

EFFECT OF SOIL FUMIGATION WITH METHYL BROMIDE ON MINERAL NUTRITION OF STRAWBERRY

By

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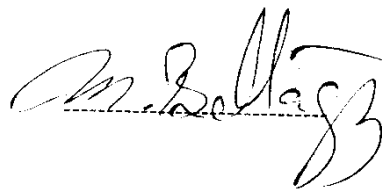
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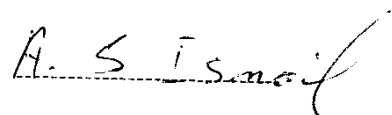
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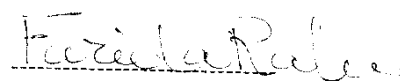
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ABSTRACT

This study was carried out on strawberry (*Fragaria x ananassa*, Duch.) during the two successive seasons of 1988/1989 and 1989/1990, at the Strawberry Improvement Center Experimental Farm at Omm Saber, south Tahreer, El-Behira Governorate. The objective of this work was to study the effect of soil fumigation with methyl bromide on mineral nutrition of strawberry cultivar Douglas. A spilt-plot design with four replicates was adopted. The results indicated a substantial increase in the content of the available macro and micro nutrients in the fumigated soils compared to the non fumigated ones. A significant increase in the number of leaves per plant, fresh and dry weight, early and total yield per plant was recorded. Fumigation

accompanied by fertilization increased the available content (N, P and K) and (Fe, Mn, Zn and Cu) in the soil in the both growing seasons compared to fumigated only or the control. Plants grown in the fumigated fertilized plots contained the highest amount of macro and micro nutrients in both the growing seasons. Fumigated non fertilized plots had the highest amount of available P and K than all other treatment. The maximum early and total yield per plant was obtained from the fumigated non fertilized plots.

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INTRODUCTION

INTRODUCTION

The strawberry plantations and production in Egypt have substantially increased in the last few years. The acreage planted with the recommended strawberry cultivars in the 1989/1990 season has increased to 4000 feddans which produced over 25000 tons of fruits. Meanwhile, strawberry has become very popular and favourite fruit in the Egyptian markets.

Effective weed control is essential to profitable strawberry production . Accordingly, several mechanical and chemical methods were used to control weeds in strawberry plantations. Soil fumigation with methyl bromide and chloropicrin has been an integral part of strawberry cultivation in the world since 1960. Fumigating is highly effective in killing weed seeds and vegetative structures of perennials such as quackgrass, field and hedge bind weed, insects, nematodes and other diseases. Fumigation with methyl bromide is the most effective among various fumigants in controlling weed seeds and vegetative structures.

Most tangible benefits of soil fumigation with methyl bromide and chloropicrin are the healthy strawberry plants growing in soils temporarily free from fungal root pathogens.

Fumigation is highly effective in increasing yield and increasing the total mineralized nitrogen in the soil following soil fumigation.

The increased amount of total available nitrogen, plus the release of certain other nutrient elements and the control of harmful diseases, insects and nematodes are responsible for improved plant growth following soil fumigation.

Therefore, it was imperative to study the effect of soil fumigation with methyl bromide on mineral nutrition of strawberry.

REVIEW OF LITERATURE

2- REVIEW OF LITERATURE

2.1. Effect of Fumigation on Soil characteristics (nutrient-supply-release).

The most important effect of the biocides is directed towards the biosphere of the soil. The organisms of the soil biosphere are of great importance for the whole soil chemistry. On the other hand, they set free important macro and micro nutrients by oxidation and reduction reactions and favour their uptake by plant roots. Such biocides may bind them biologically, and increase their leaching and volatilization, **Mulder (1979)**. Their influence on the soil texture is also essential.

First attempts at a general survey in this connection are described by **Newhall (1955)**, **Warcup (1957)** and **Martin (1963)**. The effect of fumigation on the nitrification of the soil has been widely investigated. If nitrification is inhibited for a shorter or longer period of time, this leads to an accumulation of ammonium. This fact was established, among others, for: DD, CP, EDB, DBCP, Methyl bromide, CS, da Zomet, Vapam, Trapex and Di-trapex, **Marks et. al ., 1972; Reber, 1967; Kanehiro, 1971; Dubey et. al., 1975; Gasser and Peachey, 1964**). They may necessitate nitrate fertilization after fumigation in order to avoid growth impediment of some sensitive plants. Besides their biocidal effects, the various fumigants may also influence the setting free of

different nutrient substances within the soil or they may increase their availability by forming chelates.

In addition, the mycorrhiza which is important for the nutrient uptake by certain plants, may change considerably this in turn, may have consequences on the plants.

It has been proved that the availability of the following macro and micro nutrients is influenced: calcium, copper, iron and heavy metals and sodium (**Maurer and John, 1971**) potassium (**Nettles and Hamdi, 1953**), magnesium (**Havis, 1962**), manganese and phosphorus (**Martin et. al., 1973**), nitrogen (**Jenkinson et. al., 1972**) and sulphur (**Tu, 1972**).

The influence of soil fumigation on the pH-value of the soil, the exchange capacity and the redox potential has been investigated to only a small degree (**Clark, 1950; Havis, 1962; Adams, 1966** and **Aksoy et. al., 1965**), investigated changes in the aggregation of the soil. The organic matter content of the soil may also be influenced (**Singhal et. al., 1975**).

According to the available data, any influence of the fumigants would be preceded by damage to the soil microflora. Besides these indirect effects of biocides on soil chemistry, the salt level can be changed directly in a qualitative or a quantitative manner. **Aldrich and Martin (1952)** presumed that when fumigants containing chlorine and