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A RELAVENT STUDY ON SOIL AND PLANTATION

Abstract

Soil links earth, atmosphere, water and terrestrial life and controls the availability of nearly every life. Airborne pollutants such as toxic heavy metals, releases of sulphur that contribute to acid rain can be reduced with the help of green belt. Dahej sez limited is developing multi product SEZ at Dahej, Tal.Vagra of Bharuch District in Gujarat, a coastal belt covering 1732 hect. total area. It is mandatory for all industries to develop green belt. Since the total land of SEZ is saline (pH above 9.0), humidity in the environment and water is salty and is not suitable for all type of plants to grow. Only shallow rooted plants like coconut, palm, saru, etc. can be grown. Hence we relate our study in bringing about some manipulations in the soil and improve plantation to shrubs and other plants. Addition of yellow soil together with farm yard manure and gypsum, bring down the PH around 7.5 to 8.0. With this soil composition healthy plantation was observed in the belt. Black cotton soil was also observed at few places which was improved for plantation by increasing the porosity of soil through various soil amendments.

[1] Introduction :

The total salt affected soil in India is app. 6.72 million ha, out of which 3.2 mha is coastal saline and 2.8 mha is sodic soil and rest 2.2 mha is inland saline soil.

Soil pH	EC2 (ds/m)	Exchangeable Na (ppm)	Exchangeable K (ppm)	Exchangeable Ca + Mg (ppm)
7.8 to 9.4	0.22 to 16.4	450 to 2435	1559 to 247.6	37.5 to 101.5

Gujarat accounts for 1.2 mha of saline soil, which is about 15% of the country as a whole[1]. Good soil is becoming saline or sodic due to multifarious reasons including improper irrigation in irrigated areas and sea water ingress in coastal area. Poor water quality and over irrigation is responsible for secondary salinization.

Village	% (c)	K20/HET	P205/HET	PH
Trankal	0.37	78.85	125.30	8.95
Ambhel	0.9	85.57	55.11	9.02
Apkha	1.1	78.68	128.66	9.23
Dankal	1.19	109.25	87.0	8.81

Industrialization in this area has made it mandatory to develop a green belt (NRSA 2006). So we have taken up the study to have good productive plants at minimum cost. Plants having medicinal and aromatic values were well observed

[2] Experimental :

We collected soil samples and water samples from different area around Dahej as per standard sampling norms and analyzed them after removing stones and foreign matters and processing. Ph, Exchangeable Sodium Percentage (ESP) , Electrical Conductivity (ECe) , exchangeable Potassium (K) and available Phosphorous (P2O5) were determined.

Figures in the above table are the means of twelve samples collected and analyzed from four different villages. On the bases of pH , ESP and ECe the soils were classified into two classes.

SOIL CHARATER.	SALINE SOIL	ALKALI SOIL
PH	Less than 8.2	Greater than 8.2

ESP	Less than 15	Grater than 15
ECe	Greater than 4 dsm-1	Mostly less than 4 dsm-1

Experimental results were obtained using flame photometer, pH meter and conductometer where 1 M ammonium acetate was used as an extractant.

Alkali (Sodic) Soil :

Major land of Dahej and surrounding have ESP greater than 15 and pH between 8.5 and 10.0. The exchangeable sodium content influences the physical and chemical properties of these soils significantly.

Saline Soil:

Saline soils are often recognized by the presence of white crust of salts on the surface. Generally they are flocculated having good permeability. Salt must be removed from their root zone. Leaching is the most effective procedure for removing salts. But, since water quality is not good and water table being high, leaching is not possible in this area. So, crops like Hibiscus Canabilis (KHATI BHINDI) were planted.

Black Soil:

A few portion of Dahej SEZ contains Black soil also. This soil is deep clayey, impermeable. Its characteristic of swelling and becoming sticky when wet and shrinking when dry creates crack; no doubt aerates the land. It lacks Phosphorous and nitrogen, which is suitable for Arhar (Tuver), Cotton, etc. only.

To make the black soil more cultivative, it was amended by addition of 20% vermicompost enriched with nitrogen and phosphorous solubilising bacteria and 10% fly ash. This reclamation made the soil more porous. Since the TDS of groundwater is very high, to reduce good (better quality) water consumption and to make the relation more effective micro sprinkles were used.

Reclamation and management options of soil :

For better results ESP of soil is lowered. To amend soil content 20% yellow soil, 20% Gypsum and 15% Vermicompost and crop residue were mixed in upper 10 cm of soil. Gypsum being by-product of surrounding industries was used. Addition of crop residue and organic manure along with biofertilizers in the soil resulted in improved soil structure. Urea was added to increase the nitrogen content.

For better adoption of reclamation technology, farm was levelled and provision for irrigation and drainage was made

species	PLANTS
Trees	Karanj,drumstick,salvadora(pilu),jatropa, jamun,sevan,aml
Flowers	Jasmine,lily,jasers;marigold,tuberose
Grasses	Karnal grass,cynadon,dicanthium
Cultivated	Suva,castor,guar

Most of the above crops are used in daily life. Hence they have good market values. Thus reducing additional financial burden of industries to maintain mandatory green belt which otherwise may be violated. Further, it reduces solid waste disposal cost as gypsum is used for soil amendments.

[3] RESULT AND DISCUSSION :

Studies revealed that the following plants in four categories were observed to have effective plant growth and proved highly economical to the industries, thus playing a major role in developing the green belt.

The above plants have their own specific use. Salvadora (pilu) contains lot of salt and absorbs it from the soil thus reducing the soil salinity. It is a facultative halophyte and a potential source for seed oil which has been identified as a predominant species in highly saline habitats of coastal and inland black soils. This species is a medicinal plant of great value and its bark contains resins and an alkaloid called salvadoricine. The seeds are good source of non-edible oil rich in C-12, C-14 fatty acids having immense applications in soap and detergent industries(2). Thus this species while giving economic returns from highly saline soils also helps in eco restoration through environmental greening and forms a niche for such soils.

The above grass species have mechanism to tolerate high salt concentration in root zone soil which excludes the absorption of salt. Grass species are used as fodder for animals.

Other cultivated species like karan, Suva, castor, guar have their medicinal use and aromatic crops have economical values. The flowering species develop beautiful gardens.

The above study shows that by amending the soil to reduce ESP, efficient management of nutrients in salt affected alkaline soil, using vermicompost, with adoption of sprinkler and drip irrigation results in very healthy plantation.

The barren and waste lands were also used by growing acacia nolotica, prosopis, juliflora which is currently used as fuel and gassifiers. If energy crops are included in general mixture of agricultural crops in a considered and informed way environmental damage can be avoided. There could be significant environmental, ecological and economical benefit achieved with the development of a fully sustainable energy resource helping in developing the green belt.

REFERENCES :

1. An authoritative report, prepared by the Coastal Salinity Prevention Cell, Aga Khan Rural Support Program, Sir Ratan Tata Trust and Gujarat Government.

2. Makwana et. al.,1988

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