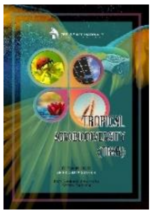
ZIBELINE INTERNATIONAL™ PUBLISHING

*ISSN: 2716-7046 (Online)*
*CODEN: TARGCA*

**Tropical Agrobiodiversity (TRAB)**

*DOI: http://doi.org/10.26480/trab.02.2025.107.113*



CrossMark

*RESEARCH ARTICLE*

# LINEAR PROGRAMING STRATEGIES FOR MAXIMIZING PROFITS FROM CROP CULTIVATION FOR FARMERS IN JASHORE REGION

**Rashed Mia, Jasim Hawlader, Nazrul Islam***

***Department of Mathematics, Jashore University of Science and Technology, Jashore-7408, Bangladesh.***
****Corresponding Author Email: nazrulislamdu.082@gmail.com***



**ARTICLE DETAILS**

***Article History:***

Received 17 June 2025
Revised 21 July 2025
Accepted 23 July 2025
Available online 5 August 2025

**ABSTRACT**

In recent years, farmers in the Jashore region of Bangladesh have been struggling to maintain profitability due to rising production costs, limited agricultural land and unpredictable market conditions. This research aims to address farmer challenges by applying linear programming techniques to identify the most profitable crop combination under the specific land, labor and capital constraints for Rabi and Kharif season. Using simplex method, a mathematical model is formed to optimize crop selection and land allocation with the goal of maximizing overall profit. The model considers constraints including total cultivable land, labor availability and investment limits, which are common factors affecting medium scale farmers in the region. An analysis shows that by adopting the optimal crop generated by linear programming model, farmers can significantly increase their net profit without the need for additional land or resources. The result shows the effectiveness of linear programming as a practical tool for data driven agricultural decision making. This approach not only supports better financial outcome for Jashore areas farmers but also promotes more effective and sustainable use of available resources such as land, labor etc. Overall, this study demonstrates that mathematical optimization methods like the simplex method can play a vital role in modernizing traditional farming practices and improving the economic resilience of farmers in Jashore region.

**KEYWORDS**

Linear programming, Crop optimization, Jashore region

## 1. INTRODUCTION

In recent years, linear programming has become a widely accepted tool for solving optimization problems in agriculture, particularly in areas focused on maximizing profitability under resource constraints. Studies such as those demonstrate how linear programming models can assist farmers in selecting the best combination of crops to achieve maximum returns from limited land, labor and capital (Poonia et al., 2022; Sofi et al., 2015). Following a similar approach, this study adopts the simplex method of linear programming to design optimal cropping strategies tailored to the conditions of the Jashore region.

The methodology centers around formulating the farming decision problem as a linear model. An objective function is constructed to maximize the total profit from selected crops, while a set of constraints represents real-world limitations such as available land, labor hours, investment capacity and agronomic requirements. Consistent with the model-building strategies used in crop optimization study, decision variables are defined to represent the area allocated to each crop type, enabling a structured approach to planning (Gupta et al., 2024). By critically reviewing previous studies, this chapter identifies the key method, successes and limitations of existing linear programming application in agriculture. Review not only guides us the development of present study's methodology but also highlights the needs for models that are practical and easily applicable by farmers in regions like Jashore.

