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EFFECT OF SEED STERILIZATION AND SOIL TREATMENT ON THE GERMINATION AND GROWTH OF TOMATO (*LYCOPERSICON ESCULENTUM* MILL)

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Seed sterilization with 20% HCI for 30 min. increased the germination percentage of tomato seeds in soil irrespective of soil treatment. Seeding with sterilized seeds showed increase in the number of fruits and fruit weight as compared to transplants in the treated and untreated soils. Treatment of soil with Formalin, Furadan and plastic mulching improved the germination of sterilized seeds. Soil treatment with formalin also increased the number and weight of tomato fruits.

INTRODUCTION

Of the various diseases affecting tomato crop tobacco mosaic virus (TMV) is widespread in and around Karachi area where it causes considerable damage. Tobacco mosaic virus diease is seed-transmitted in tomato [9, 13] where seed serves as a primary source of infection [6]. The virus occurs within the seed or the seed-coat and becomes inoculated into young seedlings during transplanting [1]. Besides, soil borne infection by fungi and/or nematodes adversely affects the tomato crop. A synergistic effect of the root knot nematode, *Meloidogyne incognita,* with the wilt fungus *Fusarium oxysporum* f.sp. *lycopersici* [2, 3] and with tobacco mosaic virus [5] has also been reported.

Surface sterilization of seed with 20% HCI for 30 min. has been reported to control seed borne infection of TMV [2]. Similarly soil disinfection with fungicides and/or nematicides have been used successfully to control soil borne plant pathologens [8]. Recently the mulching of soil with grey plastic [10] or with transparent plastic [7, 14] has been found to control soil borne infections of fungi and nematodes. Experiments were therefore carried out to examine and establish whether the production of tomato could be improved through seed sterilization, soil treatment and seeding. The parameters used in the experiment are germination, vegetative growth and yield.

MATERIAL AND METHODS

The experiment was laid at the Karachi University experimental farm where the soil was garden loam, pH 7.1. Each plot measured 4x2 m. and the plots were arranged in a randomized block design with 4 replications of each treatment. Seeds of tomato *(Lycopersicon esculentum* Mill.) cv. summer giant obtained from the local market were used. Seeds were surface sterilized with 20% HCl for ½ hr. as suggested by [2] to control the seed – borne infection of the tobacco mosaic virus. A comparable set of non-sterilized seeds were used as control. Plants were raised when (i) seeds were seeded by dibbling 10 – 15 seeds per hole and after germination they were thinned to one seedling per hole, or (ii) 6-week old seedlings were transplanted. There were 3 plants at a distance of 1m in a row keeping 30 cm difference between adjacent rows. The duration period of seed germination was 18 days and the growth experiment lasted for 130 days before the final harvest was made. Data have been reported of 120 seeds and 120 seedlings.

For soil treatment, the soil was (i) drenched with 1% Formalin @ 3 gallons per sq.m. (ii) treated with Furadan @ 2g in 3 gallons of water per sq.m, (iii) mulched with grey plastic following the method of Loebenstein *et al.* [10] and (iv) mulched with transparent polyethylene. Soil treatment was carried out only once 1 week before tomato seeding. 6 weeks later the seedlings were transplanted in the same treated plots.

RESULTS AND DISCUSSIONS

Seed sterilization with HCI increased seed germination by 8-25% when tomato seed were seeded in soil irrespective of soil treatment with Formalin, Furadan or plastic mulch (Fig. 1). Increased-germination of seeds with HCl is similar to the report of Sadruddin and Qadir [11] who found 84% seed germination after treatment with 10% HCI for 2 min. Soil treated with Formalin however showed 100% germination of the seed (Fig. 1).

Similarly soil treatment enhanced seed germination in HCI sterilized and unsterilized seeds as compared to

untreated soil (Fig. 1). Sterilization of seeds with HCI is known to control seed – borne infection of TMV [2].

There was no difference in seed sterilization and soil treatment on the over-age length of the stem (Fig. 2).

In the soil treatment no difference was noted on the plant age at flowering or fruiting whether the seeds were sterlized, seeded on where trensplants were used (Fig. 3).

Seed sterilization and Formalin treated soil however, showed pronounced differences in the average number of fruit and the weight of tomato fruits (Fig. 3).

