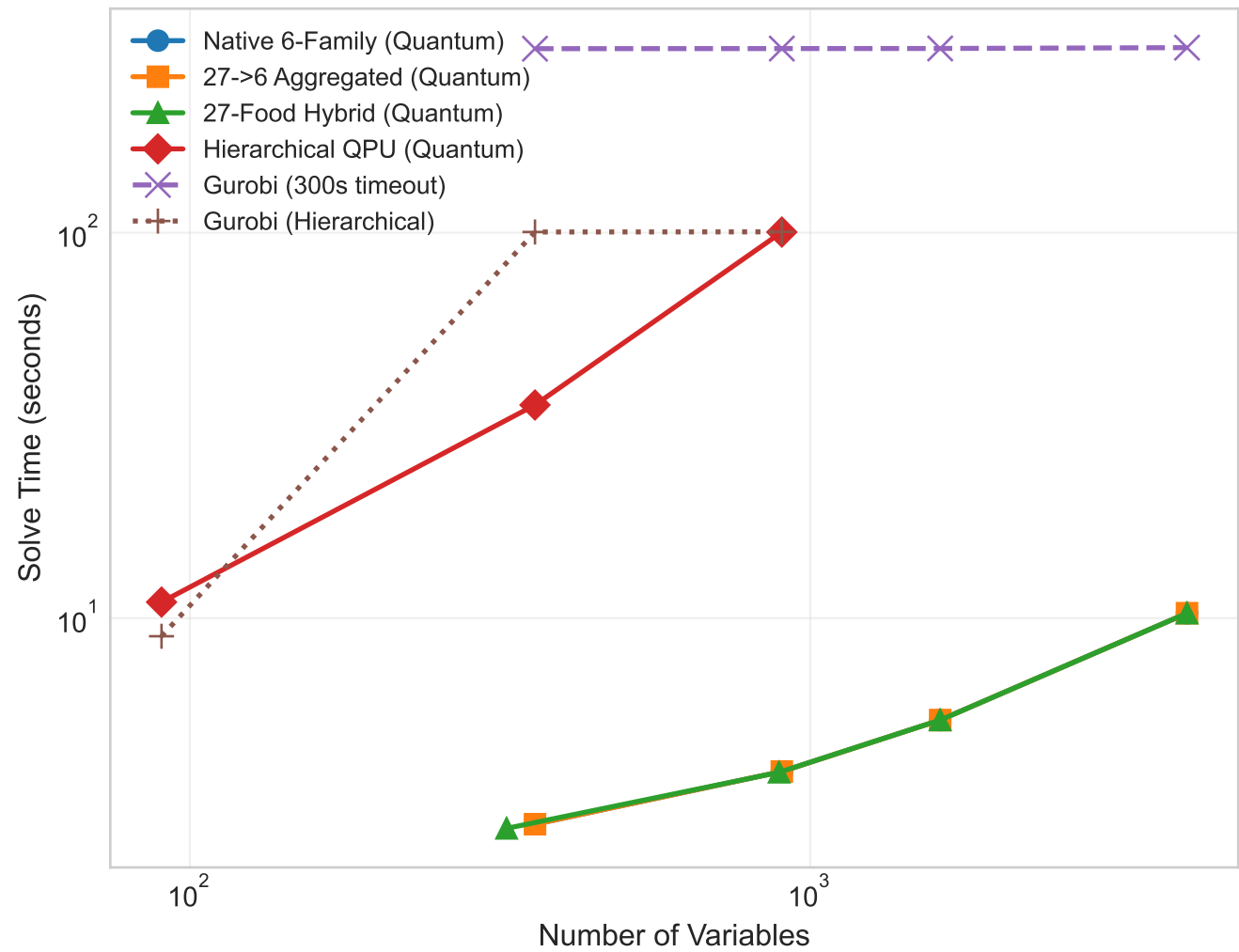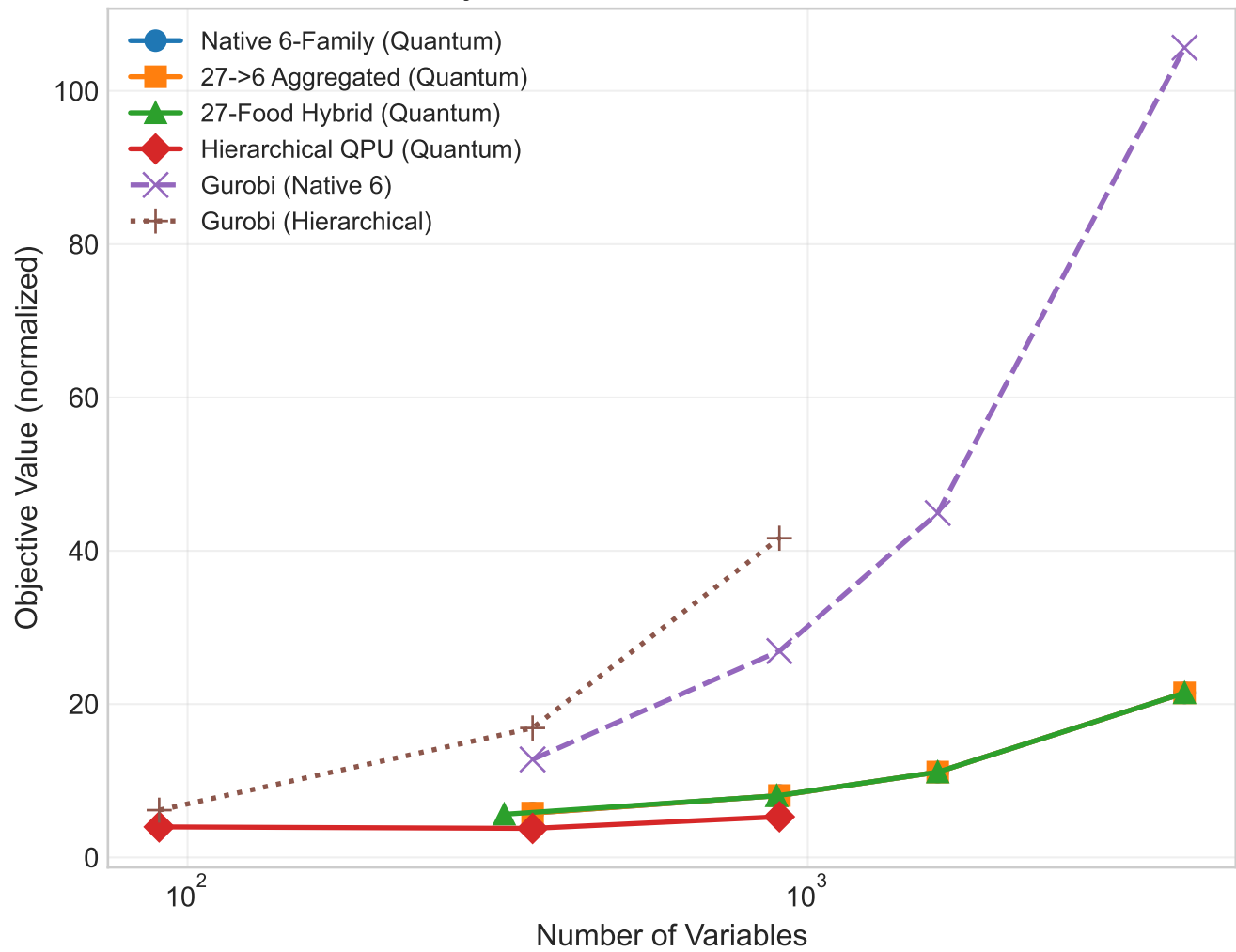**Rotation