Agriculture makes a substantial contribution to the economy of Bangladesh. Bangladesh's geographical topography is special for agriculture since it offers numerous favorable conditions. Because of the growing demand for agricultural products brought on by population increase, agricultural planning has been progressively important in current years. Scientific planning agricultural development is the emphasis of agricultural economics, which has emerged as a crucial field of study in agriculture. Agricultural planning employing an optimization model depends on the best cropping pattern with most output and profit. This kind of problem can be resolved by applying optimization strategies like goal planning, dynamic programming and linear programming. The proportionate nature of the allocation problems makes the linear programming model more widely used. Small and marginal farmers frequently struggle with how to divide their little resources across various crops in order to optimize their earnings. With a view to dealing with this problem, farmers frequently rely on their intuition and expertise. Planning problems on farms is a long way and more complicated. In addition to producing a range of crops, farmers must select number of production methods. Crop planning may entail decisions regarding pesticide and fertilizer treatments, planting dates and variety. Since its inception, linear programming has been used in agriculture to design the optimal distribution of limited resources. According to this study, traditionally, farmers have relied on experience, intuition, and comparisons with their neighbors to make their decisions (Hazal et al., 1987). Farm planners can provide useful strategies, such as linear programming (LP), to address such problems and generate optimal solutions; however, observation and expertise alone cannot ensure ideal outcomes. This study aimed to use a linear programing approach to maximize the profit and allocate land resources efficiently among marginal farmers in four distinct villages in the Karnal zone of Haryana during both the Kharif and Rabi seasons (Poonia et al., 2022). This study developed a linear programming model by selecting a combination of farm operations that are feasible given a set of fixed farm restrictions and that maximize income while also accomplishing objectives like food security (Felix and Judith, 2013). This study also focused on maximizing profit for marginal and small farmers in Shamsukh village in Hisar district during the Kharif and Rabi seasons through land allocation using the linear programing technique (Poonia et al., 2020). In their analysis of agricultural land use, it was stated that the goal of their study is to increase agricultural output and enhance profits for small and marginal farmers (Patel et al., 2017). In their study on agricultural optimization, examined the cropping patterns across several districts in Rajasthan (Bhatia and Rana, 2020). It was noted that reduced expenses or increased revenue, it becomes possible to identify agricultural practices that are more profit oriented (Upadhyaya, 2017). Consequently, this generates opportunities for improved planning and more efficient resource distribution in the agricultural sector. In their research, presented a framework for developing optimal crop plans uses of linear programming (Jain et al., 2019). The methodology aims to maximize output under various resource production and pricing scenarios, considering input usage and crop activities. This study conducted a study to develop optimal farm plans for various agricultural systems and policy interventions, aiming to increase the income of small and marginal farmers in Rampur District, Uttar Pradesh (Tamta et al., 2016). This study also investigated how linear programming can be used to maximize profits on selected commercial farms in the Kalulushi district of Zambia (Morgan and Thelma, 2025). In their effort to explore agricultural optimization, conducted a review highlighting key tools for evaluating LP model results and explored the applications of LP in agriculture (Alotaibi and Nadeem, 2021). The study also considered strategies that help optimize agricultural solutions. This study found that an 8:2 bean-to-guinea corn ratio was the ideal crop mix, potentially increasing farmers' profits by 264% (Wirnkar et al., 2024). The study recommends that government agencies and stakeholders provide more funding and resources to help farmers in Bangla LGA adopt this strategy. As part of the study, a comparison revealed a notable disparity between the costs, associated by linear programing and traditional farming methods (Patil, 2023). In their study on farm optimization, applied a linear programing model to determine land allocation plan small-holder farm, aiming to maximize earnings (Liang, 2023). The model's goal is profits maximization. As part of their study, used a linear programing model to identify the most profitable seasons for harvesting crops, aiding both farmers and agricultural planning offices (Custodio et al., 2023). Developed a linear programming model to optimize crop combinations for farmers in the Gurugram district of Haryana, India (Gupta, 2024). This study created an ideal crop mix for Assam using programming to maximize net returns and ensure efficient land and natural resources (Jain et al., 2018). The study included efforts to identify crop combinations separately for rainfed and irrigated areas in both the kharif and Rabi seasons. This study also developed a Lexicographic Goal Programming (LGP) model to determine optimal land distribution for key crops in central Yasin (Karim, 2023). This work built on prior research using LP to maximize the profits. The researchers used a linear programming model to identify the highest possible profits from the three main crops wheat, maize, and alfalfa-in the Central Yasin District of Ghizer (Haq et al., 2020). This study are conducting ongoing research on programming solutions for optimal agricultural land distribution for various crops; with a focus on Andhra Pradesh State (Rao et al., 2020). This work applied a linear programming technique using agricultural data and land to identify the best land allocation for five food crops (Sofi et al., 2015). Variables considered include daily worker wages and equipment charges for the years 2004-2011. The proposed LP model is solved using the simplex method. According to this study, developed optimal production schedules for cassava-based farmers in Kwara State, Nigeria (Adewumi, 2017). The study also examined socioeconomic factors, cropping patterns and production limitations, calculating costs and recommending farm plans. Emphasized that linear programming supports effective resource allocation, crop selection, and profit maximization within defined bounds, thereby aiding farmers and policymakers in making informed decisions (Nayak and Ananthi, 2024). This study proposed an optimal cropping plan for potato farmers in Nalanda, Bihar, aimed at increasing employment and income while minimizing fertilizer usage (Kumari and Maurya, 2023). This study also sought to develop appropriate cropping patterns for Eastern Uttar Pradesh can boost farm income while using less irrigation water usage (Kumari et al., 2017). The study concluded that linear programming is an effective planning tool that can enhance profitability and resource management in agriculture.

