Towards the southern part of the tundra soil where the sand content is greater, podsols can develop. Here the depth of soil is only 10 – 15 cm. A thin raw humic layer with a depth of one to two centimetres develops over the surface. This is A_1 horizon. Below A_1 there is a thin grey sandy layer. This is A_2 horizon. Below A_2 there is thin depository B horizon.

Soil and agriculture : Short growing season, low temperature even during summer, frozen top soil, excess moisture condition in the soil, insufficient movement of air are the hurdles to agricultural development. In recent years due to advance in technology, agriculture has just started. Among the remedial measures are– application of organic and inorganic fertilizer, increase in nitrogen content by artificial means, helping movement of air by tilling etc.

Gley Podsol soil

As one moves towards south from the tundra region, natural conditions are bettered. In particular, temperature increases, so increases the length of day. Due to increase in average summer temperature, few coniferous trees grow. In spite of the fact that winter temperature is much low, summer temperature is relatively high. This effects the melting of top soil upto considerable depth. Besides, the rate of chemical decomposition of rocks and the rate of oxidative decompositon increase. As a result, the depth of soil is relatively greater than the tundra region.

Examination of soil profile shows that the A horizon is about 3 centimetres deep. The percentage of organic matter is 1 – 3. The A_2 horizon is 7 – 10 centimetres thick. Below A_2 occurs the B horizon. It is 20 – 26 cm. thick. C horizon lies below B horizon.

Soil and its use : Since the depth of soil is greater and other conditions are relatively favourable, these soils are favourable to farming. But due to other difficulties, their use is limited. Due to increase in population, the soils are being increasingly used.

Podsol soils

Podsol soil is an important zonal soil in the earth. A wide belt comprising the northern part of Eurasia and North America is covered with podsol soils. Geographically this soil zone is located between Gley podsol soil to the north and Brown podsol to the south. Latitudinal location is between 50° – 65°.

The name 'Podsol' is derived from the Russian word 'Zola' meaning ash colour.

The colour of the soil is grey. So, it is called podsol.

Natural environment : climate : Podsol soils have developed under most extreme climate. Here the range of temperature between summer and winter is the highest (62°C). Winters are extremely cold. In north Western Siberia temperature in winter goes down to – 46°C. In some places it may even be less than –65°C. In northern hemisphere snowfall starts in the month of August. For six to seven months temperature remains below 0°C. However, during winter the range of temperature between day and night remains low which is to the extent of 8°C. The length of day is very short in this season.

During summer, however, temperature increases appreciably. The average monthly temperature during summer is 10°C. Towards the equator it is even higher. July is the hottest month. In this month the average temperature fluctuates between 16 – 18°C. Another notable feature in summer is that the length of day is very great 19 – 22 hours.

The average annual rainfall is low only 50 c.m. In the coastal areas the amount is slightly higher. Rainfall is greater during summer. Whatever rainfall occurs in winter it is in the form of snow. In Asia the region is known as **Taiga.** In Europe and North America the area is known by the same name.

Natural vegetation : In the development of podsol soil the natural vegetation has a great role to play. Coniferous vegetation is the characteristic vegetation. **Pine, fir, birch, spurce, oak, maple, lime grow abundantly** and naturally. Other plants are lichen and grasses. In respect ot climate and natural vegetation the Taiga region can be divided into three sub-regions from north to south viz.–

(1) **Taiga of the north :** Since the weather is very cold birch is the main species. Others are lichen, grasses and different types of **sturted** shrubs.

(2) **Central Taiga :** It is here where dense vegetation of spruce and fir is developed. Others are birch, oak etc. Below the canopy there is the growth of mossy vegetation along the surface.

(3) **South Taiga :** It is nearer to the equator. So, temperature is slightly higher. Side by side with the coniferous vegetation, there are broad leaved trees too like spruce, lime, oak, maple etc. Grasses are also abundant.

