*__Original Research Article__*

# Effect of organic and inorganic plant growth promoters on Yield attribute, yield and economics of wheat (*Triticum aestivum* L.) varieties.


## Abstract

The field experiment ~~entitled "Effect of organic and inorganic plant growth promoters on performance of wheat (*Triticum aestivum* L.) Varieties"~~ was carried out during *Rabi* season of 2021-22 at "Students' Instructional Farm" of Chandra Shekhar Azad University of Agriculture and Technology, Kanpur. The experiment included two factors, *viz*. three timely shown wheat varieties, $V_1$-DBW-187, $V_2$-K-1006, and $V_3$-K-607 in main-plot and plant growth promoters (PGPs), $G_0$- Control, $G_1$- Nitrobenzene @ 3ml $l^{-1}$, $G_3$-Gibberellic acid @ 2000 ppm, $G_4$-Seaweed extract solid @ 25 kg $ha^{-1}$, $G_5$-Seaweed extract liquid @ 625 ml $ha^{-1}$, $G_6$-Micronutrients (Zn, Fe, B, Cu) @ 0.5% were selected in sub-plots. The overall 18 treatment combinations were accommodated in Split Plot Design and replicated thrice. The results of this study showed significant increases were recorded in yield attributes, yield and economics, *viz.* No. of ears $m^{-2}$ (426.29, 417.63), Length of ear (10.97, 10.53cm), No. of grains $ear^{-1}$ (69.55, 69.81), Test weight (40.67, 39.66g), grain yield (4764.67, 4402.33 kg/ha) and gross income (Rs. 141547.00, 131446.90), net income (Rs. 96773.00, 86672.74) and B: C ratio (3.14, 2.93) in wheat varieties DBW-187, K-1006 respectively as compared to variety K-607. Among plant growth promoters, $G_6$-mixture of micronutrients (Zn, Fe, Cu, B) @ 0.5% foliar spray at tillering stage , resulted significant increments in yield attributes, yield and economics, *viz.* No. of ears $m^{-2}$ (445.43), Length of ear (11.96 cm), No. of grains $ear^{-1}$ (73.67), Test weight (41.87g), grain yield (4813.67 kg $ha^{-1}$), gross income (Rs. 139707.40), net income (Rs. 94263.00) and B: C ratio (3.06) as compared to control treatment. $G_3$-Gibberellic acid @ 2000 ppm and $G_5$-Seaweed extract liquid @ 625 ml $ha^{-1}$ show significant result also. The maximum No. of ears $m^{-2}$, Length of ear, No. of grains $ear^{-1}$, Test weight, grain yield, gross income, net income and B: C ratio was obtained by the variety DBW-187 and mixture nutrients (Zn Fe, Cu, and B).

***Keywords:*** Wheat; micronutrients; sea weed extract; gibberellic acid; nitrobenzene; yield; economics

## 1. INTRODUCTION

Wheat (*Triticum aestivum* L.), is the most widely cultivated crop for providing food and nutrition to two third population of the world. World wheat production is 779.30 million tonnes, in an area of 222.27 million hectares and productivity of 3.51 million tonnes per hectare (Anonymous 2021). To ensure global food security for rapidly growing population, wheat production needs to be doubled by 2050. Wheat is a *Rabi* season crop that is grown-up in tropics and sub tropics region and conjointly need cool temperature throughout its growth cycle. Soil micro-nutrients, including zinc (Zn), iron (Fe), Boron (B) and copper (Cu) have been found deficit in majority of soils where intensive agriculture is being practiced and thus pose a serious threat for food production worldwide (Jones *et al*., 2013). Micronutrients have distinguished effects on dry matter, grain yield and straw yield in wheat (Chitra Mani *et al*., 2020). The availability of micronutrients such as Fe, Zn, Cu and B is much affected by pH and $CaCO_3$ content and soil texture usually micronutrient-deficiency problems are bound in calcareous soil of arid and semi-arid regions. Low quality seed, salinity, water logging, inadequate use of fertilizers, lack of irrigation water, high input prices, low farmers' education and no use of micronutrients and organic fertilizers are the major reasons for low wheat production (Khan *et al*., 1999). About 49 % of India's cultivated land is deficient in Zn and Cu (Singh *et al*., 2009). Further long-term soil health and sustained crop productivity cannot be maintained by using sole chemical fertilizers since they do not supply all the required nutrient elements particularly trace elements (Subba and Srivastava, 2002). Micro-nutrients play a major role in many plant metabolic activities ranging from promotion of growth hormones to photosynthesis, seed maturation and production, chlorophyll formation, starch formation, metallo-enzymes, protein and carbohydrate metabolism and cellular division as well as development. (Noll *et al.,* 2003) reported that total uptake of Zn, Cu, Fe and Mn in grain and flag leaves were significantly increased.

