CHAPTER-3
MATERIALS AND METHODS

The present Research work was conducted in the Department of Botany, Meerut College Meerut. Meerut is a city in the Uttar Pradesh state of India. It is an ancient city lies 70 km. northeast from the national capital Delhi, and 453 km. northwest of the state capital, Lucknow. Geographically Meerut lies on 28°57’N latitude and 77°45’E longitude in the Indo-Gangatic plains.

SAMPLING SITES- The samples were collected from 3 following sites of Ganga River-

1. BIJNOR-

Bijnor, or more correctly Bijnour, district lies at 29.3700° North latitude and 78.1300° East longitude in the Indo-Gangetic plains of India. It occupies the north-west corner of the Moradabad Division (historically, Rohilkhand or Bareilly region), and is a roughly triangular stretch of country with its apex to the north. The western boundary is formed throughout by the deep stream of the river Ganges, beyond which lie the four districts of Dehradun, Saharanpur, Muzaffarnagar and Meerut. To the north and north-east in the hill country of Garhwal, the dividing line
being the submontane road, which runs from Hardwar along the foot of the Himalayas to Ramanagar, Haldwani and Tanakpur. This road, popularly known as the Kandi Saradk, belongs throughout its length to Garhwal, the transfer having taken place a few years since. On the east the Phika river for the greater part of its course constitutes the boundary, separating this district from Naini Tal and Moradabad, as far as its junction with the Ramganga; and to the south lie the Thakurdwara, Amroha, and Hasanpur tahsils of Moradabad, the boundary being conventional and undetermined by natural features. The extreme parallels of north latitude are 29° 2' and 29° 58' and of east longitude 78° 0' and 78° 57' from Lalitpur, the most northerly point, to koti Rao in the furthest eastern corner the distance in 56 miles (90 km); and from koti Rao to Kamharia in the south-westerly angle 57 miles (92 km); and from Kamharia to Lalitpur 62 miles (100 km). The total area of the district is liable to change slightly from time to time by reason of the erratic action of the Ganges and Ramganga: in 1906 it amounted to 1,145,272 acres (1789.5 square miles, 4634.75 km²) the average for the last five years being 1,147,967 acres (4,645.66 km²).

There remains the low fringe of khadir along the Ganges to the west. This generally resembles the lowlands that skirt the rivers of the interior, the low flats which adjoin the stream itself being purely alluvial in character,
while above them rises a terrace of higher ground extending inland as far as the chain of stagnant morasses lying immediately under the bangar cliff. But the khadir in the district, at any rate in the southern parganas, in of a very poor description and no whit better than that on the opposite bank in Muzaffarnagar and Meerut.

1.1-CLIMATE:

In Bijnor, the climate is warm and temperate. In winter there is much more rainfall in Bijnor than in summer. The average annual temperature is 24.1 °C. About 1008 mm of precipitation falls annually.

1.2-CLIMATE GRAPH:
The driest month is April with 5 mm. Most precipitation falls in July, with an average of 317 mm.

2. MEERUT:

Meerut district lies between 28°57’ to 29°02’ North latitude and 77°40’ to 77°45’ East longitude in the Indo-Gangetic plains of India. It is bound on the north by Muzaffarnagar district, in the south by Bulandshahr district while Ghaziabad and Baghpat districts form the southern and western limits. The river Ganges forms the eastern boundary and separates the district from Moradabad district and Bijnor district. The Hindon forms the western boundary and separates the district from Baghpat. The ground is not rocky and there are no mountains. The soil is composed of Pleistocene and sub-recent alluvial sediments transported and deposited by river action from the Himalayan region. These alluvial deposits are unconsolidated. Lithologically, sediments consist of clay, silt and fine to coarse sand. Land is very fertile for growing crops, especially wheat, sugarcane and vegetables.
2.1-CLIMATE:

Meerut has a monsoon influenced humid subtropical climate characterised by very hot summers and very cold winters. Summers last from early April to late June during and are extremely hot, with temperatures reaching 43 °C (109 °F). The monsoon arrives in late June and continues till the middle of September. Temperatures drop slightly, with plenty of cloud cover but with higher humidity. Temperatures rise again in October and the city then has a mild, dry winter season from late October to the middle of March. The lowest temperature ever recorded is –0.4 °C (31.3 °F), recorded on Sunday, 6 January 2013.