Characteristics of vegetation : The trees and other vegetations, which grow over here have certain features which play important role in the development of podsol such as (a) Since the vegetation in evergreen, surface gets regular supply of organic debris. So, a humic layer is formed on the surface. (b) The coniferous trees can grow with limited or poor supplies of mineral plant foods. So, the organic debris can not supply mineral and organic matter is naturally acidic in reaction. (c) Since the temperature remains very low, the total amount of debris can not be decomposed in a year. As a result the organic matter is more acidic. (d) The plant leaves are mostly coated with waxy materials which decompose slowly. It is another reason of acidic organic matter. (e) Because of the fact that organic matter is highly acidic earth worms can not live. Decomposition is mostly accomplished by fungus. The fungal decomposition is very slow. It further increases acidity (f) Decomposition of organic debris continues under anaerobic conditions. (g) A raw humic layer is formed near the surface.

Parent material : Podsol is an acidic soil. In the presence of acid, the process of podsolization is active. So, the rocks which are naturally acidic such as sandstone, granite, quartzite etc. are suitable for podsol soils as **parent** material. Over these rocks podsols can develop easily.

Relief : The relief of Taiga is mostly plain. Plain lands are suitable for podsol formation. So, relief has not been a hurdle in podsol formation in Taiga.

Process of podsolization : Although the amount of rainfall in the Taiga region is less, the rate of evaporation is also low due to low temperature. So, the effectivity of rainfall is greater. The soils remain moist throughtout the year and leaching also continues throughout the year.

Since a raw humic layer is developed near the surface which is highly acidic (pH3–4), all the soluble minerals leach down by eluviation. Even the iron and aluminium oxides which are insoluble in ordinary water become soluble under acidic condition and get removed from the surface and get deposited in the B horizon. Due to very low pH the process of nitrification is non existence. The result is that only sands are deposited in the A horizon whose colour is ash grey. In the initial stage the thickness of this sandy layer is nominal. But with the possage of time it becomes thicker and thicker (Fig - 35). Due to ash colour of the A horizon the soil is named **Podsol** because the ash colour in Russian language is known as 'Zola'. And the process by which podsol is formed is known as **Podsolization.** In short, the removal of salts from the A

horizon and deposition of sand in the same horizon is known as podsolization.

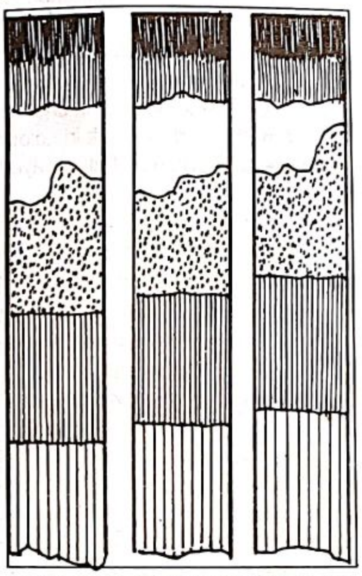

FIG 35 : DEVELOPMENT SOIL PROFIE IN COURSE OF TIME

The rate of podsolization depends mainly on the supply of water. During spring and autumn seasons, the rainfall is greater. So, the process is rapid during these two seasons.

Because of highly acidic A horizon almost all the bases get released and get deposited in the sub soil region and gives birth to the illuvial B horizon. Some amount of clay particles also leach down as colloidal solution or in a mechanical way and get deposited in the B horizon. Due to the deposition of clay minerals the B horizon becomes more compact and hard through which water can not pass. This compact layer is called **Hard pan.**

The part of the bases which become translocated downward get deposited in the B horizon and part of it is lost to ground water. Most of the iron, aluminium manganese get mobilized in the A horizon due to high acidity and they become hydrated by reacting with soluble organic matter and deposited as precipitates in the form of oxides in the B horizon. This happens because the pH of the B horizon is greater than the A horizon. The ionized iron, aluminium, manganese, calcium, magnesium and other elements react with the negatively charged silicates phosphates, humates and get deposited in the B horizon as gels. These products show red, reddish brown colours in the profile.

Soil profile : In podsol soils leaching continues throughout the year and for this reason the depth of soil is considerable. And all the soil horizons and sub horizons are found to develop vividly.

The profile which is developed under favourable conditions is called the **Ideal profile.** Following is the description of a typical podsol profile.

