



Summary and Conclusions

Red gram (Cajanus cajan L. Millsp.) or pigeonpea, locally called 'Tur' is the major pulse crop in Maharashtra. Formerly pulses were the chief source of protein and were used in enough quantity in daily diet by Indians. However with increase in population, decrease in supply and lower production of pulses caused decrease in per capita use of pulses. The increased prices of pulses in comparison to cereals was also one of the reasons. In recent years there is a decrease in acreage of pulses, cereals being cultivated in place of pulses. Looking to the need, yield/hectare of the pulses can be increased by using high yielding varieties, application of fertilizers, use of irrigation water and use of short duration varieties with improved crop rotation. Among the crop environmental factors, soil is the most important one. But unfortunately plant and soil scientists have found little common interest in the study of growth of crop plants. Keeping this in mind present study was designed.

Red gram grows in a variety of soil type. However, best results will be produced only with a particular type. In order to study the role played by soil type in increasing the crop production, three types of soils are selected for the present study. A selection variety Cajanus cajan var. T-84 has been grown on these three types of soils.

It is seen that the three types of soils used in the present investigation - the red, the black and the red + black

soils: differ in physical and chemical nature. The grain composition of the soil is different. The red soil is of a loamy sand type, the black one is a loam and the red + black is a sandy loam. This affects the water holding capacity of the soil. The black soil has highest water holding capacity. This soil is also richer in bacteria. Moisture percentage of this soil is obviously higher than the red and the red + black soils. As regards the pH, the black soil is near neutrality while the red soil is acidic.

Mineral constituents in the soils indicate that the soils have higher levels of potassium. K content of the black soil is more than two times when compared to red one. The black soil shows high calcium, low magnesium and low Na/K ratio. In contrast to this low Ca and high Mg is observed in the red soil. In the mixture of the red and the black soil, the Ca content is intermediate, Mg content is slightly higher than the red one while Na/K ratio is highest among the three types of soil. Levels of Na and Cl are higher in all the three types. The reason for this is not known. This difference in mineral status of these soils show reflection in the growth of the plants in these soils.

It is revealed that the mineral status of the crop is also governed by the type of the soil. The effect is clearly seen during the active stage of the growth. Flowering is a critical stage in the life cycle of the crop that is why more phosphorus is taken up while sodium levels are lowered. At

flowering stage K level is lowered which indicates its vigorous translocation to the flower buds. Soil type also has an influence on the uptake of sodium and potassium which can be seen from the Na/K ratio. Here also the uptake and translocation is partly governed by the stage of the growth. Therefore at flowering stage Na/K ratio is considerably low, however, it maintains the pattern of increasing order with respect to soil type from the red to the black to the red + black.

The analysis of organic constituents from the leaves and seeds after harvest indicate that soil plays major role in crop growth. It is seen that the black soil has pronounced effect on the crop growth. The chlorophyll synthesis, the amount of starch and total carbohydrates present in the leaves of plants is highest in the black soil. At flowering stage reducing sugars are very low. The value is lowest in the black soil. This indicates more translocation of reducing sugars from the leaves to the floral buds. The moisture status of the soil affects chlorophyll synthesis, polyphenols and proline content. The leaves of the plants growing in the black soil show less polyphenols and proline contents. Not only this, the amount of nitrogen and protein present in the leaves as well as in the seeds is highest in the plants grown on the black soil. Thus the black soil has favourable effect on the plant growth with respect to organic constituents.

In growth analysis it has been seen that the soil type also affects the yield of C. cajan var. T-84. The soil affects the total height of the plant, total number of branches per plant, leaf area, branching angle, number of pods per plant, number of seeds per plant, the weight of 100 seeds and the biomass production. Thus ultimately the yield per hectare is governed by the type of soil in which plant grows. Therefore, it can be said that in the days crisis of pulses it is better to take the crop on appropriate soil which will give more yields and also the justice to the labour input.