Geographical
Set-up
GEOGRAPHICAL SET-UP

Study area

Aligarh district is located in the western part of Uttar Pradesh, at a distance of about 126 Km from India's capital New Delhi. The district of Aligarh spreads from $27^\circ$, $29^\circ$ to $28^\circ$, $10^\circ$ north latitudes and $77^\circ$, $29^\circ$ to $28^\circ$, $38^\circ$ east longitudes. The greatest width from west to east is about 116 Km and the maximum length from north to south is about 72 Km. It is part of the fertile Ganga-Yamuna 'doab'. The district spreads over 4023 square Kilometres and this area varies slightly from year to year due to changing courses of the river Ganga and Yamuna. River Ganga separates the district from Budaun for a few Kilometres in the northeast while river Yamuna constitutes the dividing line in the northwest between Aligarh and Gurgaon district of the state of Haryana to the north, the boundary is formed by Anupshahar and Khurja tahsils of district Bulandshahar. On the west and south west lie Chatta, Mat and Sadabad tahsils of Mathura district while in the southeast and east the boundary is formed by Jalesar, Etah and Kasganj tahsils of Etah district.
Structure and Relief

Aligarh district lies in an extensive alluvial plain formed by the deposition of alluvium in a fore deep. The plain in Aligarh district, like a true representatives of the Ganga plain, is generally level with imperceptible slope from north to south. It is remarkably homogeneous in character but at some places sand ridges alternated by depressions are found specially in the western part of the district. These ridges are mostly seen in Khair and Iglas tahsils. There is an imperceptible large depression in the center of the district, which in the north is narrow but gets wider towards the south and eventually passes into the adjoining district of Etah. This depression is characterized by the presence of clayey soils with imperfect natural drainage and as a result of this the area is dotted with numerous Jhils and is characterized by the presence of Usar patches with reh deposits. On both sides of this depression, there is higher ground. The western higher ground occupies a tract of considerable size containing soils which are lighter and fertile. In the east, the higher ground again descends into slight depression formed by the river Kali Nadi. These depressions have been formed as a result of fluvial action coupled with that of strong westerly winds. A
close look at the topography of the district reveals that it has a shallow through of sauce-pan-shape.

**Climate**

Aligarh district experiences tropical monsoon climate characterized by two extreme conditions of severe cold in winter and oppressive heat in summer with a rainy season in between. The character of the climate is similar to that prevalent in the Western part of Uttar Pradesh. The district is affected by the Northeast and Southwest monsoon in a year. Based on these two monsoon winds, the Indian meteorological department has divided the year into four seasons.

1. **Cold weather season (December-February).**
2. **Hot weather season (March- mid June).**
3. **Season of general rains (mid June-mid September)**
4. **Season of retreating monsoon (mid September-November)**

**Cold weather season**

The prevalence of cold and dry air is the main characteristic feature of this season. Sky is generally clear and cloud cover rarely exceeds two tenth. The weather is fine, temperature and humidity both are very low. During this
season, the temperature falls and pressure rises as a result of which a high temperature belt develops over north India which influences this district.

The beginning of the season is marked by a considerable fall in temperature. The mean monthly temperature varies from 21.5°C to 18.8°C in November and it falls during December and varies from 14.9°C to 16.1°C. The temperature experiences a further decrease in January when the average comes down to 12.8°C. As compared to January, temperature start rising from February and its mean varies 16.4°C to 17.2°C. (Table-1)

The direction of prevailing winds during the season is normally from west and northwest to east and southeast. The winds during the winter season are light and generally blow at an average speed of about 3.2 Km/hr. Winds are mostly dry owing to their continental origin.

The rainfall in winter months is very low and irregular. This rain is brought by the western depressions originating in the north of Atlantic and proceeding eastwards with the prevailing westerlies. The average rainfall at Aligarh, caused by these disturbances, is recorded 0.0 to 10.0mm from December to February. Hailstorms, sometimes accompanied by cold weather storm and frost also occur occasionally. With
Table I: Mean monthly Temperature, Rainfall and Humidity during 1998, 1999 and 2000.