A_O : **1 – 5.5 cm. deep :** The organic horizon which is formed at the surface is called A_O horizon. It is formed by fallen leaves, twigs, fruits, flowers, trunks, mosses etc. and forms a thick mat of organic debris. The foresters call it **duff** or **mull.** It is dark black in colour and highly acidic in reaction. In can be divided into (a) half decayed (A_{OO}) and (b) decayed (A_O) layers.

A_1 : **15 – 20 c.m. deep :** This layer is contained with roots of different species and it is light yellow coloured. With the increase in depth, the organic matter content is rapidly decreased (Fig – 36) . It is loose, soft composed of sands of grey colours. It is structureless.

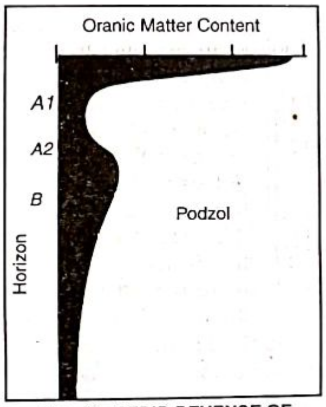

FIG : 36 REPID DEVENSE OF ORGANIC MATTER WITH IN CREASE IN DEPTH

A_2 : **15 – 20 c.m. thick :** It is ligher is colour than A_1 horizon. In mature podsols it is grey or white coloured. Structure is dusty (Fig – 34). With the increase in depth laminated soil structure is found. In sandy soils it is found up to the surface.

B_1 : **15 – 25 c.m. deep :** It is this layer where the deposition of clay and metallic products occurs. So, its texture is heavy. The deposition of minerals and clay starts from here. It is dark brown or reddish brown in colour. The deposition of organic matter occurs in the form of scattered veins. Few materials of light colour hang from the A_2 horizon like projections. On the upper side layerings can be seen like plates. In the lower part lumpy nutty structure develops.

B_2 : **15 to 20 c.m. thick :** It is the actual illuvial layer with reddish or reddish brown in colour. It is compact too. Towards the lower part the texture is sandy, sometimes nodular in structure. The hard pan is developed in this layer (Fig-37).

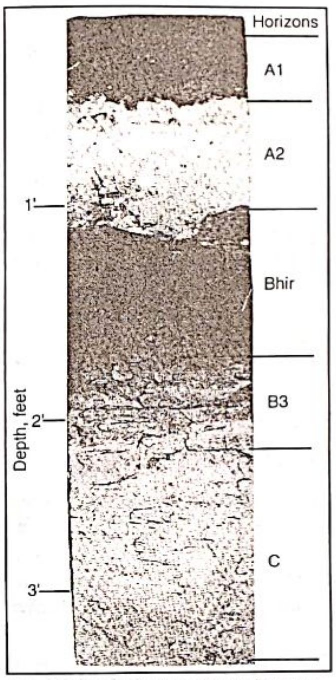

FIG : 37 WHITE OR GREY COLOURED A_2 HORIZON

In mature podsols, the B horizon is compact and hard when dry. When wet it is plastic. Drainage is difficult. So, waterlogging results and hampers crop production.

C : **horizon :** It is the parent material. This horizon is lighter in texture than the B horizon and of same nature up to great depths. The influence of soil forming factors is less here.

Under ideal conditions this type of profile is originated. But under changed environmental conditions three types of podsol can be formed viz.

(a) **Meadow podsol** (b) **Peat podsol** and (c) **Gley podsol.**

(a) **Meadow podsol :** Within the evergreen coniferous forests may grow grasslands, particularly around water bodies. In these areas there develops a mat of dead grasses on the surface. The organic matter content in the soil becomes higher and makes the soil more black in colour. The thickness of A_1 is 15-25 c.m. and that of A_2 becomes 15-20 cm. The B horizon becomes pretty stable. The colour varies frorn grey to yellowish grey and sometimes blue. However, medow podsol is acidic.

(b) **Peat podsol :** The marshy areas sometimes get silted up and become highlands. The podsols developed over them are called **Peat podsol.** These podsols are more wet than meadow podsol.

