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Factors Influencing the Growth of Marigold Flowers in (M.P.)

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Abstract
This study explores the influencing factors for the growth of marigold flowers in Madhya Pradesh, with a particular focus on the Betul district. The research aims to assess the influencing factor of Marigold Cultivation in the Betul district of Madhya Pradesh. The study identifies optimal cultivation practices that can enhance yield and quality, providing practical recommendations for farmers. Findings suggest that targeted interventions and improved agricultural practices can significantly boost marigold production, enhancing farmers' incomes and contributing to the overall agricultural development of Madhya Pradesh. This research contributes to a deeper understanding of the factors influencing marigold growth and facilitates informed decision-making and strategic planning for farmers in the region's floriculture farming.

Keywords: Marigold cultivation, Floriculture, Agriculture Development, Farming, Decision- Making etc.

Introduction:
The cultivation and propagation of ornamental and flowering plants is what defines floriculture, which has grown into a prosperous and economically important subsector of India's agricultural sector. Floriculture has gone beyond its conventional association with vibrant colors, fragrances, and visual appeal, and has become a dynamic industry. It not only beautifies festivals, marriages, and celebrations but also helps boost India's economy. (**Mathew, 2000).**
India has a deep relationship with flowers, which can be traced back to ancient times, when flowers were very important for culture and religion। India's floral heritage reflects its diverse culture and traditions, from revered marigolds decorating temples to fragrant roses representing love. India's floriculture industry has gone through a remarkable transformation in recent decades, shifting from a traditional subsistence sector to a prosperous commercial sector **(Venjil, 2001)**.
India cultivates a wide range of varieties across diverse agro-climatic zones, making it one of the world's leading flower producers today. This has made the country a vibrant hub for flower lovers, businessmen, and investors. This introduction takes a look at India's captivating floral world, analyzing its changing landscape and development over time. The study concentrated on the Betul District of Madhya Pradesh in order to further explore this fascinating sector. Madhya Pradesh, famous for its rich agricultural diversity, is a fascinating place to explore the growth and potential of floriculture **(Gupta, A., 2003).**
The study looked into possible opportunities in the floriculture industry in Madhya Pradesh. Taking a multifaceted approach, it walked the flower-growing fields, examined the economic underpinnings, and emphasized the commercial value woven into Madhya Pradesh's floriculture farming. This investigation

revealed that Madhya Pradesh's floriculture represents the inventiveness, tenacity, and entrepreneurial vigor of the state beyond simple aesthetics. This thorough analysis reveals many facets of this burgeoning sector, illuminating the prospects and viability in the always changing field of floriculture.

Objectives:

The main objectives of this research are as follows:

1. To analyze the factors influencing the growth of marigold flowers in Betul District.
2. To suggest the policies for the improvement of Marigold flowers.

Major Findings:

Multiple Regression Model constructed to analyze the factors influencing the growth of Marigold Flower in Betul District of Madhya Pradesh.

Multiple Regression Model (MRM): $Y_i = \alpha + \beta_1 X_i + \beta_2 X_{ii} + \beta_3 X_{iii} + \beta_4 X_{iv} + \varepsilon_i$

In the model, the literal interpretation of the estimated coefficient $\hat{\beta}$ is that a one-unit increase in X will produce an expected increase in Y of $\hat{\beta}$ units.

Y_i= Total production of flower

α = Intercept

β = Beta Coefficient is the degree of change in the outcome variable for every 1-unit of change in the predictor variable

X_1 = Cultivable Land

X_2 = Quantity of Seeds

X_3 = Quantity of Insecticides

X_4 = Quantity of Fertilizers

ε_i = Stochastic Error

For regression analysis, the following hypothesis has been framed.

H0: The taken factors do not influence the growth of the marigold flower in each Tehsil of the Betul district.

H1: The taken factors influence the growth of the marigold flower in each Tehsil of the Betul district.

The table below presents the Regression values for various tehsils within the Betul District.

Table 2 Regression Table

Betul Block

Betul	Coefficients	t- Stat	P-value
Intercept	1.21	2.559	0.014
Cultivable Land (in Acre)	0.028	2.113	0.049
Quantity of Seeds (in kg)	0.865	2.473	0.018
Quantity of Insecticide	0.761	1.272	0.211

(in kg)			
Quantity of Fertilizer (in kg)	0.049	2.551	0.015
R Square = 0.884			

Source: Calculated with the help of the given data

The regression table for the Betul block provides insights into the relationship between cultivable land, the quantity of seeds, the quantity of insecticide, the quantity of fertilizer, and the output variable under consideration. Here is a full interpretation:

The intercept value of 1.21 indicates the expected value of the output variable when all independent variables are set to zero. In this case, it implies that even with no cultivable land, seeds, insecticide, or fertilizer, there is still a baseline level of output.

