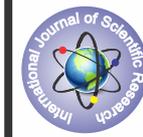


## A Comparative study of Physico – Chemical Characteristics of soils of Banaskantha district, Gujarat



### Chemistry

**KEYWORDS:** Soil, chemical properties, pH, EC, Organic Carbon,

**Charulata Srivastav**

Assistant Professor (Chemistry), Government Science College, Idar. Dist. Sabarkantha (Gujarat - India)

### ABSTRACT

*Comparative Physico – Chemical study of soil based on various parameters like pH, Electrical Conductivity (E.C.), Total Organic Carbon, Available Phosphorus ( $P_2O_5$ ) and available Potassium ( $K_2O$ ) is done for three talukas of Banaskantha District namely Vav, Danta and Vadgam. Soil sampling is the most vital step for any soil analysis. It becomes extremely important to get a truly representative soil sample of the field as a very small fraction of the huge soil mass is used for analysis. The results show that villages of Vav taluka has more of E.C. and Potassium content than Vadgam and Danta taluka., O.C. of Danta taluka is more than Vav and Vadgam taluka, Vadgam taluka has more Phosphorus content than Vav and Danta taluka whereas other parameter such as pH is comparable between three regions. Such studies help us understand fertility of soil of different agricultural regions in terms of their Physico – Chemical Characteristics. This information will help farmers to overcome problems related to soil and soil nutrients and will help them to improve agricultural yield.*

### INTRODUCTION:

Soil is a mixture of minerals, organic matter, gases, liquids and countless organisms that supports life. Soil is an unconsolidated mineral and organic mineral on the immediate surface of the earth that contains living and non-living matter and serves as a natural medium for the growth of plants. Soil is an important matter for cultivation of any type of crop. Soil supplies many necessary nutrients required for healthy growth of a crop. Soil fertility is the inherent capacity of the soil to provide the essential plant nutrients in adequate amount and in proper proportion.[1] Health of the soil is equally important as health of any other healthy person. Soil fertility and plant nutrition are two closely related subjects that emphasize the forms and availability of nutrients in soils, their movement and their uptake by roots and the utilization of nutrients within plants.[2] Deficiency of primary, secondary and micro nutrients have been observed in intensive cultivated areas.[3] To get optimum sustained long lasting and self sufficient crop production, soil fertility needs to be maintained.

Soil testing is an acceptably accurate and rapid soil chemical analysis for assessing available nutrient status (N, P, K) for making fertilizer recommendations. It is really the combination of three discrete but interrelated processes: Analysis, Interpretation and Recommendation.[4] Therefore Soil Analysis is done to estimate the plant available concentration of plant nutrients, in order to determine fertilizer recommendations in Agriculture. Fertilizers are recommended depending upon the amount of nutrients available in the soil as well as requirement of the same for the crop. It can determine fertility or the expected growth potential of the soil which indicates natural deficiencies. Soil analysis improves crop production and minimizes wastage of nutrients. As a very small fraction of soil is used for analysis, routine soil tests measure only a small portion of the total pool of nutrients in the soil.

Banaskantha is located in the North –East of Gujarat and is presumably named after the river Banas which runs through the valley between Mount Abu (Rajasthan) and Aravalli range flowing to the plains of Gujarat in this region. It covers an area of 10,400 km<sup>2</sup> and is the second largest district of the state. Vav is the largest taluka. It is on the west side of Banaskantha whereas Danta and Vadgam lies on the east side of the district. Soil comparison between two regions is useful in terms of its characteristics to find the fertility of the soil. The aim of the study was to know physico – chemical parameters of soils of Vav, Danta and Vadgam Taluka of District: Banaskantha.

There are no specific studies that have focused on soil properties in relation to topography and crop use. This system does not intend to make any interpretation on the potential environment impact of sensitive nutrients such as Phosphorus. It is meant strictly to determine the current soil suitability for agronomic or horticulture

crop production. Slope, ground cover, incorporation of nutrient sources, timing of application and other considerations all affect the potential movement of the nutrients offsite.[5,6]

### MATERIALS AND METHODS:

The study area covers three talukas of Banaskantha District, Gujarat namely Vav, Danta and Vadgam. Soil samples were collected from different villages of each Taluka. Soil samples were collected in clean polythene bags. The soil samples were dried crushed and processed to pass through 2 mm sieve. These samples were analyzed in the laboratory for major physical and chemical parameters such as pH, Electrical Conductivity (E.C.), Organic Carbon (O.C.), Potassium ( $K_2O$ ) and Phosphorus ( $P_2O_5$ ) following standard methods.

### RESULTS AND DISCUSSION:

#### 1) Soil Temperature:

It is one of the most important soil properties that affect growth of the crops. The major source of heat is sun and heat generated by the chemical and biological activity of the soil is negligible.

#### 2) Soil pH:

Soil pH is the measure of acidity or basicity of soil. Hydrogen ions present in the soil decide pH value of the soil. When ions get washed away through water, soil becomes acidic. Similarly, when amount of Ca, Na in the soil increases soil becomes alkaline. Comparing the soil pH of three talukas, the pH values varies from 7.22 to 7.89. The data shown in Table 1 represents minimum value of 7.22 for Vav taluka and maximum value of 7.89 for Vadgam taluka. (Table 1, fig 1)

The pH of the soil provides information regarding the potency of toxic substance present.[7] The pH values of Vav taluka were neutral (6.6 – 7.3), Danta taluka was mildly alkaline (7.4 – 7.8) and that of Vadgam taluka was moderately alkaline (7.9 – 8.1). The pH values of three talukas lie in the normal range.