(c) **Gley podsol :** The areas where the level of ground water fluctuates with the changes in season, **Gley podsols** are formed. The characteristic feature of this type of podsol is that a thin grey layer is deposited in the lower part of the A horizon or in the upper part of the C horizon. This is known as G. This layer is mottled with green, blue or brown colours. If the iron content in the ground water is greater iron is deposited. When ground water level goes down this layer gets the supply of oxygen and iron is oxidised and is deposited as precipitates. Sometimes, manganese is also deposited in this way. And because of these deposits, a hard pan is developed in this layer.

Use of podsol : The fertility of podsol is not up to the mark. High degree of acidity, dearth of mineral plant food, unfavourable physical conditions, waterlogging are the reasons for this. Still acid loving crops like oat, ryes, potatoes, beet are cultivated. However, the fertility can be increased by the application of lime, organic matter and chemical fertilizers. Attempts are being made to utilize the mineral and organic matter deposited in the B horizon by scientific means or by better cropping practices.

Grey forest soil

To the west of podsol soil zone of Eurasia and North America where the conditions are neither suitable for typical forest nor for typical grass land this type of soil has developed. Here, there is an admixture of forest and grasslands. The soil which has developed over here is called **Grey forest soil.** It is also called **Grey brown podsolic soil.**

Conditions for soil development : Climate : Since it is mainly developed to the west and mid western part of Eurasia, the difference in temperature between summer and winter is high. During winter temperature goes below the freezing point and snow fall occurs. That is, winter is cold. However the number of winter days is small than the podsol region. Summer temperature is much higher than the podsol region. So, more heat is felt and the rate of evaporation is increased.

Though rain bearing winds can enter the western part of Eurasia it can not sufficiently enter in the mid western part. The average annual rainfall is 75 – 115 c.m. In the western part rainfall occurs throughout the year. But due to high rate of evaporation the effectivity of rainfall is less. It is to be remembered that this region is located in such a position that to the north and east of which the effectivity of rainfall is more due to low temperature and it is less to the south. In North America this region is located to the west of podsol soil region.

combination are widely cultivated. These are used in animal rearing. Some of the best agricultural lands of U.S.A are situated here. These soil regions have relatively high density of population. Urban and industrial growths are also satisfactory.

Layer of calcium carbonate deposition : The soil regions so far discussed such as tundra soil, podsol soil, grey forest soil or grey brown podsolic soil and prairie soil are acidic soils. In these soils mineral salts leach down and get deposited in the B horizon and there is no deposition of calcium carbonate in the soil profile. According to **C. F. Marbut** these soils fall under **Pedalfer** group. As one move towards the equator from these soil zones, temperature continues to rise and lastly one reaches the deserts and semideserts where the ervaporation exceeds precipitation. So, the soils of the A horizon remains dry. Leaching is not so prominant and there is the deposition of calcium carbonte in any **part** of soil profile. According to **Marbut's** classification these soils fall under **Pedocal.** Chernozem soil, chestnut soil, brown soil, desert soil are such soils. Further to say, as one moves from the chernozem soil towards the desert soils the deposition of calcium carbonate occurs towards the surface (Fig-39).

