EFFECT OF SOME TREATMENTS ON QUALITY AND YIELD OF GARLIC.

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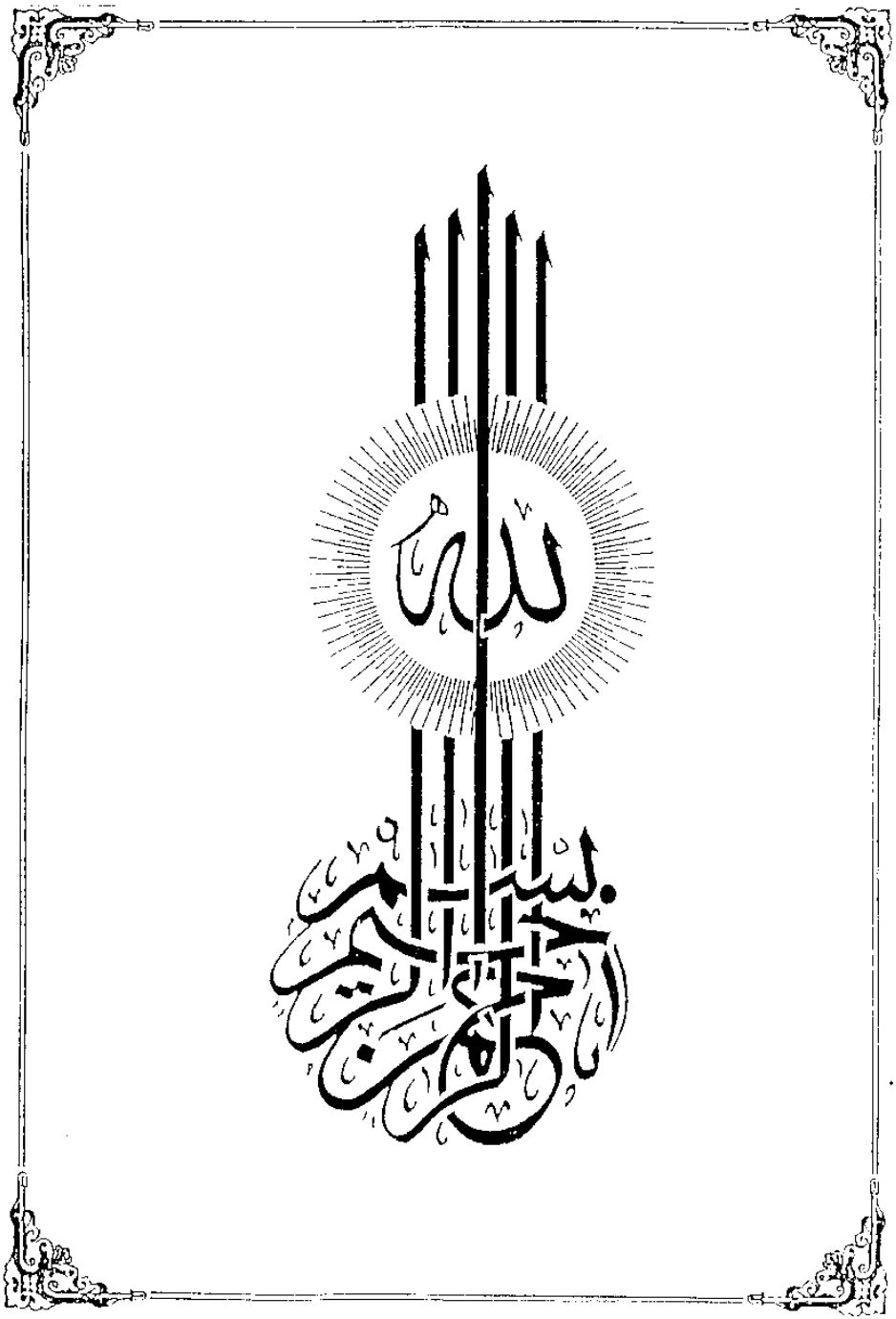

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ARABIC SUMMARY

INTRODUCTION

Garlic is one of the important vegetable crops grown in Egypt. The average total acreage amounts to about 12,000 feddans with an average annual yield of 6.11 tons per feddan. The production is used in local consumption and in exportation.