Crop Planning Problem**
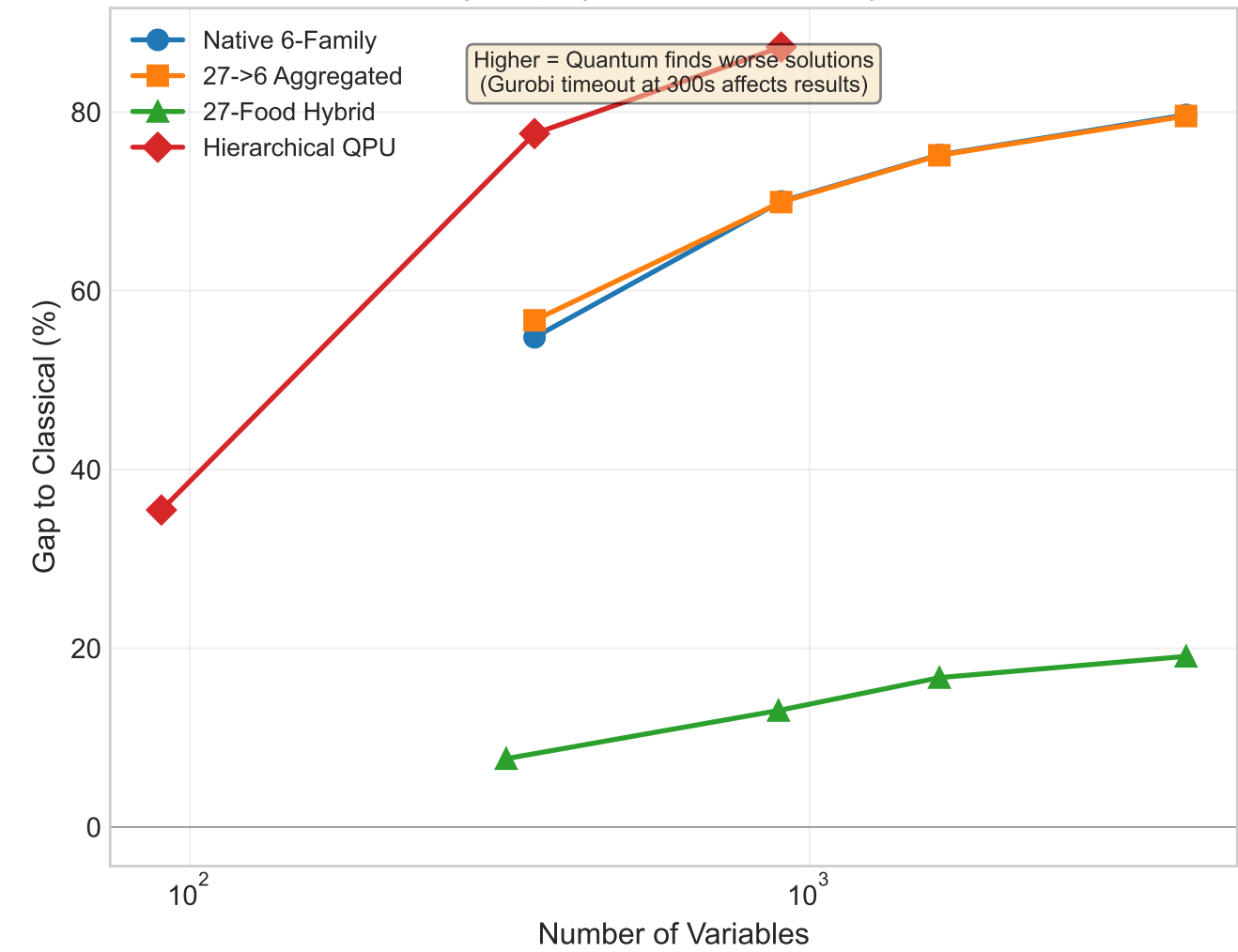
Solve Time vs Problem Size