Rainfall is about 80 cm to 100 cm per annum, which is suitable for growing crops. Most of the rainfall is received during the monsoon. Humidity varies from 30 to 100%. The city receives no snow.
2.2- CLIMATE GRAPH:

The driest month is April with 5 mm. Most precipitation falls in August, with an average of 314 mm.

3- BULANDSHAHR:

Bulandshahr District is in the Meerut Division of Uttar Pradesh, located between Ganges and Yamuna rivers. This is situated between 28.4° south and 28.0° north latitude and between 77.0° and 78.0° longitudes. The District is about 84 km in length and 62 km in breadth. The district is 237.44 meters above sea level. The district headquarters is
situated at Bulandshahr city. The district has many important towns such as Sikandrabad, Dibai, Shikarpur, Siyana, Bugrasi, Anoopshahr, Jahangirabad, Khurja and Bulandshahr.

The Ganges River separates the district from Jyotiba Phule Nagar District and Badaun District to the east. The district is bounded on the south by Aligarh District, on the west by Gautam Budh Nagar, and on the north by Ghaziabad District.

3.1-CLIMATE:

The climate is warm and temperate in Bulandshahr. In winter there is much more rainfall in Bulandshahr than in summer. The average annual temperature in Bulandshahr is 25 °C. About 826 mm of precipitation falls annually.
3.2- CLIMATE GRAPH:

The driest month is April with 4 mm. Most precipitation falls in August, with an average of 283 mm.
**RESEARCH PLANTS**

1. **MAIZE:**

   Maize, known in some English-speaking countries as **corn**, is a large grain plant domesticated by indigenous peoples in Mesoamerica in prehistoric times. The leafy stalk produces ears which contain the grain, which are seeds called kernels. Maize kernels are often used in cooking as a starch.

   The maize variety which was used for current study was Madhuri F1, Hybrid. The seeds were sown in Petri dishes at different concentrations. The concentrations which were taken into account were 0%, 20%, 40%, 60%, 80% and 100%. Then ten replicas of these seeds were grown in Petri dishes and irrigated with 10-20 ml at a regular interval in each concentration of solution. The results in the form of primary readings were taken and calculated. Then these plants were sown in fields and irrigated with same type of water and observed up to final growth.

2. **RICE:**

   Rice is the seed of the monocot plants *Oryza sativa* (Asian rice) or *Oryza glaberrima* (African rice). As a cereal grain, it is the most widely
consumed staple food for a large part of the world's human population, especially in Asia. It is the grain with the second-highest worldwide production, after maize (corn), according to data for 2010.

Since a large portion of maize crops are grown for purposes other than human consumption, rice is the most important grain with regard to human nutrition and caloric intake, providing more than one fifth of the calories consumed worldwide by humans. Rice is normally grown as an annual plant, although in tropical areas it can survive as a perennial and can produce a ratoon crop for up to 30 years. The rice plant can grow to 1–1.8 m (3.3–5.9 ft) tall, occasionally more depending on the variety and soil fertility. It has long, slender leaves 50–100 cm (20–39 in) long and 2–2.5 cm (0.79–0.98 in) broad. The small wind-pollinated flowers are produced in a branched arching to pendulous inflorescence 30–50 cm (12–20 in) long. The edible seed is a grain (caryopsis) 5–12 mm (0.20–0.47 in) long and 2–3 mm (0.079–0.12 in) thick.

The rice variety which was used for current study was Pusa1, grade foundation. Like maize, the seeds of rice also, were sown in Petri dishes at different concentrations. The concentrations which were taken into account were 0%, 20%, 40%, 60%, 80% and 100%. Then ten replicas of these seeds were grown in Petri dishes and irrigated with 10-20 ml. concentration of solution at a regular interval. The results in the form of
primary readings were taken and calculated. Then these plants were sown in fields and irrigated with same type of water and observed up to final growth.