The coefficient of 0.028 suggests that for a unit increase in cultivable land (in acres), there is a corresponding increase of 0.028 units in the output variable. This relationship is statistically significant, as indicated by the t-statistic of 2.113 and the p-value of 0.049, which is less than the conventional significance level of 0.05.

The coefficient of the quantity of seeds is 0.865 indicates that for every unit increase in the quantity of seeds (in kilograms), there is a corresponding increase of 0.865 units in the output variable. This relationship is also statistically significant, with a t-statistic of 2.473 and a p-value of 0.018.

The Quantity of Insecticide (in kg) coefficient is 0.761 suggests that there is a positive but relatively weaker relationship between the quantity of insecticide used and the output variable. However, this relationship is not statistically significant, as indicated by the higher p-value of 0.211.

Whereas, the Quantity of Fertilizer (in kg), coefficient is 0.049 suggesting that for a unit increase in the quantity of fertilizer (in kilograms), there is a corresponding increase of 0.049 units in the output variable. This relationship is statistically significant, with a t-statistic of 2.551 and a p-value of 0.015.

Overall, the regression model explains approximately 88.4% of the variability in the output variable, as indicated by the R Square value of 0.884. This suggests that the independent variables included in the model (cultivable land, quantity of seeds, quantity of insecticide, and quantity of fertilizer) collectively have a strong association with the output variable.

The below table analyses the factors influencing marigold production in the Athner District.

Table 3 Regression Table

Athner Block

Athner	Coefficients	t- Stat	P-value
Intercept	0.068	2.195	0.029
Cultivable Land (in Acre)	0.203	2.702	0.047
Quantity of Seeds (in kg)	0.782	2.467	0.011
Quantity of Insecticide (in kg)	0.762	1.682	0.101
Quantity of Fertilizer (in kg)	0.022	12.26	0.003

R Square = 0.837			

Source: Calculated with the help of the given data

The regression table for Athner block provides insights into the relationship between cultivable land, the quantity of seeds, the quantity of insecticide, the quantity of fertilizer, and the output variable under consideration.

The intercept value of 0.068 indicates the expected value of the output variable when all independent variables are set to zero. In this case, it implies that even with no cultivable land, seeds, insecticide, or fertilizer, there is still a baseline level of output of marigold flowers.

The coefficient of 0.203 suggests that for a unit increase in cultivable land (in acres), there is a corresponding increase of 0.203 units in the output variable. This relationship is statistically significant, as indicated by the t-statistic of 2.702 and the p-value of 0.047, which is less than the conventional significance level of 0.05.

The coefficient of Quantity of Seeds (in kg) is 0.782 indicating that for a unit increase in the quantity of seeds (in kilograms), there is a corresponding increase of 0.782 units in the output variable. This relationship is also statistically significant, with a t-statistic of 2.467 and a p-value of 0.011.

Whereas the Quantity of Insecticide (in kg) the coefficient is 0.762 suggests that there is a positive but relatively weaker relationship between the quantity of insecticide used and the output variable. However, this relationship is not statistically significant, as indicated by the higher p-value of 0.101.

On the other hand, the Quantity of Fertilizer (in kg) coefficient is 0.022 suggesting that for a unit increase in the quantity of fertilizer (in kilograms), there is a corresponding increase of 0.022 units in the output variable. This relationship is statistically significant, with a high t-statistic of 12.26 and a low p-value of 0.003.

Overall, the regression model explains approximately 83.7% of the variability in the output variable, as indicated by the R Square value of 0.837. This suggests that the independent variables included in the model (cultivable land, quantity of seeds, quantity of insecticide, and quantity of fertilizer) collectively have a strong association with the output variable.

Table 4 Regression Table
Amla Block

Amla	Coefficients	t- Stat	P-value
Intercept	1.78	1.997	0.053
Cultivable Land (in Acre)	0.315	2.055	0.039
Quantity of Seeds (in kg)	0.536	2.046	0.035
Quantity of Insecticide (in kg)	0.531	2.563	0.056
Quantity of Fertilizer (in kg)	0.016	7.274	0.001
R Square = 0.728			

Source: Calculated with the help of the given data

While analyzing Intercept the Coefficient: 1.78, T-Stat: 1.997, and P-value: 0.053 represents the expected output when all independent variables are zero. In this case, the intercept is not statistically significant at

the 0.05 significance level, suggesting that it may not be meaningful.
In the case of Cultivable Land (in Acre) for each additional acre of cultivable land, agricultural output is expected to increase by 0.315 units. This relationship is statistically significant (p-value < 0.05).
Whereas the quantity of Seeds (in kg) an increase of one kilogram in seed quantity is associated with an increase in output by 0.536 units. This relationship is statistically significant (p-value < 0.05).
The coefficient suggests that an increase of one kilogram in insecticide quantity is associated with an increase in output by 0.531 units, but this relationship is not statistically significant at the 0.05 significance level (p-value > 0.05).
The Quantity of Fertilizer (in kg) for each additional kilogram of fertilizer used, agricultural output is expected to increase by 0.016 units. This relationship is statistically significant (p-value < 0.05).
The R-squared value indicates that the independent variables included in the regression model can explain approximately 72.8% of the variability in agricultural output in the Amla block.