- Native 6-Family (Quantum)
- 27->6 Aggregated (Quantum)
- 27-Food Hybrid (Quantum)
- Hierarchical QPU (Quantum)
- Gurobi (300s timeout)
- Gurobi (Hierarchical)

Y-axis: Solve Time (seconds)
X-axis: Number of Variables

Objective Value vs Problem Size

- Native 6-Family (Quantum)
- 27->6 Aggregated (Quantum)
- 27-Food Hybrid (Quantum)
- Hierarchical QPU (Quantum)
- Gurobi (Native 6)
- Gurobi (Hierarchical)

Y-axis: Objective Value (normalized)
X-axis: Number of Variables

Solution Quality Gap: (Gurobi - Quantum) / Gurobi × 100

- Native 6-Family
- 27->6 Aggregated
- 27-Food Hybrid
- Hierarchical QPU

Higher = Quantum finds worse solutions
(Gurobi timeout at 300s affects results)

Y-axis: Gap to Classical (%)
X-axis: Number of Variables

Speedup vs Problem Size

- Native 6-Family
- 27->6 Aggregated
- 27-Food Hybrid
- Hierarchical QPU
- Break-even

Speedup > 1: Quantum faster
Speedup < 1: Classical faster

Y-axis: Speedup (Gurobi time / Quantum time)
X-axis: Number of Variables