Seaweed extracts, ~~are~~ well-known bio-stimulants~~.~~ , ~~The seaweed extract~~ consist of trace elements and particularly plant growth regulators such as cytokinins, amino acids, antibiotics, and Vitamins. In modern trends the seaweeds were used along with the farm land as a soil conditioner in some European countries. There are different extraction methods can be used for seaweed extracts preparation *i.e.* water extraction under high pressure, alcohol extraction, alkaline extraction, microwave-assisted extraction (MAE) and supercritical $CO_2$ extraction. Cytokinins can be extracted using chilled 70% ethanol. Deuterium is used as co-solvent in this process (Yokoya *et al*., 2010). Algal extracts improve plant resistance to frost and drought and increase crop yields. Plants sprayed with the use of seaweed extracts are also characterized by higher resistance to pests and pathogens and more efficient consumption of nutrients from soil (Matysiak *et al.,* 2010).

Around 700 species of marine algae are present in both the intertidal and deep-water regions of the Indian coast, with approximately 60 of them being commercially important. Tamil Nadu, Gujarat, Maharashtra, Goa, Lakshadweep, Andhra Pradesh, and Karnataka are the leading seaweed producers. A few species can also be found in West Bengal and Orissa, as well as the Andaman and Nicobar Islands (Tandel *et al*., 2016). Seaweed extracts are currently used in agricultural practices and have already been commercialized. Sea weed is available in a number of types, including LSF (Liquid Seaweed Fertilizer), granular, and powder. The whole or finely chopped driven algal manure has been used, and all of them have been shown to support cereals, pulses, and a number of flowering plants. Seaweed manure has the advantage of being free of weed seeds and other pathogenic fungi**.** The foliar spray of liquid extract from seaweed causes cereals, vegetables, fruit plants, and horticultural crops to grow faster and produce more (Elansary *et al.,* 2016). In many commercial crops, foliar spraying with seaweed extract is a popular practice to increase yield (Khan *et al*., 2009). The aim of recent research is to implement new methods for preparing various seaweeds, such as mixed consortiums, for use in agricultural fields and to increase yield. Brown algae liquid extracts are sold under different brand names as bio-stimulants or bio-fertilizers. Seaweed extracts have been commercially available in recent years under various names as Maxicrop (Seaborn), Cytex, and Seacrop-16 (Gandhiyappan *et al*., 2001).

Gibberellic acid (GA) is an important plant growth regulator, that plays a significant role in germination, encourages cell division, breaks seed dormancy and increases the leaf size. Moreover, GA also proved to be a crucial hormone in defense reactions towards plant stresses. It may protect the plants by eliminating excess reactive oxygen species (ROS) and by enhancing antioxidant enzyme activities. Salt stress alleviation, enhanced nutrients uptake and improved yield have been illustrated by exogenous application of GA in wheat plants (Ashraf *et al.*, 2002). GAs participate in numerous developmental processes, including, seed development and seed germination, seedling growth, root proliferation, determination of leaf size and shape, flower induction and development, pollination and fruit expansion. Germination has been found to be under strict regulation of plant hormones, including gibberellic acid (GA), abscisic acid (ABA), auxin and ethylene.

Nitrobenzene is a greenish yellow crystal or yellow oily liquid with the odor of bitter. The nitrobenzene is soluble in water, acetone, benzene, diethyl ether, and ethanol. Nitrobenzene is applied with nitrogen for the enhancement of flowering and growth of agricultural crops. The nitrobenzene from seaweed extract has the capacity to increase flowering in plant (flower stimulant) and also prevent flower shedding. Nitrobenzene is a combination of nitrogen and plant growth regulators, extracted from sea weeds that act as plant energizer, flowering stimulant and yield booster. It is specially recommended for vegetable crops and flowering plants. Nitrobenzene 20% w/w is a new generation plant energizer and yield booster of low cost PGRs compared to others. Nitrobenzene is quickly absorbed into the plants. It influences the bio chemical pathway of the plants to uptake more nutrients from the soil. It also increases the nutrient use efficiency thus in the retention of the flowers and fruits. On the other hand, 'Flora' improves the organoleptic factors and keeping quality of the produce, which increases the harvestable yield of any crops.