The following regression table analyzed the Ghoradongri Block.

Table 5 Regression Table
Ghoradongri Block

Ghoradongri	Coefficients	t- Stat	P-value
Intercept	0.75	2.559	0.01
Cultivable Land (in Acre)	0.19	2.113	0.04
Quantity of Seeds (in kg)	0.787	2.473	0.01
Quantity of Insecticide (in kg)	0.755	1.678	0.21
Quantity of Fertilizer (in kg)	0.022	12.37	0.002
R Square = 0.840			

Source: Calculated with the help of the given data

For the Ghoradongri block, the regression analysis provides insights into the relationship between agricultural output and various input factors. Here is the interpretation of the coefficients, t-Statistics, P-values, and R-squared value:
The intercept represents the expected output when all independent variables are zero. In this case, the intercept is statistically significant at the 0.05 significance level, indicating that it may have a meaningful impact on agricultural output.
For each additional acre of cultivable land, agricultural output is expected to increase by 0.19 units. This relationship is statistically significant (p-value < 0.05).
An increase of one kilogram in seed quantity is associated with an increase in output by 0.787 units. This relationship is statistically significant (p-value < 0.05).
The Quantity of Insecticide (in kg) coefficient suggests that an increase of one kilogram in insecticide quantity is associated with an increase in output by 0.755 units, but this relationship is not statistically significant at the 0.05 significance level (p-value > 0.05).
For each additional kilogram of fertilizer used, agricultural output is expected to increase by 0.022 units. This relationship is statistically significant (p-value < 0.05).

The R-squared value indicates that approximately 84.0% of the variability in agricultural output in the Ghoradongri block can be explained by the independent variables included in the regression model.
The below table analyzes the Bhaisndehi Block, with the help of the regression table. The table helped to analyze the factors influencing marigold flower production.

Table 6 Regression Table
Bhainsdehi Block

Bhainsdehi	Coefficients	t- Stat	P-value
Intercept	0.379	0.64	0.055
Cultivable Land (in Acre)	0.359	1.233	0.025
Quantity of Seeds (in kg)	0.805	1.504	0.011
Quantity of Insecticide (in kg)	0.77	1.709	0.096
Quantity of Fertilizer (in kg)	0.02	11.89	0.007
R Square = 0.830			

Source: Calculated with the help of the given data

For the Bhainsdehi block, the regression analysis provides insights into the relationship between agricultural output and various input factors. Here is the interpretation of the coefficients, t-statistics, P-values, and R-squared value.
The intercept represents the expected output when all independent variables are zero. In this case, the intercept is not statistically significant at the 0.05 significance level (p-value > 0.05), suggesting that it may not have a meaningful impact on agricultural output.
For each additional acre of cultivable land, agricultural output is expected to increase by 0.359 units. This relationship is statistically significant (p-value < 0.05).
On the other hand, an increase of one kilogram in seed quantity is associated with an increase in output by 0.805 units. This relationship is statistically significant (p-value < 0.05).
The Quantity of Insecticide (in kg) coefficient suggests that an increase of one kilogram in insecticide quantity is associated with an increase in output by 0.77 units, but this relationship is not statistically significant at the 0.05 significance level (p-value > 0.05).
Whereas the quantity of Fertilizer (in kg) for each additional kilogram of fertilizer used, agricultural output is expected to increase by 0.02 units. This relationship is statistically significant (p-value < 0.05).
The R-squared value indicates that approximately 83.0% of the variability in agricultural output in the Bhainsdehi block can be explained by the independent variables included in the regression model.

Conclusion:

The regression analyses across the different blocks—Betul, Athner, Amla, Ghoradongri, and Bhainsdehi—consistently demonstrate that cultivable land, quantity of seeds, and quantity of fertilizer have statistically significant positive effects on agricultural output. However, the quantity of insecticide does not show a statistically significant impact on the output in any of these blocks. These findings provide valuable insights for optimizing agricultural practices and resource allocation strategies to enhance productivity and sustainability in these regions.

Policy Recommendation:

Policy-level interventions are crucial to maximizing the growth and potential of marigold flower cultivation in the Betul district. The following suggestions ought to be taken into account by the government:

1. **Subsidies and Incentives:** Farmers' financial burdens can be lessened and their involvement in floriculture can be encouraged by offering subsidies on inputs like seeds, fertilizer, and equipment.
2. **Research and Development:** By establishing research facilities and working with agricultural universities, it is possible to create marigold flower kinds that are more aesthetically pleasing and more suitable to the local climate.
3. **Infrastructure Development:** Putting money into cold storage and transportation networks, for example, will guarantee that marigold flowers get to markets promptly and fresh, reducing post-harvest losses.

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