Tomato seeds seeded in soil increased number of fruits and yield as compared to transplants (Fig. 3). It may be mentioned that Goldin and Yarchenko [4] controlled the tobacco mosaic virus disease in field tomatoes by direct sowing.

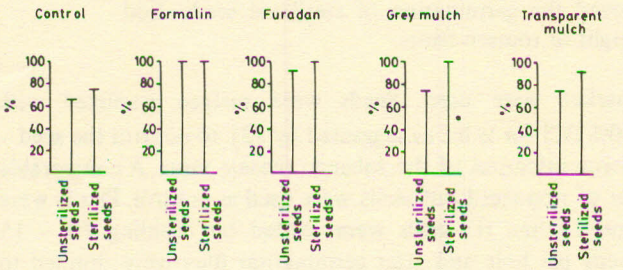

Fig. 1. Effect of seed sterilization, chemical soil treatment and mulching on germination of tomato seeds. The counts were made 18 days after seeding.

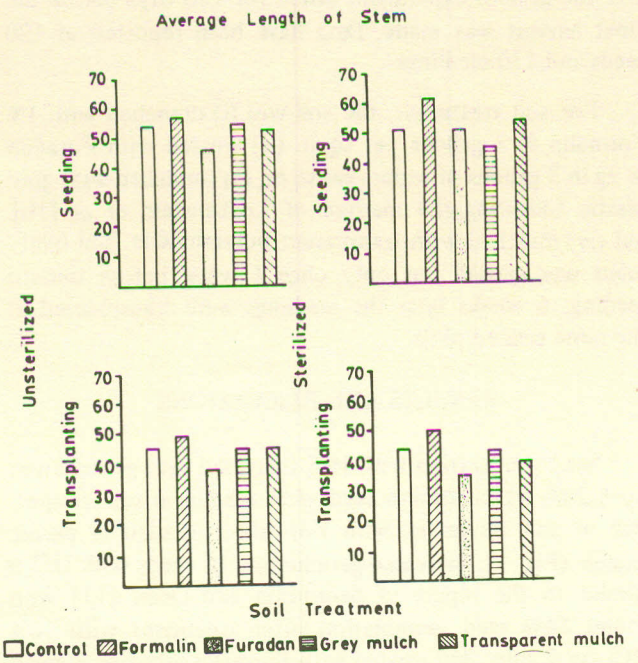

Fig. 2. Effect of chemical soil treatment and mulching on the plant height of tomatoes developed from sterilized or unsterilized seeds. The data represents 240 plants harvested 130 days after planting.

The standard deviations were calculated but they were very small, and therefore not shown.

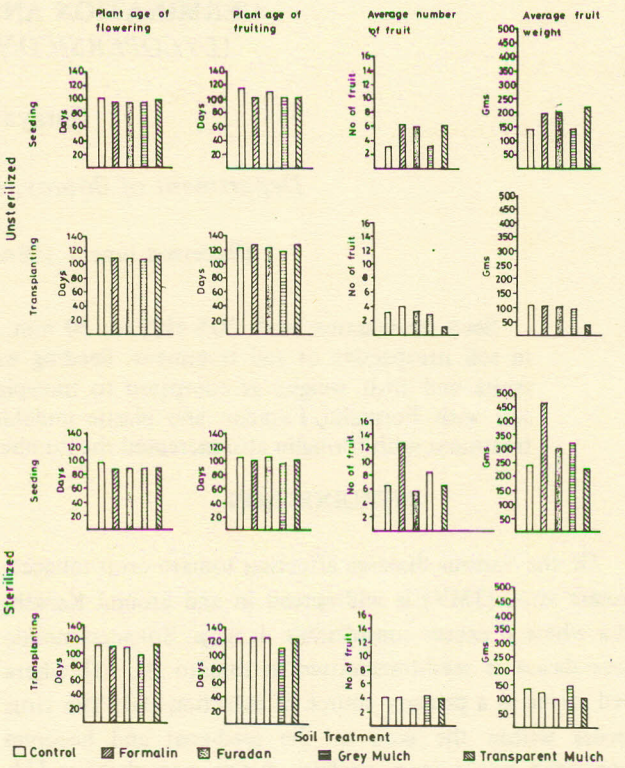

Fig. 3. Effect of chemical soil treatment and mulching on the reproduction and yield of tomato plants develped from sterilized and unsterilized seeds as a result of seeding and transplanting. Each data represent 240 plants harvested 130 days after transplanting.

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