GREENHOUSE CUCUMBER NUTRITION
A GROWTH ANALYSIS STUDY

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INTRODUCTION

The culture of greenhouse cucumbers is a well established horticultural operation in many parts of the world and in various places it parallels that of greenhouse tomato culture. In spite of this, many of the problems of production, particularly those related to the nutrition of this crop, have been neglected by agricultural investigators. There are few if any reports of nutrient levels or relationships in cucumber tissue or details of fertilizer practice. Wiebe 4 has given a short set of instructions for growing greenhouse cucumbers in the Canadian province of Ontario where two million dozen per annum are grown in localized areas. Whitaker and Davis 5 in a monograph entitled Cucurbits have given an account of the botany, cultivation and utilization of cucumbers, but with no particular reference to greenhouse production.

In some respects the greenhouse cucumber resembles the greenhouse tomato which has been the subject of numerous investigations. Its growth habit is indeterminate, it produces fruit continuously for several months, and its nutrient requirements are similar. Mechanical systems for feeding and watering are the same for both crops and the spacing of plants is only slightly different. In other important respects the two crops differ. The cucumber is unisexual monocious, grows faster, has a shallower root system and is more sensitive to unfavorable conditions. However, the same nutritional problems are usually encountered in both crops. A nutritional study of the greenhouse tomato has already been reported 2 and it formed a basis for a feeding schedule 3 which is now recommended to commercial
The present paper describes a similar study made with the greenhouse cucumber with the same object of obtaining a clear picture of the mineral status of the growing plant and of determining the actual amounts of nutrients absorbed by representative plants grown under conditions currently found in commercial practice. The detailed analysis of all parts of the plant was made to provide necessary reference information for a more intelligent selection of adequate sample material for tissue analysis which is rapidly becoming a common diagnostic tool in the production of many horticultural crops, particularly greenhouse vegetables.

**MATERIALS AND METHODS**

Cucumber plants of the variety Burpee hybrid were used in this experiment. This is the only variety now grown commercially in Ontario. The parthenocarpic types such as Telegraph, which are popular in European markets are not grown here. Seed was planted in sterilized soil in flats on December 17th, 1964. Seedlings were transplanted to 10-cm pots on Dec. 29th and from there to steamed ground beds on Jan. 12th. The rate of planting was two rows per plot, eight plants per row spaced 48 cm apart with rows in the plot 46 cm apart and 114 cm between plots. This spacing gives a density of 21,844 plants per ha or 0.465 sq m per plant. All the normal cultural treatments were applied including a regular spray program for pest control.

Various methods of training a cucumber plant are used commercially because of the prolific growth of side shoots known as suckers, which arise from the leaf axils along the main stem. Fruits grow in leaf axils from the main stem and in leaf axils from sucker stems. In this experiment suckers along the first six feet of the main stem were pinched back at the second sucker leaf to allow for the production of one fruit on each sucker. Beyond this point suckers were pruned less severely and a canopy of new growth formed over the top. Different environmental conditions, which have not yet been clearly defined, appear to favor the development of either stem cucumbers or sucker cucumbers. Pollination of the female flowers of this crop was accomplished by means of a hive of bees located in the greenhouse.

A pre-crop treatment of magnesium sulphate at the rate of 224 kg per ha was applied to the soil. During growth the plants were fed at appropriate times with 10-52-17 starter solution, potassium nitrate, diammonium phosphate, ammonium nitrate and calcium nitrate. Fertilizing and watering were carried out in the manner already described for the tomato crop. Each fruit was harvested and weighed as it matured and its position on the plant identified.

At the mid-growth stage four plants were removed from the soil and prepared for chemical analysis. At this stage the plants had 26 leaves, short suckers in 19 leaf axils, 13 fruits of various sizes, numerous blossoms and a