The amount of garlic exported increased from 38 tons in 1950 to 4210 tons in 1960 to 7900 tons in 1968. This increase is very little in comparison with onion. This might be mainly attributed to many factors among which bad keeping quality and infirmness of the bulbs are the most important.

During storage garlic bulbs are liable to sprouting, infection by diseases and a marked loss in the amount of carbohydrates stored in the cloves. It is necessary to keep garlic bulbs well during their storage to supply the local market with its demand. Consequently, the study of factors affecting keeping quality during storage of the bulbs becomes one of paramount importance.

The aim of this investigation is to study:

1- The effect of clove size and nitrogen level on growth and yield of garlic.

2.- Effect of spraying garlic plants with microelements namely magnesium and manganese.

3.- Effect of spraying garlic plants during their growth with MH on keeping quality of bulbs.

REVIEW OF LITERATURE

The literature dealing with garlic plants (Allium Sativum, L) was quite scarce and surprisingly incomplete. Therefore, the literature on the onion will be discussed herein because of its close taxonomic relation to garlic (47).

I. Effect of nitrogen

Singh et al.,(66) found that nitrogen, phosphorus and potassium had a significant effect on height and fresh weight of garlic plants. In addition, nitrogen had a significant effect on the number of leaves and cloves,the size of bulbs and the yield. The peak growth rate occurred at 35 days after planting, after which it decreased. They added that at 65, 95 and 125 days after planting, plants supplied with 40 lb. N., 80 lb. P. and 40 lb. K. had made more growth than plants supplied with higher rates of fertilizers. The same authers found that (stem/plant) and (leaf/plant) ratios were high during the intial growth stages but later decreased. With advancing age,the leaf area increased with increasing levels of nitrogen.

On the basis of sand culture experiment with garlic plant, early maturation of bulbs was noticed in nitrogen and phosphorus deficiencies, (18). Absence of nitrogen had depressed both the total nitrogen and the total phosphorus of the plant. Pande et al.,(54) reported that application of nitrogen to onion significantly increased plant height, number of leaves, total weight of plant, weight of top growth, fresh weight of bulb, length of bulbs and cured bulb weight. They added that increasing levels of nitrogen increased the yield of bulbs. Downes, (17) stated that when nitrogen was limiting, its application caused a significant increase in the growth of leaves and bulbs. Carolus, (11) on the basis of onion dry weight found that high levels of nitrogen application increased the nitrogen content of both leaves and bulbs by 30 % , the manganese content of the foliage by 400 % and of the bulbs by 180 % over the less level.

Queddeng et al.,(59) on the basis of 3 years trial on Granex onions and by applying ammonium sulphate, calcium superphosphate and potassium chloride alone and in all possible combinations at rates of 750, 1000 or 1250 kg./ha. found that nitrogen applied alone or in combination with phosphorus or with P + K gave yield significantly

higher than those of the control. They also found no significant differences due to rate of applications. Bulb yield from plants which received nitrogen up to mid or late May was equal to or slightly higher than those from plants which received nitrogen until harvest, (37). Both top growth and bulb yields were reduced when nitrogen application was discontinued from the later half of April, (37). Reductions in bulb growth and yield were much more marked when the nitrogen supply was stopped during March, and the bulbs formed were round rather than flat. Plants which began receiving nitrogen in late Feb. or early March produced growth and yield similar to those of the control which received nitrogen throughout the whole period, (37), but when nitrogen was not supplied until late March or April, growth could not catch up with that of controls. Bulb yield was not reduced by omitting the nitrogen for one month. Concerning the plant content, nitrogen and dry matter in the onion top increased from March until May, (37), the increase in April being particularly striking. In bulbs, nitrogen and dry matter contents increased rapidly from middle or late April until harvest, (37). In Japan, the period from mid or late March to mid or late May is the critical period for nitrogen supply to onions,

(37). Grebinsky and Popovic, (27) concluded that high yield of onion leaves was obtained when the percentage of nitrogen content in leaves was not less than 3 % of the dry weight.