## 2. Methodology

The general form of linear programming problem is represented below:

**Table 1:** Initial table of linear programming problems

| **Crops** | $x_1$ | $x_2$ | ⋯ | $x_n$ | **Solutions** |
|---|---|---|---|---|---|
| 1 | $q_{11}$ | $q_{12}$ | ⋯ | $q_{1n}$ | $l_1$ |
| 2<br>⋮<br>⋮ | $q_{21}$<br>⋮<br>⋮ | $q_{22}$<br>⋮<br>⋮ | ⋯ | $q_{2n}$<br>⋮<br>⋮ | $l_2$<br>⋮<br>⋮ |
| M | $q_{m1}$ | $q_{m2}$ | ⋯ | $q_{mn}$ | $l_n$ |
| Cost (Taka) | $c_1$ | $c_2$ | ⋯ | $c_n$ | |

Table 1 can be written as:

optimize $Z = c_1x_1 + c_2 + \cdots + c_nx_n$

subject to the constraint,

$$\begin{gathered} q_{11}x_1 + q_{12}x_2 + \cdots + q_{1n}x_n \le \text{ or } \ge l_1 \\ q_{21}x_1 + q_{22}x_2 + \cdots + q_{2n}x_n \le \text{ or } \ge l_2 \\ q_{31}x_1 + q_{32}x_2 + \cdots + q_{3n}x_n \le \text{ or } \ge l_3 \\ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \\ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \\ q_{m1}x_1 + q_{m2}x_2 + \cdots + q_{mn}x_n \le \text{ or } \ge l_m \end{gathered}$$

the non-negative restrictions are,

$x_1, x_2, \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots, x_n \ge 0$

Introducing slack variable $s_j \ge 0$ where $j = 1,2 \dots\dots\dots m$, to convert the inequalities to an equation.

Adding, the slack variable into the objective function with zero coefficients. Then we obtain a new linear programming problem as follows:

Maximize $Z = c_1x_1 + c_2 + \cdots + c_nx_n + 0s_1 + 0s_2 + \cdots + s_m$

Subject to the constraints,

$$\begin{gathered} q_{11}x_1 + q_{12}x_2 + \cdots + q_{1n}x_n + 0s_1 + 0s_2 + \cdots + s_m = l_1 \\ q_{21}x_1 + q_{22}x_2 + \cdots + q_{2n}x_n + 0s_1 + 0s_2 + \cdots + s_m = l_2 \\ q_{31}x_1 + q_{32}x_2 + \cdots + q_{3n}x_n + 0s_1 + 0s_2 + \cdots + s_m = l_3 \\ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. \\ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. \\ q_{m1}x_1 + q_{m2}x_2 + \cdots + q_{mn}x_n + 0s_1 + 0s_2 + \cdots + s_m = l_m \end{gathered}$$

$x_j \ge 0$, where $j = 1 \dots\dots n$ and $s_j \ge 0$, where $j = 1 \dots\dots m$

The first basic feasible solution is obtained by setting $x_1 = x_2 = \cdots = x_n = 0$ and $s_1 = l_1, s_2 = l_2, \dots\dots s_m = l_m$

$l_1, l_2, l_3, \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots., l_m \ge 0$

**Table 2:** The initial table of simplex method

| $C_j$ | | $C_1\ C_2\ C_3\dots\dots C_n\ \ 0\ \ 0\ \ 0 \dots\ \dots 0$ | **Constant value of the basic variables l** | **Minimum Ratio** |
|---|---|---|---|---|
| **Coefficient of basic variable of objective function** | **Basic variables** | **Coefficient matrix  Identity matrix** | | |

| **Table 2 (cont):** The initial table of simplex method | | | | |
|---|---|---|---|---|
| 0<br>0<br>0<br>...<br>0 | $s_1$<br>$s_2$<br>$s_3$<br>...<br>$s_m$ | $q_{11}\ q_{12}\ q_{13} \dots\ q_{1n}\ \ 1\ 0\ 0 \dots \dots \dots 0$<br>$q_{21}\ q_{22}\ q_{23} \dots\ q_{2n}\ \ 0\ 1\ 0 \dots \dots \dots 0$<br>... ... ... ... ... ... ... ... ... ...<br>... ... ... ... ... ... ... ... ... ...<br>$q_{m1}\ q_{m2}\ q_{m3} \dots\ q_{mn}\ 0\ 0\ \ 0 \dots \dots \dots 1$ | $l_1$<br>$l_2$<br>... ...<br>... ...<br>$l_m$ | |
| $z_j - c_j$ | | $z_1 - c_1 z_2 - c_2 \dots z_n - c_n\ 0\ 0\ 0\ \ \ \ 0$ | z=0 | |