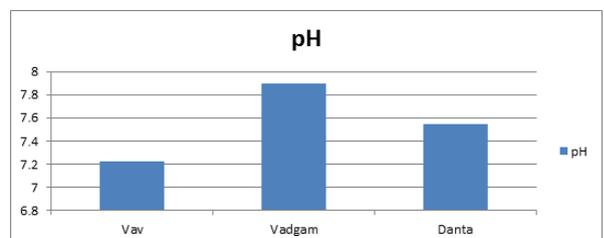


Fig-1

#### Electrical Conductivity (E.C.):

The Electrical conductivity of soil samples varied from 0.21 dsm<sup>-1</sup> to 0.70 dsm<sup>-1</sup> (Table 1). The normal values of E.C. should be less than 0.8

ds<sup>m</sup><sup>-1</sup>. The values of E.C. of all the three talukas lies in the normal range. Data shows (Table 1,figure 2) that Vadgam taluka has minimum value of conductivity and Vav taluka has maximum value of conductivity.

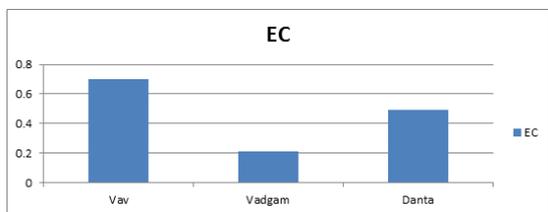


Fig-2

(3) Organic Carbon (O.C.)

Soil organic carbon is the seat of Nitrogen in soil and its determination is often carried out as an index of Nitrogen availability. As represented in (Table 1,figure3) maximum value of O.C.is found in Danta taluka. The value of O.C. in Vadgam is low (< 0.5) and medium for Vav and Danta taluka.

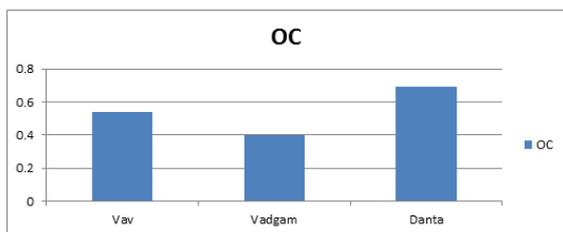


Fig-3

Phosphorus:

Phosphorus improves root development, rapid growth and encourages blooming. It plays very important role in the process of photosynthesis. It helps in transformation of solar energy into chemical energy. The data presented in ( Table 1, figure 4) represent minimum value of 30.40 Kg/ha in Danta taluka and maximum value of 38.30 kg/ha in Vadgam taluka. These values lie in the medium range.

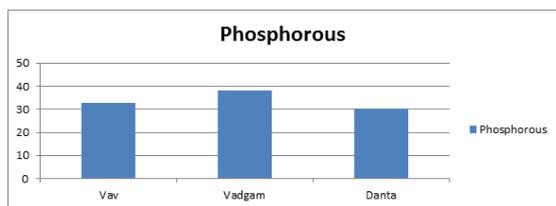


Fig-4

Potassium:

Potassium is absorbed by the plants in large amount. It helps in building of proteins. Potassium though present in very small amount in the soil, plays a vital role in metabolism of fresh water and is considered to be an important nutrient. The value of Potassium varies from 243Kg/ha to 346Kg/ha. The data presented in (Table 1, figure 5) represent minimum value of 243 Kg/ha in Vadgam taluka and maximum value of 346 kg/ha in Vav taluka. The Potassium content is high in Vav taluka and medium in Vadgam and Danta taluka.

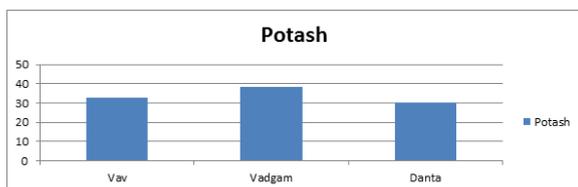


Fig-5

Table-1: Average values of Physico-Chemical Properties

Talukas	pH	EC ds <sup>m</sup> <sup>-1</sup>	O.C. %	P <sub>2</sub> O <sub>5</sub> Kg/ha	K <sub>2</sub> O Kg/ha
Vav	7.22	0.70	0.54	32.79	346
Vadgam	7.90	0.21	0.40	38.30	243
Danta	7.55	0.49	0.69	30.40	263

CONCLUSION:

From this comparative study it can be concluded that the values of pH, E.C., O.C. Phosphorus and Potassium lies within permissible limits and hence the soil of these three talukas are suitable for both agriculture and horticulture crops.

ACKNOWLEDGEMENT:

The author is thankful to the principal, teaching and non-teaching staff, Department of Chemistry, Government Science College, Idar, district: Sabarkantha (Gujarat) for their constant support and cooperation and valuable suggestions during the experimental work.

REFERENCES:

1. Rajan Kumar Basak, 2012. A textbook of soil testing and recommendations, Kalyani Publishers.
2. Foth H. D. and B. G. Ellis, 1997. Soil fertility, second edition. Lewis CRC Press LLC. USA. pp:290.
3. Dr. Dalwadi M. R., Dr. Bhatt V. R., Soil and water testing, Anand, Gujarat, India 2008.
4. Beegle D., Interpretation of soil testing result, IN recommended soil testing procedures for the North Eastern United states. University of Dalaware Ag. Experiments station bulletin no. 493, second edition UK, 84-91, (1995)
5. Eckert D. J., soil test interpretations: basic cation saturatin ratios and sufficiency levels, IN soil testing, sampling, correlation, calibration and interpretation. Brown J. R. editor, SSSA, special publication no. 21, Soil science society of America, 53-64 (1987)
6. Lemunyon J. L. and Gilber R. G., journal of production agriculture, 6(4): 483-486, (1993)
7. Baruah T. C. and Barthakur H. P., 1997. A textbook of soil analysis, Vikas Publishing House Pvt. Ltd.