# Productivity and Biomass of Sunflower (Helianthus annus L.) at Gaya ji District, Bihar

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***Abstract*—Sunflower is an important cash crops of Gayaji District, Bihar. It is a reach source of Oil. Study shows the rate of productivity and Biomass depend upon the soil characteristics i.e. concentration of Nitrogen, Phosphorous and Potash as well as available soil water holding capacity. For the growth and yield of Sunflower treatment were arranged as randomised manner. Six earthen pots were arranged and different types of soil, Nitrogen concentration and available soil water level was observed. Hence the experiment showed that the application of Nitrogenous fertilizer and soil water led to significant increasable in growth and yield of sunflower plants.**

***Index Terms*—Biomass, Variance, WHC, Nitrogenous Fertilizer, earthen pots,**

## I. INTRODUCTION

Sunflower (Helianthus annus (L) is a valuable cash crop. It is uses as edible oil for food and bio-energy. Due to high contents of unsaturated fatty acids, vitamins and lack of cholesterol. Sunflower oil is very much demanding for human conception as edible oil, A lots of researches revealed that sunflower is an alternative source of energy specially concerns with health issues. Sunflower is a better option for the production of good quality for age as its features. A high yield of silage per hectare as secured crops with low risk of failure because of its tolerance to drought and adverse situation in the state of Bihar specially Gaya ji district.

Since the district Gaya ji (Bihar) is located of southern part of the Bihar plains. Available soil is sandy to loamy feature with an alkaline $P^H$ and normal rainfall regions. Water is needed more and more for proper irrigation during the graining season. This can remarkably affect the development of the plants and its yield increase due to reduction of growth. Yield as well as adoptability, especially in relation to drought stress. However certain tolerant adaptable crop plant such as Sunflower, morphological and physiological changes occur in response to drought. Height & diameter of stem, numbers of leaves, Number of seeds and Biomass of the plants is declined.

However, studies related to the management especially used of Nitrogen fertilization and water holding capacity of soil is necessary for a systematic explanation of cultivated area of Gaya ji district, Bihar. Therefore, the aim of the experiment evaluated the growth and yield rate of Sunflower plant. When growing under different level of water availability in soil and amount of fertilizer.

## II. MATERIAL & METHODS

The study was carried out from April 2025 to June 2025 in a Garma season. The treatment was arranged as completely randomised way (manner). Six different Nitrogenous fertilizer level with soil and water level with three soil replica i.e. Total 18 experimental unit was prepared. Each unit about 20kg soil in each earthen pots with different level of fertilization ratio and water contents.

The seeds of Sunflower were sown in each earthen pot. The soil water contents along with experimental periods was monitored daily through a segmented probe, Frequency Dorman Reflect meter (FDR), Major frequent water holding capacity of soil (WHC) through data compiled in a spread sheets according to the equation of the soil water retention curve. After completion experimental plants were collected and separated in its leaves and stems and oven dry at $105^0$C

for 12 hours to a contain was estimated and data were subject to analysing soil of variance.

## III. RESULT AND DISCUSSIONS

The increase in the height of plants and the number of seeds shows the significant growth of traits i.e. stems, leaves and dry weight were significantly affected by Nitrogen level. The result of the interaction between the factor like Nitrogen and available water level were not significantly affected (Table-1 and Table-2) respectively

Table-1
Analysis of variance for experiment growth traits

| Treatment | | Fresh Condition | | | | Dry Condition | | |
|---|---|---|---|---|---|---|---|---|
| | | DF | Steam | Leaves | Seed No. | Steam | Leaves | Seed No. |
| A | Nitrogen Level (N) | 2.5 | 15.26 | 7.21 | 11.21 | 1.02 | 1.01 | 0.78 |
| B | Available Soil Water (AW) | 2.5 | 9.86 | 1.01 | 08.07 | 0.95 | 0.26 | 0.94 |

Table-2
Analysis of variance for experiment Production ration

| S.N. | Treatment | DF | Steam Diameter | Seed No. | % Seeds variable | 1000 seeds weight |
|---|---|---|---|---|---|---|
| A | Nitrogen Level (N) | 2.5 | 0.57 | 187.67 | 0.21 | 1.01 |
| B | Available Soil Water (AW) | 2.5 | 0.38 | 92.29 | 0.98 | 1.88 |

## VI. CONCLUSION

Nitrogen application and available soil water affected for the growth and yield of Sunflower except for the dry weight of 1000 seeds of the crop had a high requirement for nitrogenous fertilizer sufficient Nitrogen and soil water application are important to produce higher Sunflower yield in Gaya ji district, Bihar

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