Table 2 can be written as:

| **Table 3:** Final table of simplex method | | | | | |
|---|---|---|---|---|---|
| $C_j$ | | | $C_1\ \ C_2\ \ C_k\ \ C_n\ \ C_{n+1}\ \ C_{n+r}$ | **Constant value of the basic variables l** | **Minimum Ratio** |
| $C_B$ | **B** | $X_B$ | $y_1\ \ y_2\ \ y_k\ \ y_n\ \ y_{n+1}\ \ y_{n+r}$ | | |
| $C_{B1}$ | $\alpha_1$ | $X_{B1}$ | $y_{11}\ y_{12}\ y_{1k}\ \ y_{1n}\ \ y_{1n+1}\ \ y_{1n+r}$ | $l_1$ | $\frac{l_1}{y_{1k}}$ |
| $C_{B2}$ | $\alpha_2$ | $X_{B2}$ | $y_{21}\ y_{22}\ y_{2k}\ \ y_{2n}\ \ y_{2n+1}\ \ y_{2n+r}$ | $l_2$ | $\frac{l_2}{y_{2k}}$ |
| ... ... | ... ... | ... ... | ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... | ... | ... ... |
| $C_{Br}$ | $\alpha_r$ | $X_{Br}$ | $y_{r1}\ y_{r2}\ y_{rk}\ \ y_{rn}\ \ y_{rn+1}\ \ y_{rn+r}$ | $l_r$ | $\frac{l_r}{y_{rk}}$ |
| $C_{Bm}$ | $\alpha_m$ | $X_{Bm}$ | $y_{m1}\ y_{m2}\ y_{mk}\ \ y_{mn}\ \ y_{mn+1}\ \ y_{mn+r}$ | $l_m$ | $\frac{l_m}{y_{mk}}$ |
| $z_j - c_j$ | | | $z_j - c_j\ \ z_2 - c_2\ z_k - c_k \dots \dots z_{n+r} - c_{n-r}$ | z | |

- Key column: The column which contains the most negative $z_j - c_j$ of maximization problem and most positive for minimization problem. It gives the variable represent the column enters the basic solution.
- Key Row: The row with minimum ratio$\left(\frac{x_{Bi}}{y_{ik}}, y_{ik} \geq 0\right) = \frac{l_k}{y_{rk}}$ corresponding to the variable that will leave the basis with a view to making room for interning variable. The leaving variables are known as departing variable.
- Key element: The element at the intersection of key column and key row is known as key element.
- The unit basis matrix: The unit matrix in the simplex table represents the coefficient of slack variable. Each simplex table must contain the unit matrix under the basic variable. The matrix under the non-basic variable is known as coefficient matrix.
- Evaluation row($z_j - c_j$): The last row of simplex table is called the evaluation row. The row is calculated by the formula $z_j - c_j = c_{Bi}.y_j - c_j$. Which indicate that the solution is optimum or not.
  - If all $z_j - c_j \geq 0$ then we get the optimal solution.
  - If at least one $z_j - c_j = 0$ for non-basic variables the problem has alternative solution.
  - If $z_j - c_j < 0$ and all the element of this column is less than or equal to zero, then the problem has an unbounded solution.
  - If none of $z_j - c_j = 0$ and all $z_j - c_j \geq 0$, then the problem has a unique solution.

**Table 4:** Data for Rabi Season

| Serial No | Crop's Name | Land (acres) | Man-days (days/acres) | Working hours for labor | Operating Capital (Taka/acres) | Output (Taka/acres) |
|---|---|---|---|---|---|---|
| 01 | Boro Rice | 4 | 51 | 3 | 36,000 | 40,000 |
| 02 | Maize | 2 | 110 | 6 | 62,000 | 77,000 |
| 03 | Wheat | 5 | 31 | 3 | 20,000 | 24,000 |
| 04 | Red Lentil | 4 | 48 | 2 | 13,000 | 47,000 |
| 05 | Sunflower | 2 | 21 | 2 | 50,000 | 61,000 |
| 06 | Mung bean | 3 | 45 | 3 | 18,000 | 27,000 |
| Total | | 20 | 950 | 60 | 5,74,000 | 8,25,000 |

**Table 5:** Data for Kharif Season

| Serial No | Crop's Name | Land (acres) | Man-days (days/acres) | Working hours for labor | Operating Capital (Taka/acres) | Output (Taka/acre) |
|---|---|---|---|---|---|---|
| 01 | Potato | 4 | 90 | 7 | 1,65,000 | 1,70,000 |
| 02 | Onion | 5 | 120 | 5 | 1,80,000 | 3,21,000 |
| 03 | Cauliflower | 3 | 75 | 4 | 90'000 | 1,50,000 |

| **Table 5 (cont):** Data for Kharif Season | | | | | | |
|---|---|---|---|---|---|---|
| 04 | Cabbage | 2 | 71 | 5 | 83,000 | 1,10,000 |
| 05 | Tomato | 4 | 162 | 12 | 2,34,000 | 3,27,000 |
| 06 | Bitter gourd | 2 | 126 | 8 | 96,000 | 1,57,000 |
| Total | | 20 | 2227 | 140 | 31,24,000 | 45,77,000 |

### 2.1 Formulation of Model

#### *2.1.1 Model formulation for Rabi Season*

Assuming that,

area for growing crop1 (Boro Rice) $= x_1$

area for growing crop2 (Maize) $= x_2$

area for growing crop3 (wheat) $= x_3$

area for growing crop4 (Red Lentil) $= x_4$

area for growing crop5 (Sunflower) $= x_5$

area for growing crop6 (Mung bean) $= x_6$

where $x_1, x_2, x_3, x_4, x_5$ and $x_6$ are the decision variables.