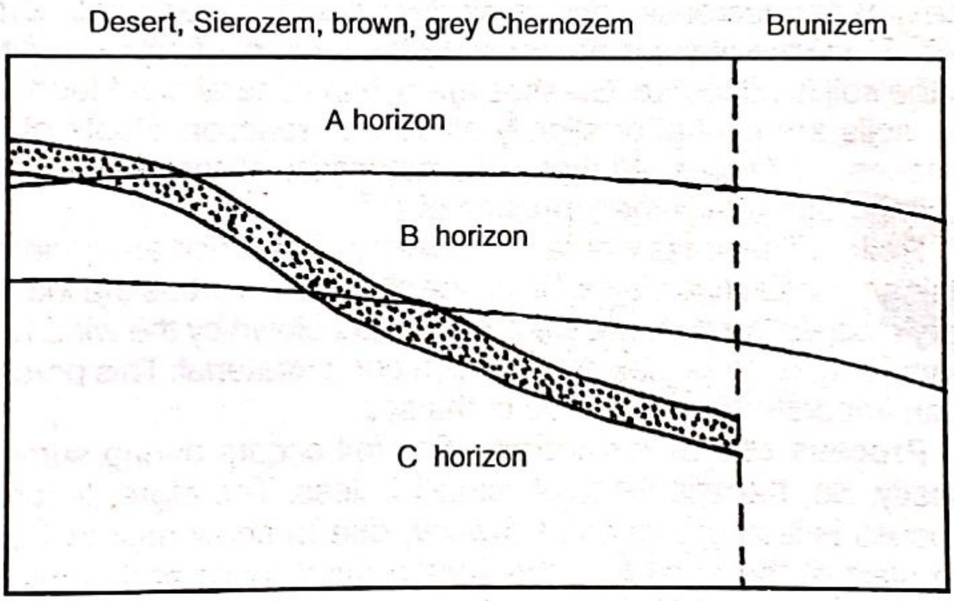

FIG : 39 INCREASE IN RAINFALL AND INCREASE IN THE DEPTH OF DEPOSITION OF CALCIUM CARBONATE

Chernozem soil

The Russian meaning of chernozem is **black.** So, chernozem soil means **black soil.** Russians were the first who identified chernozem soil. Though chernozem type of soil is developed in other parts of the world, all such soils have been known by the name **'chernozem'**. In Europe this soil is developed in a belt stretching from south-east to north-west. This belt extends up to Amur basin crossing Ural mountains. This type of soil is also developed in the central part of North America, south central part of South America and grasslands of Australia. Latitudinally it is developed within latitudinal limits from 35° – 50° in both the hemispheres.

Conditions of soil development : Climate : From the point of view of climate it is developed under semidesert and sub-humid parts of temperate regions. These areas are located mostly in the interior parts of the continents. So, climate is extreme in type. The range of temperature is very high. Winters are cold, temperature drops to below freezing point. Average summer temperature is moderate (18 – 25°C). Most of the rainfall occurs during summer. The average amount is 50 – 100 c.m. The regions get snow melt water by the start of the summer.

Natural vegetation : Under the prevailing extreme type of climate, herbaceous plants i. e. grasses are the only characteristic vegetation. Even within this region amount of rainfall varies. On the basis of the amount of rainfall the height of the grasses also varies. In areas of greater rainfall, the height of the grass is 1 – 2 metres. With the decrease in the amount of rainfall, the height of the grasses decreases and ultimately it becomes few centimetres only. Since the grasses are annuals, the amount of organic debris in the soil is adequate. Grasses are rich in mineral plant food. So, the soils are neutral or slightly alkaline in reaction. Roots of the grasses are fibrous. All these characteristics of the grasscs play an important role in the formation of soil.

Relief : The areas where chernozems are formed are generally plains or undulating plains. Since the chernozem areas are located very close to the deserts, soil particles are blown by the winds and have formed **loess** plains. Loess is a porus material. This porosity is an important characteristic of the soil.

Process of soil formation : Rainfall occurs during summer mostly. So, the effectivity of rainfall is less. Therefore, leaching process is less prominent. However, due to snow melt water by the start of the summer , the soils remain moist and helps the growth of grasses.The grasses dry up during, summer mostly. However the grasses grow rapidly during the periods of summer rain. During the periods of drought the grasses extend the roots very rapidly downwards. Although the decomposition process remains stagnant during dry summer days, the process starts by the end of summer when rain occurs and forms organic matter. Perolating water contained with organic material tends to form the soil structure or peds within the soil. Due to dryness in summers and freezing during winters, the peds become strong and stable. Content of organic matter is very high near the surface which varies between 3.5 – 15 percent.

In chernozems, calcium humates are formed in the A horizon. In wet conditions it is soluble. But during the dry season it is insoluble. During drying it forms a fine organic layer around the soil particles and develops soil structure . The structure is crumby (Fig- 40) which is considered to the best in type. It does not get destroyed even in the presence of water.