<table>
<thead>
<tr>
<th>Month</th>
<th>Temp °C</th>
<th>Rainfall (mm)</th>
<th>Humidity %</th>
<th>Temp °C</th>
<th>Rainfall (mm)</th>
<th>Humidity %</th>
<th>Temp °C</th>
<th>Rainfall (mm)</th>
<th>Humidity %</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>12.8</td>
<td>0.0</td>
<td>60.9</td>
<td>14.4</td>
<td>9.2</td>
<td>67.0</td>
<td>15.6</td>
<td>0.6</td>
<td>63.6</td>
</tr>
<tr>
<td>February</td>
<td>17.2</td>
<td>6.6</td>
<td>55.9</td>
<td>17.0</td>
<td>8.5</td>
<td>66.7</td>
<td>16.4</td>
<td>10.0</td>
<td>50.1</td>
</tr>
<tr>
<td>March</td>
<td>22.6</td>
<td>2.3</td>
<td>51.9</td>
<td>20.5</td>
<td>9.6</td>
<td>59.6</td>
<td>21.0</td>
<td>5.0</td>
<td>56.1</td>
</tr>
<tr>
<td>April</td>
<td>30.5</td>
<td>0.6</td>
<td>27.5</td>
<td>28.3</td>
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<td>34.2</td>
<td>29.0</td>
<td>0.0</td>
<td>35.9</td>
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<tr>
<td>May</td>
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<td>0.0</td>
<td>24.4</td>
<td>32.1</td>
<td>28</td>
<td>40.3</td>
<td>33.0</td>
<td>0.0</td>
<td>26.0</td>
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<tr>
<td>June</td>
<td>32.1</td>
<td>72.6</td>
<td>55.4</td>
<td>34.0</td>
<td>120.6</td>
<td>39.7</td>
<td>34.2</td>
<td>32.3</td>
<td>57.4</td>
</tr>
<tr>
<td>July</td>
<td>29.4</td>
<td>332.7</td>
<td>82.8</td>
<td>29.5</td>
<td>179.2</td>
<td>82.1</td>
<td>29.8</td>
<td>354.3</td>
<td>81.0</td>
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<tr>
<td>August</td>
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<td>141.4</td>
<td>78.0</td>
<td>29.9</td>
<td>81.8</td>
<td>73.5</td>
<td>29.7</td>
<td>426.4</td>
<td>81.7</td>
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<tr>
<td>September</td>
<td>29.5</td>
<td>96.9</td>
<td>70.2</td>
<td>30.0</td>
<td>106.2</td>
<td>58.8</td>
<td>28.4</td>
<td>73.2</td>
<td>71.3</td>
</tr>
<tr>
<td>October</td>
<td>27.2</td>
<td>21.4</td>
<td>58.6</td>
<td>25.6</td>
<td>0.0</td>
<td>64.8</td>
<td>26.2</td>
<td>0.0</td>
<td>51.2</td>
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<tr>
<td>November</td>
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<td>0.0</td>
<td>58.2</td>
<td>18.8</td>
<td>2.6</td>
<td>76.6</td>
<td>21.5</td>
<td>0.0</td>
<td>58.5</td>
</tr>
<tr>
<td>December</td>
<td>15.5</td>
<td>1.2</td>
<td>72.7</td>
<td>14.9</td>
<td>0.5</td>
<td>73.6</td>
<td>16.1</td>
<td>0.0</td>
<td>64.6</td>
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</table>
these few exceptions, generally, the weather in the winter season is pleasant. By the end of February the sun moves northward as a result of which the temperature rapidly rises and hot weather season sets in by March (Table-1).

