A COMPARATIVE STUDY ON FOLIAR AND SOIL NUTRITION IN CALCAREOUS SOILS

By

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I INTRODUCTION

In Egypt, Sugar cane is the only source of sugar industry. The average annual local sugar production amounts to 370,800 tons in 1967. Since the average local consumption of sugar is about 458,000 tons, it is apparent that there is a deficiency in local sugar production amounting to about 87,200 tons which is expected to increase as a result of greater consumption of the over increasing population. Therefore, it is necessary to search for new sugar plants, other than sugar cane, to increase the sugar production in the U.A.R.

Experiments carried out by the Ministry of Agriculture, Sugar Crops Research Section, El-Zalaki & Abo El Wafa (1966), proved that sugar beet can be successfully grown in sandy, saline and calcareous soils whereas sugar cane, under the same conditions, is practically unable to develop to its normal growth.

Furthermore, it is noteworthy to mention that the water requirements for sugar beet to produce one ton of sucrose are about 1300 cubic meters during the whole season of growth, El-Zalaki & Abo El-Wafa (1966). On the other hand, the sugar cane plant consumes about 4600 cubic meters of water to produce the same quantity

of sucrose. Moreover, the sucrose content of sugar beet is about 20% of fresh weight, while it reaches 14% of fresh weight of sugar cane. Also, the growth period of sugar beet is about half that of sugar cane. In addition, the cultivation of sugar beet in the U.A.R will not interfere with that of sugar cane. It is interesting to note also that the beet crop is in reality two crops in one. It is capable to produce 3.0 - 3.5 tons of sugar per feddan, and, in the same time, the green leaves could fulfill a great portion of the requirement for a green fodder, specially during summer season.

Sixty thousand feddans of the highly calcareous soil at the Northern Region of El-Tahrir Province is the suggested area where sugar beet will be planted for sugar production. Therefore, it was thought of importance to evaluate the effect of fertilizers, as well as their methods of application, on sugar beet production. For this purpose, a scheme of research was planed to investigate the effect of nitrogen, phosphorus and potassium on sugar beet yield, as well as sugar content of the roots. Boron fertilization was also considered since its role in sugar translocation is well known, and due to the fact that highly

2- REVIEW OF LITERATURE

For the sake of clarity, the cited literature pertaining to this subject is divided into four parts.

2.1.- The effect of soil fertilization on the yield and sugar content of sugar beet plants.

2.2.- The effect of foliar nutrition on the yield, sugar content and nutrient contents of plants.

2.3.- Effect of boron fertilization on yield, sugar content and mineral composition of sugar beet plants.

2.4.- Nutrient contents of sugar beet plants under different fertilization conditions.

2.1.- The effect of soil fertilization on the yield and sugar content of sugar beet plants.

The growth and development of the sugar beet plants, as outlined, take place in an orderly fashion as long as the climate (temperature, light and moisture) is favourable, and no nutritional deficiencies, diseases, pests, or other factors are hindering plant growth. When there is a change in climate or in the nutritional status, a new equilibrium is established within the plant. Some of these changes, when occurred in the fall of the year, may induce sugar storage

or "ripening" while others, specially those inducing new growth, cause a lowering of the sucrose concentration of the beet.root.

Kolbe (1958) and Haddock et al (1956) found that the yield of sugar beet roots increased with increasing rates of nitrogenous fertilizers. However, higher rates of N increased top production, and reduced the sugar content of roots.

From two field trials, Dubourg et al (1958) noticed that higher rates of nitrogen greatly increased the percentage of amino acids in the roots particularly glutamic acid, resulting in lower sugar yield. The same result was obtained by Tolman & Johnson (1958). Roussel (1960), using two varities of sugar beet grown on different soil types, showed that 150-180 kg. N per hactar gave the highest yield of roots and sugar production.

In California, Ulrich et al (1959) found that overuse and late use of nitrogen is the major factor contributing to the decline in sucrose concentration of beets.

Dunn and Rost (1950) and Mc Queen (1960) noticed that sugar content of beet was slightly raised by phosphorus application. In field experiment on low