CHAPTER: VI

CONCLUSION AND SUGGESTIONS

INTRODUCTION

The present study had been undertaken to find the distribution of soil pattern in the Sangli district, considering its physical and chemical properties. The district posseses a variety of soil patterns. Micro level variations in them are therefore shown for better landuse planning. The micro level variations are discussed in the previous chapters. The physical properties like soil texture, structure, colour etc and chemical properties like pH, TSS, N, P and K have been considered to find micro level variations. The present investigation was also undertaken to find whether there is development of salt affected soils in the study area. The problem of salt affected soils is of piculiar nature developed under natural condition and is of recent origin due to rise of ground water table as a result of seepage from elevated adjacent lands irrigated perennially under lift irrigation and wrong use of soil and water by cultivators.

In all 16 soil samples were examined for different morphological properties and 462 surface soil samples were examined for different chemical properties. These properties are used to show fertility of soil in the sangli district. On the basis of pH, TSS and nutrient contents, soils were classified into three soil categories. The categories

are named as low, medium and high fertile soils. The location and extent of these categories were mapped. The correlation studies between some chimical properties and landuse according to availiability of plant nutrients were also studied. The findings of these investigations are narrated below :

i) The morphological features of area indicates that soils are deep to very deep having clay texture, nearly levelled to flat topography.

ii) The soils except western part of shirala taluka are poorly or imperfectly drained due to flat topography and clay texture.

iii) Most of the soils from district except strata No.IV (western shirala) have moderate (60.9 to 73.5% soils) to high (5.5 to 16.7% soils) content of total soluble salts. In strata No.IV none of the soils has high TSS values. Therefore the soils of strata No.IV are more fertile than the soils of other strata in respect of TSS. The number of salt affected soils is also higher in the strata No.I,II and III.

The heavy deep soils, nearly levelled to flat topography, silted nalas, low rainfall, and high temperature are the probable causes, responsible for the increase of salts and development of salt affected soils in strata No. I, II and III. In semiarid climate like eastern part of district, periodical low rainfall and high temperature have brought about the salts near to surface through capillary action caused by intense evaporation in dry season.

The area affected by salinity and alkalinity is -

located mostly along the banks of water coarses and in adjusent area. The topography of the area is nearly levelled to plain, and at some places bowl like. It is observed that water coarses in the area are very shallow and completely silted at many places. The soils are deep to very deep with high to very high clay content.

The high amount of soluble salts in the areas can be attributed to the accumulation of salts through runoff water and seepage from the elevated terrain in the watershed as these areas are low laying. The very deep heavy textured soils having impeded drainage might have inhibited the leaching of salts and consequently resulted in their accumulation. Under these circumstances the development of saline-alkali soils might have taken place in due course of time as a result of soil exchange reactions.

Whereas, rise of sub-soil water table is due to seepage from adjoining irrigated area is responsible for the development of salty soils and water table above surface in strata I. It is confined to Krishna and Warana river basins of the district.

Low to medium pH and TSS values in strata No.IV are due to the leaching of salts from soil by heavy periodical rainfall, more slope and good drainage.

iv) The soils all over district are less to medium fertile in respect of Nitrogen. It may be due to the N removed (absorbed) by crops like sugarcane, tobacco and groundnut.

v) 43 to 47% of the soils from strata No.I,II and III are infertile in respect of P. And 52 to 71% of soils from all strata are medium to high fertile in respect of P.

vi) Soils of district are rich in potassium.

vii) Effective fertility is less in strata No. I, II and III but it is medium in strata IV.

viii) The use of land (soil) made for sugarcane is not proper in respect of available N.

ix) The use of land (soil) made for Jawar in drought-prone area in respect of availability of P and use of land (soil) for sugarcane, paddy and Bajara in respect of availability of potassium is suitable landuse.

Suggestions -

As compared to the ideal soils, the soils of the district fall much below the standard. This has happened due to the high pH, greater values of TSS and poor content of N and P nutrients in the soil. Therefore some more efforts are required in their management.

1) Management of salt affected soils - Different methods are used for the reclamation of salt affected soils depending on the nature of problem. However proper understanding of the problem is essential to decide the appropriate measures to be adopted for the reclamation and management of salt affected soils from a perticular area. Salt affected soils greatly differ from normal soils in many important morphological

features, physical properties and chemical characteristics. The salt affected soils have some thing extra which limits the crop production.