Objective function:

Maximize $Z = 40000x_1 + 77000x_2 + 24000x_3 + 47000x_4 + 61000x_5 + 27000x_6$

The constraints,

For land (acres): $4x_1 + 2x_2 + 5x_3 + 4x_4 + 2x_5 + 3x_6 \leq 20$

For man-days (days/acres): $51x_1 + 110x_2 + 31x_3 + 48x_4 + 21x_5 + 45x_6 \leq 950$

For working hours for labor: $3x_1 + 6x_2 + 3x_3 + 2x_4 + 2x_5 + 3x_6 \leq 60$

For operating capital taka (Taka/acres):

$$36000x_1 + 62000x_2 + 20000x_3 + 13000x_4 + 50000x_5 + 18000x_6 \leq 574000$$

Non-negativity restrictions:

$x_1, x_2, x_3, x_4, x_5, x_6 \geq 0$

#### *2.1.2 Model formulation for Kharif season*

Assuming that,

area for growing crop1 (Potato) $= y_1$

area for growing crop2 (Onion) $= y_2$

area for growing crop3 (Cauliflower) $= y_3$

area for growing crop4 (Cabbage) $= y_4$

area for growing crop5 (Tomato) $= y_5$

area for growing crop6 (Bitter gourd) $= y_6$

where $y_1, y_2, y_3, y_4, y_5$ and $y_6$ are the decision variables.

Objective function:

Maximize $Z = 170000y_1 + 321000y_2 + 150000y_3 + 110000y_4 + 327000y_5 + 157000y_6$

The constraints,

For land (acres): $4y_1 + 5y_2 + 3y_3 + 2y_4 + 4y_5 + 2y_6 \leq 20$

For man-days (days/acres): $90y_1 + 120y_2 + 75y_3 + 71y_4 + 162y_5 + 126y_6 \leq 2227$

For working hours for labor: $7y_1 + 5y_2 + 4y_3 + 5y_4 + 12y_5 + 8y_6 \leq 140$

For operating capital taka (Taka/acres):

$$165000y_1 + 180000y_2 + 90000y_3 + 83000y_4 + 234000y_5 + 96000y_6 \leq 3124000$$

Non-negativity restrictions:

$y_1, y_2, y_3, y_4, y_5, y_6 \geq 0$

## 3. Result and Discussion

### 3.1 Result

i. Rabi Season:

| **Table 6:** Optimal solution of Rabi Season | |
|---|---|
| **Variables** | **Optimal value of variables** |
| $x_1$ | 0 |
| $x_2$ | 8.2948 |
| $x_3$ | 0 |
| $x_4$ | 0.2935 |
| $x_5$ | 1.1181 |
| $x_6$ | 0 |

The Maximum profit:

$Z = 40000x_1 + 77000x_2 + 24000x_3 + 47000x_4 + 61000x_5 + 27000x_6$

$= 40000 \times 0 + 77000 \times 8.2948 + 24000 \times 0 + 47000 \times 0.2935$

$+61000 \times 1.1181 + 27000 \times 0$

$= 7,20,701.73$

ii. Kharif Season:

| **Table 7:** Optimal solution of Kharif Season | |
|---|---|
| **Variables** | **Optimal value of variables** |
| $x_1$ | 0 |
| $x_2$ | 0 |
| $x_3$ | 0 |
| $x_4$ | 0 |
| $x_5$ | 5 |
| $x_6$ | 0 |

The maximum profit:

$Z = 170000y_1+321000y_2+150000y_3+110000y_4+327000y_5+157000y_6$

$= 170000\times0+321000\times0+150000\times0+110000\times0+327000\times5+157$

$= 16,35,000$

### 3.2 Comparison of result

| **Table 8:** Comparison of land allocation of farmers and LP model for Rabi Season | | |
|---|---|---|
| **Crops** | **Land (acres) allocation by farmers** | **Land (acres) allocation by LP model** |
| Boro Rice | 4 | 0 |
| Maize | 2 | 16.5896 |
| Wheat | 5 | 0 |
| Red Lentil | 4 | 1.174 |
| Sunflower | 2 | 2.2362 |
| Mung bean | 3 | 0 |

