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Improvement of salt affected - water logged soils in western maharashtra through subsurface drainage (Ssd) system

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The subsurface drainage system was installed on farm with corrugated perforated PVC pipes on 8.81 ha of salt affected soils at Agril. Research station K. Digraj Dist-Sangli (M.S.) in December, 2002 to study the effect of subsurface drainage system for improvement of salt affected - waterlogged soils. The results revealed that the pH, ECe, SAR and ESP of soil in SSD with synthetic envelope, coarse sand filter and synthetic envelope + coarse sand filter were decreased in monsoon and winter season but slightly increased during the summer season. This indicates that the improvement in salt affected soils due to subsurface drainage and gypsum application within a period of one year.

Key words : Salt affected, Waterlogged, Subsurface drainase.

INTRODUCTION

IN India salt-affected soils have been estimated to occur on 8.6 million ha, of which about 3.0 million ha are coastal saline soils which have been developed due to seawater intrusion. The black soils, commonly known as black cotton soils belong to Vertisols group. Deep black clayey soils with low drainability, indiscriminate use of irrigation water for cash crops like sugarcane, lack of crop rotation and less use of organic manures, low lying lands and less rainfall resulted in development of salt affected soils in western Maharashtra in districts of Sangli, Kolhapur, Satara, Pune & Ahmednagar. Mann and Tamhane (1910) estimated that six to seven percent of the area was being damaged annually due to application of heavy irrigation to deep black soils with insufficient drainage. Inglis and Gokhale (1928) observed that a relation between damage caused and intensity of irrigation in black cotton soils of Deccan. Kulkarni (1961) also pointed out that there was a regular increase in the development of salt affected area on the major canals western Maharashtra.

In many canal commands the rise of water table is so alarming that after the introduction of irrigation, substantial areas are going out of cultivation due to water logging .In various canal command the water table has a rising trend. (Singh 1993.)

In view to above, the present investigation is aimed to study the effect of subsurface drainage system for improvement of salt affected - waterlogged soils in western Maharashtra.

MATERIALS AND METHODS

The subsurface drainage system was installed on farm with corrugated perforated PVC pipes on 8.81 ha of salt affected soils at Agril. Research station K. Digraj Dist-Sangli (M.S.) in December, 2002. The experimental initial soil status of salt affected soil having medium deep black with pH-8.13 to 8.52, EC 2.22 to 17.82 dS/m, ESP 7.04 to 17.50. The hydraulic conductivity was in the range of 0.0236 to 0.0579 m/day. The water table of fluctuations recorded was in the range of 0.265 to 1.85 m from the surface in different seasons. The field covered with dense prosopis Julifora growth were removed with the help of JCB machine and contour survey was done. The design was fixed according to slope and soil properties. Perforated corrugated PVC pipes of 80 mm diameter were used for lateral drains and non perforated corrugated PVC pipes of 80 mm diameter were used for collector drain. The average depth of collector and lateral drains was 1.32 m. The spacing between two laterals was 25 m. The drain spacing of 25-100 m horizontal subsurface drainage requirements for waterlogged saline soils studied at Sampla and other places in Haryana (Gupta ,1985,Rao ,et.al.,1986).Coarse sand, synthetic filter and Coarse sand+ synthetic filter was used as filter envelope. The drainage effluent was pumped from sump well and left in natural open drain. The soil drainage water and soil samples were analyzed for salinity and sodicity parameters at every month. The soil samples were analyzed for gypsum requirement and gypsum were applied to different sections.

RESULTS AND DISCUSSIONS

The results revealed that the pH of drainage water decreased from 8.11 to 7.31(Table No 2). The pH was higher in summer season in the month of January to May 2003 and slightly decreased in monsoon season. Similarly electrical conductivity (ECe) of drainage water were decreased from the month of January to December 2003, due to more leaching of soluble salts in monsoon through subsurface drainage system.. The SAR and ESP was highest in the month o April-May- June-2003, due to high evapotranspiration and then decreased due to dilution effect.

According to Table 3 the result indicated that the pH of synthetic filter soil was maximum in the month of February-March and April-2003,onwards it was found the decreasing trend. The ECe of soil was the highest in 9.25 dS/m and lowest in October 2003. Surywanshi et.al. (1995) observed that the pH and EC of soil and water after drainage indicated that the values of pH and EC had decreased because of leaching of salts through the subsurface drains. The SAR and ESP were maximum in March and May 2003 and it was lowest in December 2003

From Table No 4 it was found that the pH of synthetic and coarse sand section was maximum (8.50) in March 2003 and lowest in (7.90)in November 2003 .The ECe were slightly increased from the month of January to July 2003 then decreased in the monsoon months . The SAR and ESP was highest (9.72) in the month of May and lowest (1.69) in November due to more exchange of sodium form the clay particle with calcium from gypsum. As soils are leached, the SAR also decreases. (Shainberg, et.al.1981)

The pH of coarse sand filter soil was fluctuate in the month of summer season(Table No.5), then slightly reduced upto 7.90 but the ECe of soil was maximum (15.80 dS/m) in the month of May, which is decreased upto 8.12 dS/m .Similar trend was obtained in SAR and ESP parameters. The soil reclamation likely occur during monsoon season, when surface drains are running full.

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