International Journal of Engineering and Science Invention (IJESI)
ISSN (Online): 2319-6734, ISSN (Print): 2319-6726
www.ijesi.org ||Volume 11 Issue 1 January 2022 || PP 72-75

Soil Analysis of Sujangarh Tehsil, Churu District

Dr. Anita Jeph
Department of Botany
Govt. Girls (PG) College, Jhunjhunu, Rajasthan, India

I. Introduction-

This area is not so developed drainage system where are no flowing streams, owing to poor rainfall, surface water resources do not exist while ground water resources are often deep and blackish. Natural vegetation is therefore, only seasonal. With the first showers in late July, a few grass species grow and shrubs and dwarf trees become green, but soon after the retreat of the monsoon in mid-September the vegetation dries up, leaving only a few perennial shrubs and a thin pad of pale grass on the landscape. There are no perennial streams and river around the area so the climate is dry and healthy. This Conservation Reserve is one of the unique habitat of its type is found this particular area. The variation in temperature in various seasons is quite high owing to arid semi desert and sandy soil. In summers the temperature soars to 47 °C. In winters it drops to near about 0 °C to -3°C. General climate of this area is dry and hot. Three seasons namely summer, monsoon and winter are observed over the region. Summer season generally starts from mid-March and continues up to the end of June. May and June are the peak summer months. During summers, days are very hot and longer. During summers, maximum day temperature, ranges between 45 ^{0}C and 47 ^{0}C. This is due to the extremely low relative humidity found during this period. At the end of summer season (June end), high temperature and unstable atmospheric condition prevail over the region. Dust storm / Thunder storm activities associated with light to moderate rainfall are a common feature during afternoon hours. On some occasions, strong winds with gale force are also observed damaging the infrastructures at many places. These activities continue till the onset of monsoon. Summer prevails for a longer duration than the other seasons..

Location and Area
Sujangarh tehsil is one of the most important tehsil in Churu District. It is located in the extreme south of the district in its border with Nagaur at 74º28' East Longitudes and 27º42' North Latitudes at a height of about 518.6 meters above mean sea level

Climate
The Sujangarh is extremely hot and arid like other desert towns of the region. There is a great variation in day and night temperature. The mean daily maximum and minimum temperature vary from 41.3ºC in summer to 4.8ºC in winter. During summer hot winds blow throughout the day but the nights are generally pleasant and cool.

Temperature
Summer temperature is very high and the diurnal range exceeds even 20ºC. During the day, the summer may as high as 46ºC but drop in temperature after night fall in rather sudden. In winters, the day temperatures are higher but the night temperature may be near freezing point. January is the coldest month when the mean daily minimum temperature 0ºC and the mean daily maximum temperature is 20ºC. Frosts are fairly frequent.

Rainfall
The annual rainfall is about 450 mm. Due to monsoon characteristics the maximum annual precipitation is recorded between the months of June to September.

Humidity
Except during the brief rainy season, humidity in the air remains very low even during the rainy period. The summer months are the driest, especially in the afternoons of April and June when relative humidity is 20.5%, while maximum average humidity has been recorded 78.75%.

Analysis of Soil
The soil of the Sujangarh tehsil is more or less sandy except in a small portion where it is loam with shifting sand-dunes. Due to the scarcity of rains the vegetation cover on the surface and organic matter in the soil is wind erosion as moisture retaining capacity is nil.

Method-
Soil samples were collected from two different sites i.e. Chhapar and Tharda village areas of Sujangarh tehsil. Samples at 0-22 cm (superficial) and 22-45 cm (deep) were taken and packed in polythene bags and brought to the laboratory for analysis. All the soil samples collected for the purpose of study were analysed for various physio-chemical properties by following methods:

Methods for Soil Analysis
(A) Physical analysis:
1. Mechanical analysis was done by International pipette method as described Piper (1957) with modification inclusive Calcium Carbonate fraction by using as dispersing agent.
2. Maximum water holding capacity or saturation percentage was determined by preparing saturation paste of soil as suggested by Richards (1954).
(B) **Chemical analysis** :
1. **pH (Soil reaction)**: Soil pH was determined by preparing 1:2 soil water suspension by using glass electrode Toshniwal digital pH meter following the method outlind by Jackson (1973).
2. **Electrical Conductivity**: Electrical conductivity of 1:2 soil water ratio was measured by digital conductivity bridge of 25ºC and results were reported mmhos/cm at 25ºC.
3. **Available Nitrogen:** Available Nitrogen was estimated in the soil samples by using alkaline Potassium Permeganate as reported by Subbiah and Asija (1956). 20 gm. of soil was taken in a Kjeldal flask and 20 ml. of water was added followed by 100 ml. each of 0.32% $Kmno_4$ and 2.5% NaoH solutions. The contents were distilled and liberated ammonia was collected in a flask containing 20 ml. of the standard Boric Acid solution (with mixed indicator). About 100 ml. of distillate was collected which was titrated with 0.02 NH_2SO_4 to the original shade (Pinkish).
Available Nitrogen = Rx0.02x1/20x0.014x100
Where R = Volume of 0.20 NH_2SO_4 used in titration
4. **Available Phosphorus:** Available Phosphorus content was determined by Olsen's *et al.*, (1954) method using 0.5 molar Sodium bicarbonate solution of pH 8.5 as extractant. Calorimetrically, soil extract was prepared by taking 2.5 gm. of soil in a 100 ml. plastic bottle, a little of Darco G 60 was added following by 50 ml. of Olsen's reagent. The Flasks were shaken for 30 minutes and the contents were filtered immediately through dry filter paper, 5 ml. of soil extract was taken into a flask and 5ml. of chloro molebedic acid added. The contents of the flask were diluted to about 22ml. of this 1ml. of diluted stannous chloride solution was added, shaken and made up to the mark. The intensity of the colour was noted at 660 mu standard. Curve was calibrated with the help of standard phosphorous solution and readings of unknown solution was plotted.
5. **Available Potassium:** Available Potassium was determined by using normal neutral ammonium acetate as an extractant with the help of flame photometer (Jackson, 1973). 5 gm. Soil were shaken with 25 ml. of neutral normal ammonium acetate for 5 minutes and the contents filtered immediately through a dry filter paper. First few ml. of the filtrate was rejected. Potassium was estimated in the extract with the help of AMIC digital flame photometer, calibrating it by standard solution.

6.2 Physical Characteristics
Physical characteristics like percentage of sand, silt, and clay particles have been analyzed. The maximum water holding capacity was also observed. Physical characteristics of soil samples taken from different sites are shown in the Table-6.2.1 given below:

Physical Characteristics of Soil of Different Sites

Name of Site	Depth (cm)	Sand %	Silt %	Clay %	Texture	Max. water Holding capacity (%)
Chhaper	0-22	91	3	5	Sandy	20.0
	22-45	88	4	6	Sandy	20.5
Tharda	0-22	87	5	7	Sandy	22.0
	22-45	82	9	9	Sandy	23.0

Table -6.2.1 indicates that the soil of both the sites is sandy in texture. It has low water holding capacity.

Chemical Characteristics

The chemical analysis of soil has been presented in the Table- 6.2.2 given below.

Chemical Characteristic of Soil of Different Sites

Name of site	Depth (cm)	PH	Electrical Conductivity Mmhos/Cm	Av. Nitrogen (Kg/ha)	Av. P_2O_5 (Kg/ha)	Av.K_20 (kg/ha)
Chhaper	0-22	8.90	0.52	16	37	202
	22-45	8.35	0.12	18	40	140
Tharda	0-22	8.30	0.17	19	45	140
	22-45	8.80	0.17	21	50	222

Table – 6.2.2 indicates that the soil is slightly alkaline and the amount of nitrogen, phosphorus and potassium contents did not show much variations in the soil of two different localities of Sujangarh Tehsil.

II. Summary

Arid region of Rajasthan is characterized by its xeric flora and fauna due to extreme conditions. Xeric flora includes diversity of herbal plants. This region of desert suffers periodic droughts and comprised of isolate and dreary regions which are occupied by fixed or mobile dunes.

Plants of this zones are good and potential source of nutritional and medicinal compounds. In the present study of Sujangarh Tehsil, Churu district is selected for ecological survey from medicinal plants point of view.

The physical analysis indicates that the soil of both the sites is sandy in texture. It has low water holding capacity. The chemical analysis indicates that the soil is slightly alkaline and the amount of nitrogen, phosphors and potassium contents did not show many variations in the soil of two different localities of Sujangarh tehsil.

III. Result

The soil show wide variations in their morphological, physical and chemical characteristics and accordingly large variations occur in their resources potential. Major factor responsible for soil formation in this region are climate, parent material and history of landscape evolution. Physical properties of soil are the function of level of organic matter, its texture and structure, which are most significant aspect in plant production. Chemical properties of soil determine the availability of nutrients of plants.

The soil reactionis due to the soild solutions. This reacton is acidic or alkaline according as the hydrogen or hydroxyl ions are in greater concentration. In general high soil pH is associated with sodium and boron concentrations reach high levels in alkaline soils. Most of the plant grow best in soils that are neutral or only slightly acidic. Most of the plants are injured when grown in acid soils because acidity checks the activities of nitrogen fixing microbes and prevents the decaying process of humus, carbon dioxides and other toxic substance. Further, at all these study area, *Parthenium hysterophours*, etc. These exotic species adversely affected the native flora. *P. juliflora* is growing in almost every patch of study area and cover the native plants area and shifted them.