The yield of onion increased by 22 and 37 % over control by the application of 50 and 100 lb. of nitrogen respectively (2), and it increased with increase in level of nitrogen alone and in combination with P (61); and a complete fertilizer with high P (7); with application of 40 pounds of nitrogen per acre (7). Excess of nitrogen produced excess of growth of the tops and light straw coloured bulbs (7). The most economic dose of nitrogen was of 67.25 kg./ha. which resulted in 80.2 % increase over the control (62).

II. Effect of clove size

Concerning seed size, D'agouto, (14) planted garlic cloves with and without storage leaves in his experiment and concluded that mineral deficiency symptoms (N.P.K) appeared at first on the no - storage leaf treatment. This evidence was based on that plants from no - storage leaves showed deficiency symptoms earlier than whole clove. Increasing bulb size of onions of "Yellow Globe" caused on

increase in number of seed head per plant, seed yield per plant and per acre, (40); larger onion sets gave higher yield than smaller one (45), number, length, dry weight of tubular blades per plant, number, length and dry weight of the neck and big mother bulb produced about 50 and 117 kg of seeds per feddan more than the medium and small one respectively (19), the number of shoots per plant (6), number of leaves and seedstalks, dry matter content of leaves, seedstalks and umbells (50, 64), the number of seedstalks (63). On the other hand Warid and Abd-El-Gaber, (76) found that the seed yield per plant was not affected by bulb size when they used two different onion bulb size weighing 62 and 118 gms. for the medium and big one respectively.

III. Effect of Manganese

Manganese is equally essential for the growth of seedlings and metabolism of higher plants. As a trace element it regulates the development and growth and is not replaced by any other element in its function. Moreover manganese plays prime role in sugars formation and metabolism. Sugar and starch are reduced in manganese deficient plants (65). In addition, manganese increased the yield

of onion (23, 28, 51, 69). Maximum yield was obtained by using 30 pounds on a silty loam soil, (23), 100 pounds, (69), and 200 pounds of manganese sulphate per acre on a slightly to medium alkaline peat (28), 73 pounds per acre in greenhouse experiments with a sedge peat having a reaction of about 6.2 (51), and 38 pounds per acre in field with peat (51). Stuart (69) recommended 150 - 200 pounds per acre as a minimum treatment. Jagodin (38) obtained better growth of onion when treated the soil with a mixture of some minor elements containing 0.1 % manganese.

Manganese plays a specific role in hydrogenation of oxygen to hydrogen peroxide (22), accelerates the assimilation of CO_2 (22), the absorption of nitrite (41, 65), and stimulates respiration and CO_2 output (9, 34).

IV. Effect of Maleic hydrazide

Growth-regulating substances have been used extensively on horticultural crops to prevent sprouting and keeping quality during storage. Several investigators have observed that preharvest application of growth regulators such as MH. may affect the keeping quality of garlic

onions, onion sets and potatoes during storage (1, 7, 12, 13, 14, 25, 26, 35, 36, 39, 42, 52, 53, 55, 56, 57, 60, 70, 71, 73, 74).

MH. inhibited sprouting by spraying Egyptian garlic plants at a rate of 2500 p.p.m. two weeks before harvest (71), during storage onion foliar sprayed plants 7 and 10 days before harvest with concentration of 500 and 1000 (56) at a rate of 1200, 1800 and 2400 p.p.m. 7 and 15 days before harvest (74), at a rate of 2000 - 3000 p.p.m. 1 to 3 weeks before harvest (1, 12, 26, 56, 60, 70, 73), during storage spraying onion plants 1, 2 or 3 weeks before harvest with concentrations of 1500, 2500 or 3500 p.p.m. reduced the sprouting of bulbs, stored at 4°C and 85 % relative humidity or at ordinary atmospheric conditions (39).

Keeping quality of Allium species was affected greatly by treating plants with MH. (16, 36, 42). Kepkowa, (42) treated onions with MH. at concentrations of 2500 to 5000 p.p.m. and found that this chemical reduced the weight loss of the bulbs during storage. The keeping quality of a "poor keeping" onion variety like "Early Yellow Globe" or varieties grown under poor conditions was improved to a greater degree by the MH. sprays than was the keeping quality of a "good keeping" variety grown under optimum