On the other side, the foliar application of macronutrients caused a significant and/or highly significant effect on some of growth parameters and yield attributes during the two growing seasons. In addition, some nutrient of wheat grains content *i.e.* Fe, Zn, Cu and B also increased due to foliar application of macronutrients. There were significant differences between the two varieties for most studied characteristics (Abd El-Ghany *et al.*, 2013). Among different timely shown wheat varieties, DBW-187 showed the best results as compared K-1006 and K-607. Also, different plant growth promoters, mixture of micronutrients significantly interacted with the varieties for yield attributes and economics. The objectives of the experiments were to evaluate, to assess the performance of timely sown wheat varieties, to assess the effect of plant growth promoters on yield of wheat varieties, to analyze the interaction effect of wheat varieties and plant growth promoters, and to evaluate the economics of the treatments.

## 2. MATERIALS AND METHODS

### 2.1 Experimental site:

The field investigation was conducted on Student's Instructional Farm (SIF) at Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, and generated weather data of wheat crop during the *Rabi* season of 2021-22 from Agro-meteorological Observatory, Department of Agronomy. The experiment farm falls under the Indo- Gangetic alluvial tract of Uttar Pradesh.

### 2.2 Climatic conditions

Climate is a summation of weather conditions over a region during a comparatively long period. It is related to longer area like zone, state, country, and continent and for long-duration like months, season, and year. Geo-graphically, Kanpur is situated in the central part of Uttar Pradesh and the sub-tropical semi-arid tract of North India. It lies between $26^0$ 29' 35" North latitude and $80^0$ 18' 25" East longitudes and is located on an elevation of about 125.9 meters above mean sea level in Gangetic plain. It is situated in the central plain zone of Uttar Pradesh which is located on the right bank of the holy river the Ganga and falls under the upper Indo-Gangetic plain zone of India. The average annual rainfall is about 885.6 mm out of which normally about 88.70% is received during July to September.

### 2.3 Soil characteristics

The soil as a medium of plant growth is bound to affect profoundly the rate of growth of plants and ultimately the final yield through its properties. The general character were sandy clay loam soil, Organic Carbon (0.49%), Available nitrogen (148.20 kg $ha^{-1}$), Available $P_2O_5$ (20.60 kg $ha^{-1}$), Available $K_2O$ (215.50kg $ha^{-1}$) with pH of (7.7).

### 2.4 Experimental details

The experimental design was split- split plot design with three replications, timely shown wheat varieties (DBW-187, k-1006 and K-607) were allocated in the main plots and plant growth promoters ($G_0$- Control, $G_1$- Nitrobenzene @ 3ml $l^{-1}$, $G_3$-Gibberellic acid @ 2000 ppm, $G_4$-Seaweed extract solid @ 25 kg $ha^{-1}$, $G_5$-Seaweed extract liquid @ 625 ml $ha^{-1}$, $G_6$-Micronutrients (Zn, Fe, B, Cu) @ 0.5%) were allocated in the sub-plots. The size of each plot was (12 $m^2$), 4.0 m long and 3.0 m width. Total 18 treatments combination was included.

**2.5 Crop varieties:**

**(a) K-1006 (Shekhar):** It was released from Chandra Shekhar Azad University of Agriculture & Technology (U.P.) Kanpur in 2014. The optimum time of sowing this variety ranges from the 1st week of November to the 2nd week of December and its yield potential is 50 - 60 q $ha^{-1}$.

**(b) K-607 (Azad)**: It was released from Chandra shekhar Azad University of Agriculture & Technology (U.P) Kanpur in 2013. The optimum time of sowing this variety range from the 2nd week of November to the 1st week of December and its yield potential is 50-55 q $ha^{-1}$.

**(c) DBW-187 (Karan Vandana):** It was released from Indian Institute of Wheat and Barley Research, Karnal, Haryana. This variety is recommended for irrigated timely sown condition NWPZ (Punjab, Haryana, Delhi, Rajasthan and Western U.P.). Resistant to stripe and leaf rust, highly resistant to wheat blast, moderate resistance to karnal bunt and tolerance to loose smut with average yield of 61.3 q $ha^{-1}$ and yield potential of 96.6 q $ha^{-1}$.