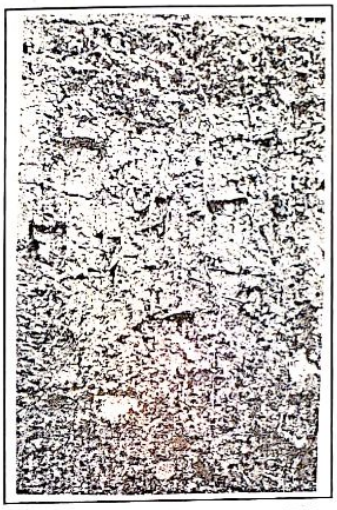

FIG : 40 CRUMB SOIL STRUCTURE

Chernozems are not only rich in organic matter. They are also rich in minerals. There is gradual decrease in organic matter from the top (Fig - 41). The colour of the soil in the A horizon is deep black. Besides, the type of clay mineral which is originated here is montmorillonitic in type. This can hold more moisture. The base exchange capacity is also high. The soidium and potassium that are derived during weathereing are partly mixed with ground water and partly remain in the A horizon.

Calcium and magnesium leach down and get deposited in the B horizon. They are present in the soil in the form of white streaks as veins and sub veins in the soil. Sometimes they are deposited as calcium and magnesium carbonates. In spite of the removal of calcium and magnesium from the A horizon, the pH of the A horizon remians

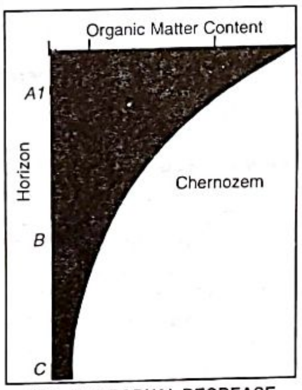

FIG : 41 GRADUAL DECREASE OF ORGANIC MATTER WITH INCREASE IN SOIL DEPTH neutral or slightly alkaline because of the fact that the supply of minerals remains steady due to the release of minerals from mineralization. For this reason, the chernozem soils are rich from the point of view of organic matter and minerals and the soils are very fertile. The profile of a typical chernozem is as follows :

A_0 : 1 – 2.5 c.m. deep. It is like a mat composed of dead grasses.

A_1 : 30 – 60 c.m. deep. Deep black to brown in colour. The percentage of organic matter is 4 – 15. The organic matter gradually decreases downwards. They are granular or crumby in structure. The structure is stable. Aeration is good.

A_2 : 30 – 60 c.m. deep. The colour is black to brown. Although the organic matter content is slightly less than the A horizon, it is pretty high, The structure is nutty. Lime remains in free form.

B : 40 – 60 c.m. deep. The colour is light yellow. No observable soil structure, dusty in nature. The deposition of calcium carbonate is observable. Sometimes, the deposition of gypsum is noted also.

C : Parent material is formed of loess. However, granites. basalts, limestones are also seen as parent material.

Use : Since the chernozem soils are developed over semidesert and sub-humid regions, the density of population is low. But the soils are very fertile. Provided water is available, it is suitable for the cultivation of wheat, cotton, corn etc. Wheat is a surplus crop. Animal rearing is an another occupation. In spite of low density of population, the number of towns and industries is pretty high.

Chestnut soil

Conditions for the development of soil : As one moves towards the low rainfall areas from the chernozem region i.e. towards the equtor, the leaching process dwindles in the A horizon due to low rainfall.So, the deposition of calcium carbonate starts occurring more nearer the surface. Besides, the deposition of potassium and sodium becomes more observable. Due to less rainfall, the plant growth is also scanty and dwarfed. Also due to less organic matter content, the colour of the soil becomes light brown. Deposition of salts on the surface occurs owing to upward movement of water i.e. capillary water from the ground water.

Soil profile : The profile of typical chestnut soil is like the following :

A_0 : 1 – 1.5 c.m. thick composed of a mat of dead grasses.

A_1 : 10 – 14 c.m. thick , grey, chestnut brown in colour. Laminated soil structure, soft and friable, stable downward.

