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Profit Optimization in Chilli Marketing using a Linear Programming Model: A Case Study of Bilasipara Sub-Division, Dhubri, Assam, India

Md Nazir Hussain

Assistant Professor, Department of Mathematics, Bilasipara College, Dhubri, Assam, India

Abstract

Chilli farming in the Bilasipara sub-division of Dhubri district, Assam plays a significant role in local agriculture and rural income. This study develops a **Linear Programming (LP)** model to optimize profits from chilli selling by small and marginal farmers. Using empirical data on costs, revenue, land constraints, and market prices, we calculate the optimal allocation of chilli varieties to maximize overall profit. A case scenario demonstrates the effectiveness of LP in practical decision-making.

Keywords: Chilli, Linear Programming Model, Assam.

1. Introduction

Bilasipara is a town and sub-division in the Dhubri district of Assam, where agriculture remains the backbone of rural livelihoods. Chilli cultivation is widely practiced in Bilasipara and neighbouring areas, contributing higher returns than traditional crops like paddy. One bigha under green chilli cultivation yields between ₹35,000–₹40,000, and dry chilli fetches ₹45,000–₹50,000 -significantly higher than paddy yields (₹8,000 per bigha) under similar acreage.

2. Literature Review

Linear programming has been extensively applied to agricultural optimization problems. Previous studies illustrate how LP models help maximize profits under resource constraints for various crops and food industries.

Table 1 – Sample Literature on LP in Agriculture

Study	Region	Focus	Key Result
Imran et al. (2024)	Karnataka, India	LP in food product	Improved profit using LP model
Nurul & Ayop (2025)	Malaysia	LP for frozen food	Determined optimal production to maximize profit
Poonia et al. (2022)	Haryana	LP for crop allocation	Profit increased by 5–12% using LP

3. Methodology

3.1. Problem Description

We seek a linear programming model structure that determines the optimal allocation of farmland between different types of chilli production (green vs dry chillies) and possibly other crops, subject to constraints like:

- Land availability
- Budget for seeds, fertilizer and labours
- Market demand/prices

3.2. Model Formulation

Let the variables be

- x_1 =Area (in bighas) for green chilli
- x_2= Area (in bighas) for dry chilli
- x_3 = Area (in bighas) for paddy

Objective Function:

Maximize Profit , $Z = p_1x_1 + p_2x_2 + p_3x_3 - C(x_1x_2\ x_3)$

Subject to

- Total land constraint: $x_1 + x_1 + x_3 \leq 10$
- Input budget constraint: $ax_1 + bx_1 + cx_3 \leq 100000$

- Non-negativity constraints: $x_1 , x_1, x_3 \geq 0$.

Where

- $p_{1=}\ 35{,}000/-\ , p_2 = 45{,}000/-, p_3 = 8{,}000/-$ are revenue per bigha for each crop,
- C is total cost function.
- Land (L = 10) bighas
- Budgets for seeds, fertilizer and labour, a=10,000/-per bigha green chilli, b=12,000/-per bigha dry chilli and c=8,000/-per bigha paddy.

LP Model Diagram is

Maximize Z = 35,000 x_1 + 45,000 x_2 + 8,000 x_3

Subject to

$x_1 + x_2 + x_3 \leq 10$

10,000x1 + 12,000x2 + 8,000x3 ≤ 100,000

$x_1, x_2, x_3 \geq 0$

4. Data and Assumptions

4.1. Crop Data (Bilasipara Market)

Crop Type	Revenue per Bigha (₹)	Cost per Bigha (₹)	Net Return (Profit)
Green Chilli	35,000	10,000	25,000
Dry Chilli	45,000	12,000	33,000
Paddy	8,000	8,000	~0

Note: Revenue ranges sourced from local agriculture reports.

5. Results

Using a simplex approach gives

Table 2 – Optimal Crop Allocation

Crop	Optimal Area (bighas)	Contribution to Profit (₹)
Green Chilli	0	0
Dry Chilli	8.33	3,75,000
Paddy	1.67	0
Total	10	3,75,000

Interpretation: Dry chilli is selected over green chilli or paddy due to its higher profit margin under constraints.

6. Discussion

The LP model suggests allocating more land to high-profit chillies (dry chilli) to maximize returns. In Bilasipara, where chilli production yields significantly higher returns versus staple crops, resource allocation strongly favours chilli farming.

7. Policy Implications

Improved processing, direct marketing facilities and better infrastructure (e.g., godowns, price negotiations) could enhance farmers' market power and profit margins. Empowering local cooperatives

may reduce middlemen dependency.

8. Conclusion

This study demonstrates that linear programming provides valuable insights into profit optimization for chilli selling in Bilasipara. With data driven optimization, farmers and planners can allocate limited resources (land and budget) more efficiently to maximize earnings.

References

1. Government scheme details for chilli production in Bilasipara and Dhubri, Times of India, 2012.
2. Bilasipara Sub-division agriculture profile and geography.
3. Imran, D. K., et al. "Profit Maximization through Linear Programming Problem..." Migration Letters, 2024.
4. Nurul Ashikin Yadri Shah & Zuraini Ayop, "A Linear Programming Approach in Profit Maximization for Food Production".
5. Poonia, H., et al. "Optimization of Profit and Land Resources for Marginal/Small Farmers". Asian Journal of Agricultural Extension , 2022.