Plant growth is mainly determined by nitrogen availability. Biological nitrogen fixation plays an important role in meeting the nitrogen requirement of legumes and also in enrichment of soil nitrogen status for use by the succeeding cereal crops (Lahiri and Rao, 1989).

Results revealed that pH value were slightly differed at various sites of Sujangarh tehsil and seasonal variations were also not found at visited sites. The result indicate that the pH of soil of Sujangarh tehsil is alkaline in nature and ranged from 8.30 to 8.90. Electrical conductivity (mmhos cm-1) in the soil collected from different site of Sujangarh Tehsil ranged from 0.12 to 0.52 so the most soil sample were saline in nature. Therefor it is recommended to incorporate organic and use of salt tolerant variety of plants to achieve maximum growth and to reduce to adverse effect on flora. The available phosphorus in these soils were found from 37-50 kg/ha; where available nitrogen ranged from 16-21 kg ha-1. The most of soils samples were medium to normal in available phosphorus and the most of soils samples were low range in available nitrogen. Therefor it is recommended to increase additional dose of nitrogen and phosphorus fertilizers in area of low category. Water holding capacity (%) in the soil collected from different sites of Sujangarh Tehsil is ranged from 20 to 23. The most soils samples were low range in Water holding capacity. The most of soil sample were sandy loamy.

The many sample of soils were taken and it was investigated that the nitrogen contents ranged low and low status of water holding capacity. The soil is alkaline in reaction. The low content of available nitrogen and phosphorus in this region is associated with hot and dry climate complex due to low content of organic matter

and reported nitrogen deficiency in soils. The climate is going to change negatively in the reference of plants natural growth due to the low content of available nitrogen, phosphorus in the concerned area. The less content of N and low range of water holding capacity are not suitable for growing flora.

References

[1] Jackson, M. L. (1958). *Soil Chemical Analysis*. Prantice Hall Inc. Eaglewood Cliffs, New Jersey, U.S.A.
[2] Jackson, M. L. (1967). *Soil Chemical Analysis*. Prentice Hall of India Pvt. Ltd., New Delhi, pp 205.
[3] Lahiri, A.V. and Rao, A.V. (1989), Nitrogen fixation in arid legumes under Water strers. In: Focal Theme (Botany), ISCA Symposium. 11-124.
[4] Muhr GR, Datta NP, Shankara-subramoney IT, Leley VK, Donahue RL. *Soil testing in India*. U.S.D.A. publication, pp. 120, 1965.
[5] Olsen SR., Col SCW, Wantable PS and Dean LA. *Estimation of Available Phosphorus in Soil by Extraction with Sodium Bicarbonate.* USDA, Cire, 1954.
[6] Paliwal KV and Maliwal, GL. Some relationships between constituents of irrigation waters and properties & irrigated soils of western Rajasthan. *J. Indian soc. Sci.,* 1971; 19:299-303.
[7] Piper, C. S. (1942). *Soil and Plant Analysis*. University of Adelaide, Australia.
[8] Richards, L. S. (1954). Diagnosis and improvement of saline and alkali solids. U.S.D.A. *Hand Book NO.60*.
[9] Roy BB, Ghose B, Pandey S. Land scope soil relationship in chhotan Block in Barmer district in western Rajasthan. *J. Indian Sco. Soil Sci*., 1967; 3:7-13.
[10] Singh, S. and Shankarayan, K. A. (1986). Dynamics, morphology and management of sand dunes in the Indian desert. In current practices in geo-technological engineering (Eds. Alam Singh and M. L. Ohri) Vol. 3, *Geo-Environ.* Academia, Jodhpur, 23-43.
[11] Sriniwas K., and Afolayan A. J. (2007). *Current Science*, 92, 906-8.
[12] Troeh FR and Thompson LM. Soil and Soil Fertility, *Oxford University Press*, New York, 1993.
[13] Zheng, T., Yao, D., Chen, W., Hu, H., Ung, C. O. L. and Harnett, J. E. (2019). Healthcare providers' role regarding the safe and appropriate use of herbal products by breastfeeding mothers: A systematic literature review. *Complementary therapies in clinical practice,* 35 (1), 131–147.
[14] Singh, KS and Sharma, RP. Studies on the effect & saline irrigation waters on the physicochemical properties of some soils & Rajasthan .*J. Indian Soc. Soil Sci.,* 1970; 18:345-356.