#### *3.2.1 Graphical representation of data of table 8*

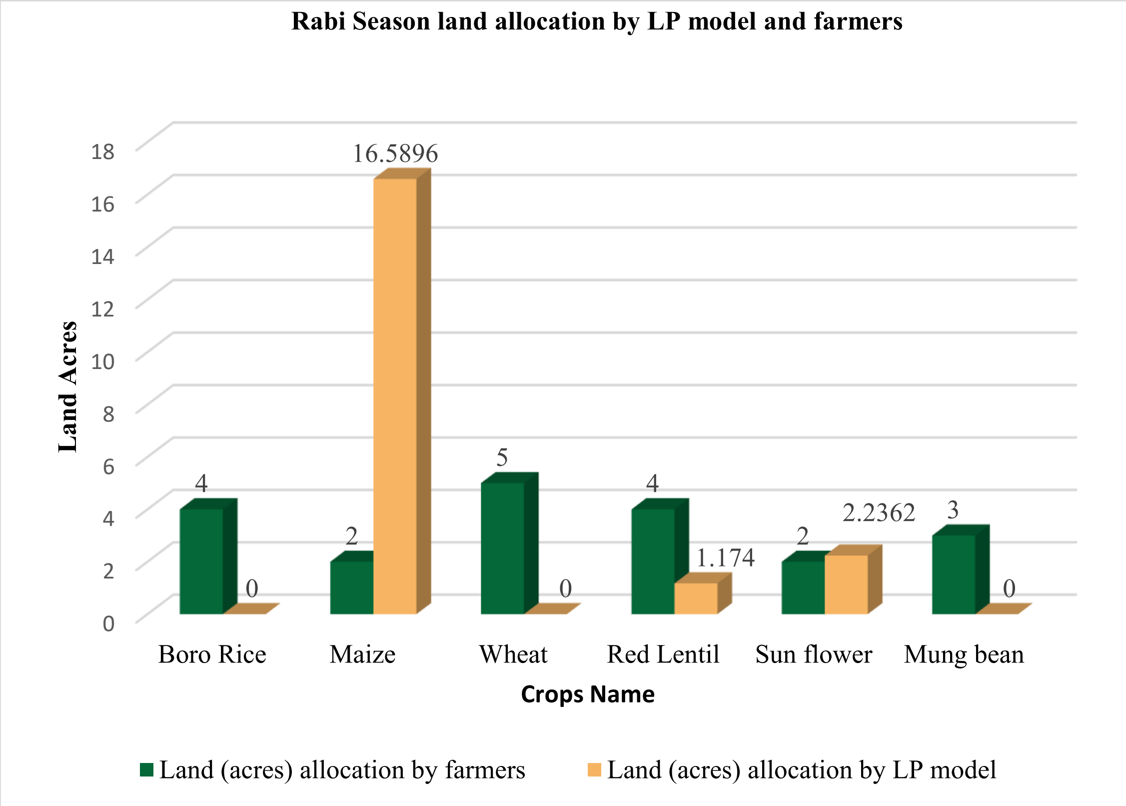



**Figure 1:** Rabi Season land allocation by LP model and farmers

| **Table 9:** Comparison of profit got from farmers and LP model for Rabi Season | |
|---|---|
| **Comparison of profit(taka)** | |
| Profit from LP model | 7,20,701.73 |
| Profit from farmers model | 2,51,000.00 |
| Profit increase | 4,69701.73 |

By applying LP model, Profit is maximized 81.83%

| **Table 10:** Comparison of land allocation of farmers and LP model for Kharif Season | | |
|---|---|---|
| **Crops** | **Land (acres) allocation by farmers** | **Land (acres) allocation by LP model** |
| Potato | 4 | 0 |
| Onion | 5 | 0 |
| Cauliflower | 3 | 0 |
| Cabbage | 2 | 0 |
| Tomato | 4 | 20 |
| Bitter gourd | 2 | 0 |