Desert and semi desert soil

Deserts and semi deserts do not have any definite soil forming process. The environmental conditions are not favourable for soil growth. So, soils remain in primary stage of development. They are very rudimentory. In spite of this, soils develop and they are mostly grey in colour. In pedology these soils are called **Grey soil** or **sierozem soil.**

Conditions of soils development : The amount of rainfall is very low indeed. It is highly variable too. The average annual rainfall is 25 – 50 c.m. Since the rate of evaporation is very high, as soon as rainfall occurs, it is rapidly evaporated. The ranges of temperature between summer and winter and between day and night are very high. Due to low and erratic rainfall, plant growth is scanty. Except some thorny bushes and cactus which are few and far between nothing mentionable vegetation is grown. However, if the amount of rainfall is high which occurs rarely, there is luxurious growth of green grasses.

Amount of organic matter is small. The rate of chemical decomposition is also very low. Only rocks are shattered and disintegrated due to physical weathering. Due to chemical weathering sodium and potassium are derived first and get removed from the A horizon and lastly lost to underground water. Calcium and magnesium being derived from the rocks are also removed from the A horizon and get deposited in the B horizon in the form of carbonates. Gypsum may also be deposited. However, iron, aluminium and manganese are not released from the minerals.So, these are not available in the profile.

Profile of sierozem soil :

A_O : It rarely develops. In most of the cases the organic matter is blown out by winds.

A_1: 7 – 10 c.m. deep. straw. coloured. Platy structure, soft, deposition of calcium carbonate is observable. The percentage of organic matter varies between 0.5 – 1.5. There are adequate amounts of phosphorus and potassium.

A_2: 10 – 20 c.m. deep. light coloured, small holes made by insects are available, deposition of calcium carbonate and gypsum observable.

B: 20 – 40 c.m. deep. much stable, calcium carbonate deposition occurs. Gypsum is deposited below.

C: Parent material composed of varying rocks.

Use of the soil : Desert soils are not suitable for agriculture. Water is the main problem. Other problems are high alkalinity, meagre organic matter and nitrogen. However, wherever irrigation water is available the soils are used for cropping. Otherwise animal rearing and herding are practised.

Laterite soil

In 1807 English soil scientist Bukhanon while working in the foothills of Malabar coast of Kerala found a type of soil, red in colour. The meaning of 'later' in Latin word is red. So he named that soil as '**Laterite**'. It is observed that iron, aluminium or magnesium oxides have deposited on the surface or at varying depths from the surface in a horizontal fashion. Most of the sands have been removed from the seats of their deposits and due to excess deposition of iron or magnesium oxides the soils are red in colour. That is, the process of soil formation in which there deposition of iron, aluminium or manganese oxides on the surface or at varying depths from the surface is called **Laterization** and the resultant soil is called **Laterite.**

Conditions of soils development : Laterite is formed under areas of uniformly high temperature and high rainfall. The average annual temperature near the equator is between 27 – 28°C. Away from the equator, the summer temperature remains to the extent of 35 – 40°C and winter temperature to the extent of 15 – 20°C. The equatorial area receives high amounts of rainfall which is to the extent of 200 c.m. It occurs throughout the year. In monsoon regions climate is hot and humid during summer and dry in winter. The amount of rainfall is 150 c.m.

Since the amounts of rainfall and temperature are uniformly high, dense forests have developed. Apart from trees there is **profuse** growth of lianas, creepers, epiphytes. parasites etc. In monsoon regions there is an admixture of evergreen and deciduous trees. Sometimes, there is abundance of evergreen trees. Due to various types of natural vegetation there are different types of animals, insects etc. Their number is innumerable.

The surface is mostly undulating. It has an important role to play in the soil development.