**2.6 Agronomical practices adopted:**

The field was prepared well at proper soil moisture level after pre-sowing irrigation which was given about 10 days before the sowing date. The first ploughing was done by tractor-drawn rotavator followed by two cross ploughing with cultivator followed by planking. Certified seed of wheat varieties DBW-187, K-1006 and K-607, were timely sown on 29 November 2021. Sowing was done by manually at proper moisture with a uniform seed rate of 100 kg $ha^{-1}$ and planking was done properly to cover the seeds in the furrows. The crop was fertilized uniformly @ of 120 kg N, 60 kg $P_2O_5$, and 40 kg $K_2O$ $ha^{-1}$. The plant growth promoters, Nitrobenzene @3 ml/l at tillering stage, Gibberellic acid@ 2000 ppm at tillering stage, Seaweed extract (solid) @ 25kg/ha at sowing time, Seaweed extract (liquid) @ 625ml/ha at tillering stage, Micronutrient ( Zn, Fe, Cu, B) @ 0.5% at tillering stage were applied. For weed control Application of

Clodinafop-propargyl (Topik) @ 60-80 g a.i. $ha^{-1}$ & Metsulfuron-methyl @ 4-8 g a.i. $ha^{-1}$ was applied uniformly at 30-35 DAS in each treatment. The experiment was conducted under irrigated condition and five irrigations (including one pre-sowing irrigation) were applied. The crop was first irrigated at the crown root initiation (CRI) stage (21-25 DAS) in all the treatments and the remaining three irrigations were given to the fulfillment of the crop after 20-25 days interval. The crop was harvested when the ear head turned golden yellow in color and leaves and stem became dry. The plants were cut close to the ground and kept for drying. Net plot, leaving borders from each treatment were harvested, bundled, and tagged separately. Bundles were brought to the threshing floor and weighted after complete drying in the sunlight. Threshing was done plot-wise by thresher, yield data of grain and straw were recorded carefully.

**2.7 Observations recorded**

The appropriate sampling technique implies that proper balance in sampling to achieve maximum precision at minimum cost. Following this principle, the various observations were recorded from four tagged plants in each plot. Yield and yield attributes were recorded per plot basis and then converted to kg $ha^{-1}$.

**2.7.1 Yield attributing characters:**

a) **Number of ears ($m^{-2}$):**

Number of spikes per meter square was counted before harvesting the crop at four places and the average value was taken and expressed in the number of ears per meter square.

b) **Length of the ear (cm):**

Length of four selected ears from each plot as measured carefully from the neck node to the tip of last grain and averaged out to get the length of a single ear.

c) **Number of grains $ear^{-1}$:**

The total yield from randomly selected ears was threshed and seeds were counted and averaged to get the number of grains per ears.

d) **Grain weight per spike (g):**

The total yields of grain from four randomly selected tagged plants were balanced manually from each replication of variety. Average was worked out and recorded as yield (g) of grain spike.

**e) Test weight (g):**

One thousand grains from a composite sample of each plot was taken, weighed separately, and recorded in grams.

### 2.7.2 Yield

**a) Grain yield (kg ha$^{-1}$):**

After measuring the bundle weight of the harvested produce of each plot, the grains were separated by threshing. The grains thus obtained after threshing the produce from each net plot were air-dried to maintain 12 % moisture and grain yield was recorded in (kg plot$^{-1}$) which was further multiplied with conversion factor in order to get in (kg ha$^{-1}$).

### 2.7.3 Economics of treatments: INR

**a) Cost of cultivation (INR ha$^{-1}$):**

Cost of cultivation for different treatments were worked out by considering all the expenses incurred in the cultivation of experimental crop and added with variable cost due to treatments (INR. ha$^{-1}$).

**b) Gross return (INR ha$^{-1}$):**

Gross return was worked out based on grain and straw yield of wheat obtained under treatments considering the prevailing current maximum support price (MSP) of grain (INR ha$^{-1}$) and local price for straw respectively.

**c) Net return (INR ha$^{-1}$):**

Net returns for individual treatment were worked out by deducting the total cost of cultivation of each treatment from gross returns of respective treatments (INR ha$^{-1}$).