**The Hot Weather Season**

This season begins with a rise in temperature and decrease in pressure. The maximum temperature in March about 32°C, while the minimum temperature is 15°C. The maximum and minimum temperature continues to rise through April until the highest temperature of the year is recorded in the month of May and June. The temperature of May goes up as high as 43°C or 44°C and even more than 46°C for days in both the months. The average maximum and minimum temperature is found varying from 34.5°C to 28.5°C. The days during these months are characterized by intense heat, dry air and low relative humidity. The diurnal range of temperature is quite high due to which the days are warm and hot but nights are pleasant (Table-1).

The hot and dry winds which blow with great velocity are a regular phenomenon. These winds are characteristic of this season and are locally known as "loo". The velocity of winds increases from 5.5 Km/hr. in March to maximum of 70.5
km/ hours in June. These winds are usually calm during the night hours, but from 8.00 A.M. to 1 or 2 P.M., the velocity increase rapidly and during the next 2 or 3 hours it blows almost with the force of a gale, after which it again falls very rapidly until 6 P.M. when it is light and nearly calm. The humidity is lowest in these months, occasionally falling to 24.4% (Table-1).

A peculiar phenomenon of this season is the occurrence of dust thunderstorms which are locally known as "andhis". They are caused by the conventional movements of air and usually occur in the afternoon when the air movements are strongest. The frequency and strength of these storms increases with the advancement of season. During the period of May and early June they are more frequent and sometimes move at a speed of 48 to 64 km per hour. These storms are short lived and sometimes they cause rains with winds, thunder and blinding dust. However, it brings an appreciable decrease in the temperature. The air becomes cold and one gets temporary relief from the oppressive heat. No rainfall, except for a small amount accompanied by the thunderstorms, makes drought situation severe during this season.
The Season of General Rains

By the middle of June, changes occur in the weather phenomenon. This is called, over north India, as the burst of monsoons. Due to excessive heat in summer months, a low pressure area develops in the north western India and by the middle of June it brings a complete reversal in the air movements. The atmospheric pressure continues to decrease till the first week of June when it is lowest and the winds start to move from sea towards land. With the arrival of humid oceanic currents in July, temperature falls and the air becomes cool and pleasant. There is a significant fall of temperature from July to August and the mean temperature goes down upto $29.4^\circ C$ in July. The relative humidity increases from 55.4% to 82.8%, during June, July and August. The rainy season is characterized by overcast sky having an average cloud cover about seven tenth in July which rarely exceeds two tenth during the summer months (Table-1).

The time of the onset and retreat of monsoon varies from year to year. Generally, the rains set in by the end of June or by the first week of July and continue till the end of June or by the first October. July and August are the rainiest months and having average rainfall varying from 237.05mm in 1998,
130.5mm in 1999, and 390.35mm in 2000 respectively. By the September there is a marked decrease in rainfall. The average rainfall during September of 1998, 1999 and 2000 is recorded 92.1mm. The incidence of rainfall is not continuous throughout the season but it takes place in brief spells of cloud burst and usually two to three days of continuous rain followed by an interval of a week or so when there is almost no rain. The decreasing trend of rains in September, gradually ceases by the end of this month or early October (Table 1).

**The Season of Retreating Monsoon**

The southwest monsoon ends by September or from the beginning of October. Usually this monsoon retreats gradually and September has hot and sticky weather with a distinct rise in temperature which however, comes down by the end of October. The intensity of monsoon now decreases and rainless intervals become longer. The retreat of monsoon takes place by a series of intermittent rains and dry weather. With the recession of monsoon, the precipitation falls and weather becomes dry and warm. During this period, the sky is clear and relative humidity falls to 51.2%. The precipitation in October is sometimes nil and cloud cover rarely exceeds one-tenth. Sunshine due to clear sky causes a slight increase in the day temperature but the temperature in the night decreases
slightly because of the dryness of air. However, by the end of October the humid oceanic currents are replaced by the dry continental air. Thus, it is a season when southwest monsoon retreat yielding place to northeast monsoons. This period may be considered as the period of transition between the hot wet weather and cool dry weather. The temperature during this season is uniformly high in the beginning of October but by November it begins to decrease more sharply and a cool weather sets in by December with temperature around 15.5°C (Table-1).