As regards the reclamation, the adequate information has been generated from the research which can be made use of in this area. However, the cause may not be removed completely due to one reason or the other and reversion of the problem may take place. It is therefore, necessary to manage the problematic soils. To mention high standard the soil pH and TSS values must be lowered. For that following points in brief which needs to be looked into management of problemetic soils in the area.

i) Scrapping off the surface salts:- Excess of salts come on the soil surface by capillary action and forms thin white coloured layer of salts on it. Scrapping off the surface salt can lower salts as well pH of soil.

ii) Use of chemicals :-

Use of Gypsum - Saline soils with pH usually below 8.5 in study area, gypsum ($CaSO_4$) is considered to be best for reclamation of these soils. Ca^{++} ions from gypsum replaces Na^{+} ions from the exchange complex. Na_2SO_4 formed in this process leached from the soil by drainage will reduce soil pH, salts and will improve the physical condition of soil. Use of gypsum is made as per USDA (1954) recommondations.[1]

Use of sulpher : The alkali soils from strata strata No. I, II, III whose PH is generally above 8.5 may be

reclaimed by spreading sulpher on the soil. The sulpher oxidises to sulphuric acid which in ionic exchange converts Na_2CO_3 into Na_2SO_4. It can be removed by leaching. The chemical reaction is as follows :

$$2\ S + 3\ O_2 \quad --- \quad 2\ SO_3 \text{ (bacteria)}$$

$$SO_3 + H_2O \quad --- \quad H_2SO_4$$

$$H_2SO_4 + CaCO_3 \quad --- \quad CaSO_4 + H_2O + CO_2\uparrow$$

$$2\ Na\ (Clay\ ) + CaSO_4 \quad --- \quad Na_2SO_4 + Ca\ (Clay)$$

This process of reclaming alkali soils is some what tedious because the chemical reaction takes place only in presence of bacteria. Therefore to keep bacteria alive and to increase their number organic matter is required to be supplied in such soils. Use of S is also made as per USDA (1954) recomondations.[2]

Use of molasses - There are 5 sugar factories around the sangli city. The molasses from these factories can be used to reduce the alkalinity of soil. Dhar has recommended five tons of molasses per hectare along with 2.5 to 5 tons of press mud and 125 to 250 kgs. P_2O_5 per hectare.[3] The molasses provides energy for micro-organisms and on fermentation, produce organic acids. These acids reduce alkalinity and increase the availability of P. Press mud contains Ca salts which help in reducing exchangable Na.

Heavy doses of organic matter may be given which helps to improving soil structure and increasing infiltration rate.

iii) Leaching of salts - Due to compact and hard surface

layer in the case of alkali soils, absorption and drainage of water is difficult. Hence land should be ploughed deep preferably before monsoon and left in slightly cloddy condition for greater penetration of water in the soil.

In order to keep salts away from the root zone as far as possible, ridge- furrow system and planting on slopes should be followed for better growth of salt tolerant crops.

If the nature of problem is severe and extended over a large area like in Kasabe-Digraj and Ashta villages, the measures for provision of adequate drainage facilities would have to be adopted on very large scale. It would be difficult for any individual cultivator to establish a effective drainage without co-operation of his neighbourers. Because it is tedious and costly method. No doubt some extra efforts will have to be taken if the problem in perticular area is more severe. However, approach should be on community basis rather than on individual basis.

The provision of adequate drainage facilities must include the desilting and deepning at different water coarses in the problematic area. Field drains, either open ditches or tile drains would have to be constructed at suitable interval. If there is no outlet for the surface and sub-surface drainage, then some wells will have to be constructed and water from these wells will have to be pumped out periodically. Even though the general topography of the area is flat to slightly rolling, undulating due to ups and downs in fields should be removed by levelling wherever necessary so that there will be equal -

opportunity for the entry of rain and or irrigation water in the soil.

Large information on the leaching of salts is available for its implementation in the above mentioned villages and other salt affected soils along Krishna and Warana rivers. However considering the nature and magnitude of the problem, it would be desirable to have an organizational set up which would involve technical personnel, officials and non officials and the cultivators. The technical programme should be planned and executed by providing adequate finance for drainage. Suitable cropping scheme for individual cultivator should be prepared and necessary inputs required may also be provided through some agency. It would help in better management of these soils and ultimately to improve the production from this area.

It is also essential to pay proper attention towards the maintenance of field drainage system as well as natural water courses in the area in order to keep them in good functioning condition permenantely. Hence, the constant efforts both on the individual and community level would be required for the reclamation of these soils.

2) Use of fertilizers -

The soils of Sangli district are dificient in N and P. The doses of fertilizers containing N and P must be supplied to the soil to increase its fertility. To obtain the

maximum benefit of fertilizers, it is necessary to apply the fertilizers in accordance with the needs of the plants at different, stages of development. Because/uptake and utilization of N & P during various stages of development is different. The doses of N and P containing fertilizers should be given according to recommondations of concerning soil testing laboratories.

REFERENCES

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2 I Bid - pp 208

3. V.G. Vaidya, K.R. Sahasrabuddhe - Introduction to AGRONOMY and soil and water Management. Continental Prakashan Pune. pp 310