*3.2.2 Graphical representation of data of table 10*

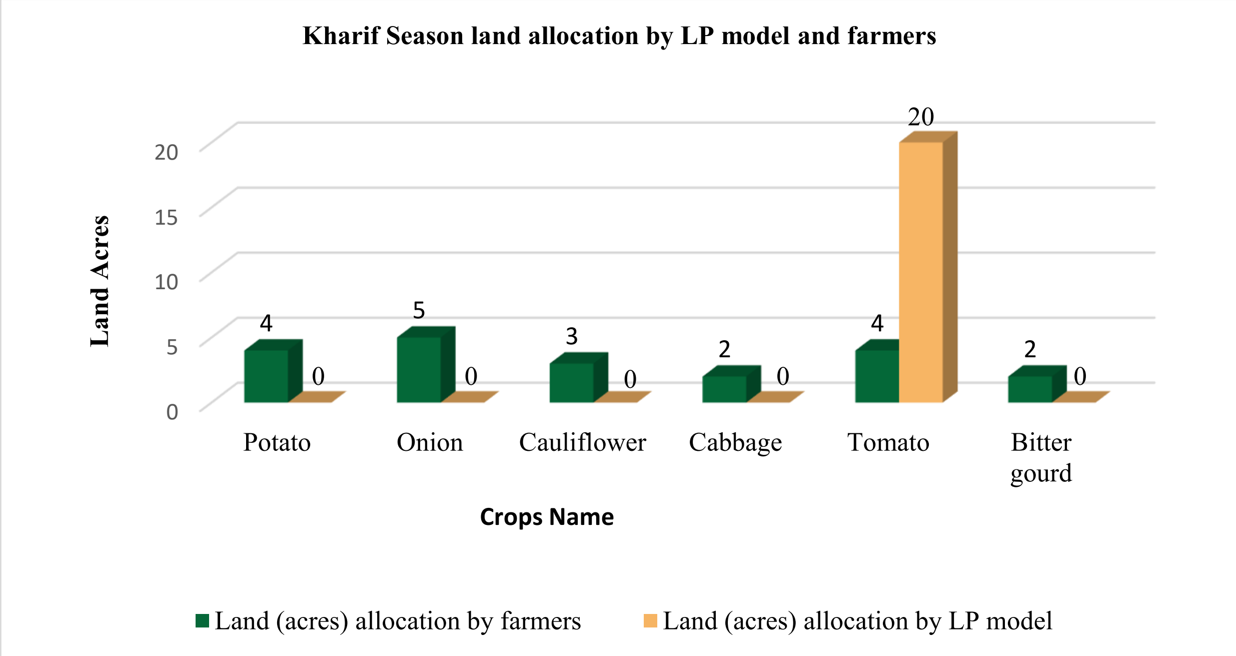



**Figure 2:** Kharif Season land allocation by LP model and farmers

| **Table 11:** Comparison of profits got from farmers and LP model for Kharif Season | |
|---|---|
| **Comparison of profit(taka)** | |
| Profit from LP model | 16,35,000 |
| Profit from farmers model | 14,53,000 |
| Profit increase | 1,82,000 |

By applying LP model, Profit is maximized 5.82%

## 4. Conclusion

A linear programming (LP) model that formed the ideal of crop combination for Rabi and Kharif season for farmers in Jashore area of Bangladesh is created this study. Crops considered in the Rabi season are Boro rice, Maize, Wheat, Red Lentil, Sunflower and Mung bean on the other hand crops considered in Kharif season are Potato, Onion, Cauliflower, Cabbage, Tomato and Bitter ground. For Rabi season LP model suggests cultivating sixteen point five eight (16.58) acres of maize, one point- one seven (1.17) acres of red lentil and two point two three (2.23) acres of sun flowers for getting profit eighty-one point eight three percents (81.83%) than before. For kharif season LP model suggests cultivating twenty (20) acres of tomato for getting profit five point eight two percents (5.82%) than before.

## References


Adewumi, A., 2017. Optimum production plans for cassava-based crop farmers in Kwara State, Nigeria [Unpublished master's thesis]. Department of Agricultural Economics and Extension Technology, Federal University of Technology, Minna, Nigeria.

Alotaibi, A., and Nadeem, F., 2021. A review of applications of linear programming to optimize agricultural solutions. International Journal of Information Engineering and Electronic Business, 15(2), p.11.

Bhatia, M., and Rana, A., 2020. A mathematical approach to optimize crop allocation—a linear programming model. International Journal of Design and Nature and Ecodynamics, 15(2), Pp. 245–252.

Custodio, J. M., Billones, R. K., Concepcion, R., and Vicerra, R. R., 2023. Optimization of crop harvesting schedules and land allocation through linear programming. Process Integration and Optimization for Sustainability, 8(1), Pp. 123–134.

Felix, M., and Judith, M., 2013. Linear programming in Bindura, Zimbabwe. Research Journal of Management Sciences, 2(5), p.1171.

Gupta, S., 2024. Linear programming approach: Optimization of profit and land resource. Indian Journal of Natural Sciences, 15, Pp. 75364–75367.

Handayani, S., 2022. Optimization of organic rice production using linear programming analysis in Lampung Province. Asia Pacific Journal of Management and Education, 5(3), pp.37–47. https://doi.org/10.32535/apjme.v5i3.1643

Haq, F., Ali, E., and Hussain, S., 2020. Optimization of the cropping pattern in Central Yasin District, Ghizer, Gilgit-Baltistan. Journal of Mountain Area Research, 5, Pp. 10–18.