**Vegetation**

The Aligarh district lies in the subtropical belt having deciduous type of vegetation. This district was once covered by dhak jungles which have been cleared for cultivation purpose. A certain amount of dhak jungles however are still found scattered in patches in the clayey and usar tracts. In the khadar of Ganga, there is a considerable extent of tamarisk, an evergreen shrub on the more recent alluvium of the rivers. In the khadar of Yamuna, there is a narrow belt of tamarisk which is followed by broad stretches of waste covered with that clung grass. The eastern, part of the district has more trees than the western part.
Type of Soils

The soils in general differ greatly in texture and consistency, ranging from sandy through loams and silts to heavy clay. They change in texture from sandy along the river Ganga in the east to sandy loam and then the clayey loam in the middle of the district. Further, westward, the reverse order of texture is seen from clay loam in the middle, through a sandy loam to finally a sandy bed along the river Yamuna.

Variation in texture, chemical composition and consistency of the soil character has forced pedalogists to follow different classification to suit their purpose.

Six categories of soils namely:

1 - Ganga Khadar
2 - Eastern upland
3 - central lowland
4 - Western upland
5 - Yamuna Khadar
6 - Trans Yamuna Khadar.

A simple and functionally useful classification was however presented by four types of the soils in the district.

Younger Alluvial Soils

These soils occupy narrow belts in the eastern corner along the river Ganga and the western corner along the river
Yamuna. These tracts are flooded every year and thus regularly receive new deposits of silt and sand. They are not mature and the profile shows many layers of younger alluvium. These soils are light gray to dark gray in colour and sandy to silty loam in texture. The water table is high and usually present near the surface. The drainage in soil is therefore imperfect, restricted and poor. During the summer months widespread salt efflorescence may be seen on the surface. The soils are saline in nature and alkaline in reaction. Agriculturally, the soils are not well developed because of floods, water logging and saline efflorescence but cultivation is possible. Most of the land is devoted to the cultivation of salt tolerant crops such as sugarcane, barley, paddy, etc.

**Calcareous Alluvial Soils**

These soils are found in Iglas tahsil, Mursan block, Atrauli and Gangiri block of Atrauli tahsil. In Iglas tahsil, they extend over mainly the Gonda block. In Atrauli tahsil they occupy narrow belts in the western part of Atrauli and Gangiri blocks, along the course of Kali Nadi. In Iglas block they are found in the southwestern part, while in Mursan block found in western, eastern and southern part. The texture of such soils varies from sandy to sandy loam. Small sandy ridges are also seen especially in Iglas tehsil. These soils are
poor in organic matter and other plant nutrients. They are rich in calcium carbonate because of which they are called as calcareous alluvial soils. For agricultural purpose, they are not good soils due to their poor organic matter, sandy nature and presence of soluble salts. These soils are mainly suitable for forestry and grazing.

**Saline and alkali soils**

Owing to imperfect drainage, the district contains vast areas of saline and alkali soil having a PH value of above 8.5. Such soils are widely distributed in the tahsils of Sikandra Rao and Koil and in some parts of Khair, and Iglas tahsils. The texture of these soils varies from loam to clayey loam. During the rainy season the soil remains submerged and becomes impermeable when it finally dries up. These poor soils cannot be utilized without reclamation and proper management. At some places, where the intensity of salt is low, some salt tolerant grasses and crops such as paddy, barley and sugarcane are cultivated but the yields remain very low.

**Older Alluvium**

Older alluvium covers large parts of the district. Its soil profile is mature and the texture varies from good quality loam to sandy loam. It is a good, deep, well-drained, neutral to
slightly acidic soil and can be easily ploughed and cultivated. The soil is very fertile and in fact some of the highest yields in the districts are obtained from this soil. The main crops obtained from these lands are Jowar, Bajra and Maize during the Kharif season and barley and wheat in the Rabi season.