

I General Introduction

GENERAL INTRODUCTION :

Increased crop productivity mainly depends upon increased land productivity. Increased production is and should be a continuous endeavour of agricultural scientists and scientific community as a whole. Now it is amply realised that search for alternative source of food for man's dependence on the major crop plants for his energy and protein is unlikely to decrease in the foreseeable future (Evans, 1975). The high technology can only be developed if bare needs of man's food, clothing and shelter is first provided to every individual of the country. In this respect agriculture becomes a foundation.

Today in both developed and developing countries about 11% of the total land is cultivated. Estimates of potentially cultivable land vary widely but the present arable area of 1.4×10^9 hectares could be increased to 3.2×10^9 hectares (although this estimate was made 10 years ago it can be visualized that no appreciable increase must have taken place). In the recent years agricultural production has increased in the developing countries, not by increase in the yield per unit area but by increase in the area under cultivation (Evans loc cit). This is mainly because more and more rainfed land has come under irrigation. This transformation, once thought to be a boon to farmer has slowly and unknowingly lead

him to cross his finger over the problem of over irrigation. Because of improper management of water and fertilizer fertile arable land has slowly turn in saline and non-productive.

Major portion of arable irrigated land in Maharashtra is under Sugarcane cultivation and is under great threat of going arid. Added to the problem is, sugarcane is more susceptible to the salt than any other crop. Since it is a basic feed over which the sugar industries and industries allied to that are dependent the problem is of more serious nature. Thanks to the breeders, whose sustained efforts to produce varieties of high recovery and high tomage have converted the entire face of the sugarcane cultivation of the region. It is imminent that they concentrate their effort even to produce varieties tolerant to salinity.

Varieties under cultivation in Maharashtra are CO 419 and CO 740 bred in coimbatore. Amongst the two the latter variety is wide under cultivation because of its high tonnage and recovery, while the former though has certain good qualities of high sucrose content is receding because of certain limitations. Production of new variety by hybridization is limited by the availability of germ plasm. Nontheless this limitation could be overcome by increasing

genetic variability artificially. One of such artificial means is use of gamma radiation to induce mutations. Such efforts are also being made in Bhabha Atomic Research Centre, Trombay, Bombay. The two varieties TS 1 and TS 8 taken along with CO 419 for the study in the present investigation are mutants raised by irradiation of CO 419 at Bhabha Atomic Research Centre, Bombay. It is felt essential to give a brief information about the variety as to their origin.

During the year 1975, at Bhabha Atomic Research Centre, Trombay (Bombay) seed setts of Sugarcane variety CO 419 were irradiated with different doses of gamma rays to induce mutations. The irradiated buds were planted simultaneously both at B.A.R.C. and K.I.A.A.R. (Sameerwadi) to assess their performance under actual CO 419 cane growing region. Some of the interesting mutants obtained with 2 Krad treatment, which bred true in successive vegetative generations were as follows :

- 1) Thick cane type Ts 1 and Ts 8,
- 2) Early and profusely tillering type Ts 2.

The results of these trials have been reported earlier by Sharma Rao and others. Thick cane mutants are referred to cane girth, weight, yield and juice quality, besides being solid even at 14 months age.

Ts 8 mutant, a further selection made at Trombay is reported to have given still better yields and recovery at K.I.A.A.R. The yield was 75 tonnes/acre and C.C.S. was 13.21% as compared to 41 tonnes/acre and 12.10% C.C.S. in Co 419 of 11 months age. The cane weight of Ts 8 was 1.80 kg as against 0.92 kg in Co 419.

There is no need to emphasize that irradiation of the cane-buds might have led to mutation at random. One of such mutations might endow the mutants with the ability to withstand salinity. It is with this view these varieties, the parental stock Co 419 and its mutants TS-1 and TS-8 are investigated for their ability to withstand salinity. To do so the effect of increasing concentrations of salinity on growth, mineral nutrition, carbohydrate and nitrogen metabolism and the enzymes of carbohydrate metabolism and nitrogen metabolism have been studied. The entire work is presented in four chapters. In the first chapter effect of increasing concentration of salinity on the growth is presented. Second Chapter includes mineral nutrition. The third Chapter includes carbohydrates and nitrogen level and the fourth presents the enzymes Nitrate Redutase (NR), Sucrose-P synthetase, sucrose synthetase and invertase. A modest effort to screen these varieties for their ability to withstand salinity in this respect has been made here.