**d) Benefit : cost ratio:**

Benefit:cost ratio of each treatment was calculated by dividing gross return by the Cost of Cultivation of the respective treatment.

$$\text{B: C ratio} = \frac{\text{Gross return } (\textbf{INR}\ \text{ha}^{-1})}{\text{Cost of cultivation } (\textbf{INR}\ \text{ha}^{-1})}$$

## 3. RESULTS AND DISCUSSION

### 3.1 Yield attribute

The data regarding yield attributing characters, (Table 1) revealed that the timey shown wheat varieties DBW-187, K-1006 recorded significantly higher No. of ears $m^{-2}$, length of ears (cm) and test weight (g) as compared to variety K-607, respectively. The better yield attributes in DBW-187 is due to better growth characters compared to other varieties. In plant growth promoter's, the mixture of micronutrients (Zn, Fe, B, Cu) @ 0.5% recorded more numbers of ear, length of ear, No. of grain $ear^{-1}$ and test weight compared to control treatment. The Gibberellic acid Sea weed extract showed better performance but next to micronutrients mixture in terms of increasing No. of ears, length of ear, No. of grain $ears^{-1}$ and test weight compared to control treatments. Although the micronutrients are required in a small quantity, their supplementation during the crop growth help in better utilization of all other nutrients which intern result increase of crop growth of wheat. The application of seaweeds extracts also increase yield attributes due to provide essential plant hormones and nutrients. Similar findings were also reported by Islam *et al.* (2014), Gomaa *et al.* (2015), Zain *et al.* (2015), Mishra *et al.* (2021), Navya *et al.* (2021).

### 3.2 Yield

The performance of wheat varieties viz. DBW-187, K-1006, K-607 in terms of grain yield (Table 1) shown significant results. The DBW-187 increased the grain yield 4764.67 kg $ha^{-1}$ (10.83 %), compared to variety K-607, while the K-1006 recorded increment in grain yield 4402.33 kg $ha^{-1}$ (2.41 %), compared to K-607. The better performance of DBW-187 in terms of gain yield is resultant of better growth and yield attributing characters. Among plant growth promoters, the micronutrient mixture (Zn, Fe, B, Cu) @ 0.5% increment in grain yield 4813.63 kg $ha^{-1}$ (16.17%), compared to control treatment. Next to micronutrients, Gibberellic acid also reported better performance in terms of increasing grain yield 4650.33 kg $ha^{-1}$ (12.24%) compared to control. Yield can be consider being the final expression of physiological and metabolic activities of plants and is governed by various factors. Seaweed extracts are known to improve to the source-sink relationship translocation of photo assimilates and their by photosynthetic ability of the plants and thus play significant role in realization of high productivity levels and higher grain yields. Similar findings were also reported by Vasudevan *et al.* (2014), Islam *et al.* (2014), Zain *et al.* (2015), Chowdhury *et al.* (2018), Navya *et al.* (2021).

### 3.3 Economics

The overall performance of wheat variety DBW-187 found excellent in terms of economics over other varieties *viz.* K-1006 & K-607 tested (Table 2). The DBW-187, K-1006 recorded higher gross return **INR** 141547.00 & 131446.90, net return **INR** 96773.03 & 86672.74 and B: C ratio 3.14 & 2.93 respectively, significant over wheat variety K-607. Among plant growth promoters, the mixture of micronutrients (Zn, Fe, B, and Cu) @ 0.5% recorded more grass return **INR** 139707.48, net income **INR** 94263.39 and B: C ratio 3.06 significant over control. The above findings are similar with findings of Manimaran *et al*. (2019), Navya *et al.* (2021).