Hazell, P. B. R., and Norton, R. D., 1986. Mathematical programming for economic analysis in agriculture. Macmillan.

Jain, R., Immaneulraj, K., Malangmeih, L., Deka, N., Raju, S. S., Srivastava, S. K., Hazarika, J. P., Kaur, A. P., and Singh, J., 2018. Linear programming based optimum crop mix for crop cultivation in Assam state of India. In: Springer International Publishing, Pp. 988–997. https://doi.org/10.1007/978-3-319-76348-4_95

Jain, R., Kingsly, I., Chand, R., Raju, S. S., Srivastava, S. K., Kaur, A. P., and Singh, J., 2019. Methodology for region level optimum crop plan. International Journal of Information Technology, 11, Pp. 619–624.

Karim, F., 2023. Lexicographic goal programming approach for the optimization of cropping pattern in Yasin region, Gilgit, Pakistan. Journal of Mountain Area Research, 8, Pp. 103–109. https://doi.org/10.53874/jmar.v8i0.176

Kumari, M., Singh, O. P., and Meena, D. C., 2017. Optimizing cropping pattern in Eastern Uttar Pradesh using Sen's multi-objective programming approach. Agricultural Economics Research Review, 30(2), Pp. 285–295.

Kumari, S., and Maurya, M., 2023. Optimization of resources using Sen's multi-objective programming (MOP) model for potato growers of Nalanda District, Bihar. Environment and Ecology, 41(3C), Pp. 1937–1940. https://doi.org/10.60151/envec/SWCP7346

Liang, X., 2023. Linear programming approach in agricultural production-land allocation. In: Proceedings of the 6th International Conference on Economic Management and Green Development. Springer Nature Singapore, Pp. 697–705.

Morgan, M., and Thelma, C. C., 2025. Application of linear programming in profit maximization: A case of selected commercial farms in

Kalulushi District of Copperbelt Province, Zambia. International Journal of Research (IJR), 12(1), p.2348.

Nayak, B. G., and Ananthi, R., 2024. Profit optimization in agricultural crop production in Belthangady Taluk using linear programming models. Louis Savinien Dupuis Journal of Multidisciplinary Research, pp.292–298. https://doi.org/10.21839/lsdjmr.2024.v3.194

Padi, T. R., Paidipati, K. K., and Oram, M., 2020. Optimal land allocation programming problems for agricultural revenue maximization in Andhra Pradesh. Agricultural Science Digest – A Research Journal, 40(3), Pp. 275–279.

Patel, N., Thaker, M., and Chaudhari, C., 2017. Agricultural land allocation to the major crops through linear programming model. International Journal of Science and Research (IJSR), 6(4), Pp. 519–522.

Patil, N. C., 2023. Evaluation of optimal cost structure in agriculture in Raigad District using linear programming model. Journal of Advanced Zoology, 44, Pp. 202–206.

Poonia, H., Tonk, M. S., Bhatia, J. K., and Rani, N., 2020. Linear programming based crop land allocation to maximize profit of marginal/small farmers. Agricultural Research Journal, 57(2), p.245.

Poonia, H., Tonk, M. S., Bhatia, J. K., and Rekha, 2022. Optimization of profit and land resources for marginal/small farmers—a linear programming approach. Asian Journal of Agricultural Extension, Economics and Sociology, 40(9), Pp. 112–120.

Regional Agricultural Research Station (RARS), Jessore, n.d. Homepage. https://rars.jessore.gov.bd/

Sofi, N. A., Ahmed, A., Ahmad, M., and Bhat, B. A., 2015. Decision making in agriculture: A linear programming approach. International Journal of Modern Mathematical Sciences, 13(2), Pp. 160–169.

Tamta, P., Singh, H. N., Singh, J., Ruhela, A., Pal, V. K., and Pant, M., 2016. Optimum farm planning under different farming systems on small and marginal farms in Rampur district, Uttar Pradesh: A linear programming approach. International Journal of Research in Management, 6(4), Pp. 42–53.

Upadhyaya, A. S., 2017. Application of optimization techniques for crop planning to improve farm productivity of ICAR-RCER, Patna, India. Journal of AgriSearch, 4(1), Pp. 68–70.

Wirnkar, A. D., Abdulkarim, H., Sirajo, M., Sabo, A., and Michael, O. A., 2024. Optimizing crop production in Balanga Local Government Area of Gombe State through linear programming and sensitivity analysis. Journal of African Innovation and Advanced Studies, 6, p.3026.