The process of soil formation : High temperature and high rainfall create such a condition where (a) The rate of chemical and biological decompositions are very high. It is so high that even the quartz which is considered to be one of the most resistant mineral gets solubilized. (b) Develops dense evergreen forest or dense deciduous forest. (c) The organic debris gets humified and mineralized quickly. (d) Since the organic debris is derived from evergreen and deciduous species organic matter becomes relatively rich in minerals. (e) The soil reaction is either neutral or slightly acidic because of the release of minerals due to rapid rate of mineralization. (f) The neutral reaction helps the precipitation of metallic iron, aluminium and manganese elements. (g) Silicic acid is ionized and is removed as silica gel. (h) Calcium, magnesium, sodium, potassium etc. get leached and ultimately two chemical characteristics become important i.e. – (1) **removal of silica** and (2) **deposition of sesqui oxides** particularly iron and aluminum oxides. It has been found experimentally that the parent material in which the percentages of silica and iron were 42 and 7.84, after the process of laterization their corresponding percentages are 2 – 3 and 71.12.

Process of laterization : There are differences of opinion as to the process by which laterites are developed. Some are of the opinion that due to excessively high rainfall in the equatorial areas, the ground water level lies very close to the surface. Oxides of iron aluminium and magnesium are lost to the ground water through ages. So, the ground water becomes enriched with those oxides. If by any natural means the ground water level goes down vertically or the region vertically moves up, then that ground water gets opportunity to be dried and in contact with air those oxide - rich elements become hard which we call **Laterites.**

Others are of the opinion that laterite is an end product of weathering. According to them, under high rainfall and temperature, particularly due to high temperature, silica gets solubilized and lost to underground water. Same is the fate for other soluble minerals except iron, aluminium and magnesium. Because they are not mobilized due to less acidity of the soil. So, they exist as end products of weathering when others are lost. This is how an incrustation develops composed of iron and other oxides of metallic cations.

Laterites are generally developed at the top of the mountains or hills. These have been developed in Karnataka, Kerala, Madhya Pradesh, Chattisgarh, Eastern ghats, Malabar coastal region, Orissa, Jharkhand and western part of West Bengal. These are called **High level laterites.** Due to weathering and erosion those high level laterites are deposited as detritus at the foot hills and get hardened in course of time and become laterites. This type of laterites developed at the foot hill regions are called **Low level laterites.**

Classification of laterites : The laterites formed under ideal conditions possess less silica and more oxides. Generally if the

silica : sesqui oxide ratio is less than 1, then it is called **true laterite.** And if the ratio varies between 1 – 2, then that type of soil is called **lateritic.**

Characteristic features of laterites : Laterities have certain characteristics such as (a) Due to greater concentration of oxides of metallic elements, the colour of the soil is red. Sometimes it becomes brown or yellowish. (b) While lying below the surface, it is very soft and may be cut by knives. But as soon as they are exposed to air they become hard like stones. (c)The laterites seem to be composed of honeycomb cells. This is called **Vessicular structure.** (d) The clay which is originated under laterites is kaolinitic in type whose water holding and cation exchange capacities are low. (e) This soil is more resistant to erosion due to the presence of iron and other oxides. (f) Since most of the mineral plant foods are lost to underground water the soil is considered to be poor. (g) The organic matter content is less. (h) Generally the percentage of iron in this soil is 40 – 45. Sometimes it becomes 86 percent. (i) Horizons are not distinctly developed in laterites.

Use of the soil : Generally laterite soils are agriculturally poor, because most of plant nutrients like Ca, Mg, K, Na etc. are lost or leached down. Besides the slag-like material which is developed near the surface is so hard that it is difficult to cultivate. However, if that incrustation is removed, then the cultivation becomes possible. The yield is also good. However, this soil is suitable for plantation crops like cocoa, coffee, rubber, cashew nut, banana etc. In the river valleys paddy, maize, tobacco, oil seeds, cotton, hemp, jute, ground nut vegetables can be cultivated. Slag like materials are used for building materials and the ground laterites are used for roads.

Lateritic soils : Laterites and lateritic soils are developed between 30°N – 30° S. latitudes. The entire region is climatically hot. So, temperature remains high throughout the year. However, there is wide variation in rainfall. In spite of variations in rainfall, due high temperature there is deposition of oxides: So, the colour of the soil is red. Depending on the percentage of oxides and degree of hydration the colour may vary and various types of lateritic soils are developed such as **red-yellow podsolic soils, yellow-brown lateritic soil, reddish prairie soils, red-brown soil, reddish desertic soil** etc.