**Table 1: Effect of organic and inorganic plant growth promoters on Yield attribute and yield of wheat varieties.**

| Treatments | Yield attributes | | | | Yield |
|---|---|---|---|---|---|
| | No. of ears $m^{-2}$ | Length of ear (cm) | No. of grains $ear^{-1}$ | Test weight(g) | Grain yield (kg $ha^{-1}$) |
| **Varieties** | | | | | |
| DBW-187 | 426.29 | 10.97 | 69.55 | 40.67 | 4764.67 |
| K-1006 | 417.63 | 10.53 | 69.81 | 39.66 | 4402.33 |
| K607 | 413.19 | 10.43 | 66.11 | 39.28 | 4298.83 |
| SE(d)± | 2.121 | 0.109 | 0.382 | 0.266 | 41.554 |
| CD (P=0.05) | 6.046 | 0.311 | 1.089 | 0.758 | 118.461 |
| **Plant Growth Promoters** | | | | | |
| Control | 394.28 | 9.56 | 63.87 | 38.16 | 4143.00 |
| Nitrobenzene@3ml/l | 402.85 | 10.03 | 65.68 | 39.03 | 4325.33 |
| Gibberellic acid @ 2000 ppm | 438.73 | 11.37 | 71.50 | 40.90 | 4650.33 |
| Seaweed extract(solid) @25kg/ha | 414.10 | 10.12 | 66.63 | 39.28 | 4444.33 |
| Seaweed extract(liquid) @625ml/ha | 419.43 | 10.83 | 69.59 | 40.03 | 4539.00 |
| Micronutrient( Zn, Fe, Cu, B) @0.5% | 445.43 | 11.96 | 73.67 | 41.87 | 4813.67 |
| SE(d)± | 4.915 | 0.136 | 0.677 | 0.487 | 55.579 |
| CD (P=0.05) | 10.086 | 0.280 | 1.389 | 0.999 | 114.056 |
| **Interaction** | | | | | |
| V×G | | | | | |
| SE(d)± | 8.055 | 0.241 | 1.136 | 0.814 | 97.207 |

| | | | | | |
|---|---|---|---|---|---|
| CD (P=0.05) | NS | 0.535 | 2.434 | NS | NS |
| G×V | | | | | |
| SE(d)± | 8.513 | 0.236 | 1.172 | 0.843 | 96.265 |
| CD (P=0.05) | NS | 0.523 | 2.511 | NS | NS |

**Table 2: Effect of organic and inorganic plant growth promoters on economics of wheat varieties.**

| Treatments | Economics analysis | | |
|---|---|---|---|
| | Gross return (INR $ha^{-1}$) | Net return (INR $ha^{-1}$) | B:C Ratio |
| **Varieties** | | | |
| DBW-187 | 141547.00 | 96773.03 | 3.14 |
| K-1006 | 131446.90 | 86672.74 | 2.93 |
| K607 | 127584.30 | 82992.47 | 2.84 |
| SE(d)± | 831.41 | 955.81 | 0.022 |
| CD (P=0.05) | 2370.20 | 2724.83 | 0.062 |
| **Plant Growth Promoters** | | | |
| Control | 125877.40 | 83453.45 | 2.95 |
| Nitrobenzene @ 3 ml/l | 130449.50 | 85005.14 | 2.86 |
| Gibberellic acid @ 2000ppm | 135806.20 | 90862.22 | 3.02 |
| Seaweed extract(solid) @ 25kg/ha | 134779.10 | 90199.43 | 2.99 |
| Seaweed extract(liquid) @625ml/ha | 134536.80 | 89092.84 | 2.94 |
| Micronutrient( Zn, Fe, Cu, B) @ 0.5% | 139707.48 | 94263.39 | 3.06 |
| SE(d)± | 1193.48 | 1103.08 | 0.038 |
| CD (P=0.05) | 2449.21 | 2263.69 | 0.079 |
| **Interaction** | | | |
| **V×G** | | | |
| SE(d)± | 2062.107 | 1988.86 | 0.065 |

| | | | |
|---|---|---|---|
| CD (P=0.05) | NS | NS | NS |
| **G×V** | | | |
| SE(d)± | 2067.180 | 1910.59 | 0.067 |
| CD (P=0.05) | NS | NS | NS |

## 4. CONCLUSION

The result of the current investigation shows that the variety of wheat DBW-187 recorded better, yield attributes and grain yield (4764.67 kg $ha^{-1}$) under timely sown ($29^{th}$ Nov 2021) compared to other varieties K-1006 and K-607. Among plant growth promoters, the mixture of micronutrients (Zn, Fe, B, and Cu) recorded maximum yield attributes, grain yield (4839.00 kg $ha^{-1}$) compared to control treatment. On the basis of economic parameters of the wheat variety DBW-187 recorded maximum gross income (**INR**141547.00), net income (**INR** 96773.03) and B: C ratio (3.14). Among plant growth promoters, the mixture of micronutrients recorded maximum gross income (**INR** 139707.40**),** net income (**INR** 94263.39) and B: C ratio (3.06) compared to other plant growth promoters and control treatment. The interaction effect of varieties and plant growth promoters found non-significant.

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