"*TRICHODERMA* AS A PLANT GROWTH PROMOTER FOR POMEGRANATE (CV. BHAGVA)"

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ABSTRACT: : *Trichoderma is distributed all over the world and present in range of soil type including forest, agricultural, orchard,and desertsalt marsh soils. Trichoderma is best known for biocontrol activities and production of antifungal compounds. Resent investigations supported that Trichoderma produce different plant growth promoters (PGRs). PGRs production ability of indigenous strains of Trichoderma was confirmed by using different media like Borrow, Darken and Stodola. Extraction of PGRs from culture broth was done using ethyl acetate. Determination and quantification of PGRs was carried out by using advanced molecular technique including UV-spectrophotometer, HPLC and GC-MS. Experiments results indicated that all the treatments significantly increasednumber of flowers. Highest number of flowers were observed in 15% (886), followed by 10% (803) and least number in control (563). Spraying of culture broth significantly reduced fruits number over the control (131), on the contrary allthe treatments showed significant gain in fruit size. Maximum average size of fruit was foundin 15% (445), followed by 10% and 55% over the control. This findingsupports thatTrichoderma culture broth significantly promotes number of flowers and size of fruits with decreasing in of number fruits.*

Key Words: *Pomegranate, Trichoderma, Culture extract*

Introduction:-

Trichoderma spp. is a group of free-living fungi which are common in soil and root ecosystems. It has gained immense importance since last few years because of its biological control ability against many plant pathogens. They are being employed widely in plant physiology, agriculture for both applications disease control and increase yield (Chang et al., 1986; Harman, 2006). In addition to the ability of *Trichoderma* species to control the growth of plant pathogens directly, earliest discoveries indicate that *Trichoderma* have evolved in multiplemechanisms, that result in improvements in plant resistance to disease and plant growth and productivity (Harman, 2004; Vinale et al., 2008).These new findings are drastically changing our knowledge of the mechanisms of action and uses of this fungus. Recently, many workers observed that *Trichoderma* spp. have diverse antifungal mechanisms and abilityto promote plant growth. They stimulate plant growth in cucumber, cabbage, lettuce, potato, tomato, carrot, beans and peas (Ousley et al., 1994; Rabeendran et al., 2000; Khan et al., 20040). Multiple mechanismsare involved in the stimulation of plant growth by *Trichoderma* including interactions with plant roots.Possible explanations of this phenomenon include, control of minor pathogens leading to stronger root growth and nutrient uptake (Ousley et al., 1994), secretion of plant growth regulatory factors such as phytohormones (Chang et al., 1986) and release of soil nutrients and minerals by increased saprophytic activity of *Trichoderma* in the soil (Ousley et al., 1994). Therefore this study was undertaken with the objectives *Trichoderma* as a growth promoterfor pomegranate.

Materials and methods:

Isolation and identification of *Trichoderma* strains:

Different strains of *Trichoderma* spp. were isolated from soil samples of Sangamner tehsil by serialdilution technique.*Trichoderma* strains were identified on the basis of morphological and cultural characteristics.

Maintenance of pure culture of isolated organism:

Colonies were purified by transfer and retransfer on fresh PDA plates, pure culture were maintained onPDA slants and slants were maintained in incubator at 28 ^{0}C.

In vitro production of gibberellic acid:

Production of *Trichoderma* PGRs in modified glucose medium was carried out at optimum physical conditions (Temperature 30^{0}c, pH 6.2 and culture at 100 rpm).

Extraction determination and quantification of PGRs:

Extraction of plant growth regulators was done by ethyl acetate method and extracellular PGRs produced in culture broth by *T. harzianum* was determined and quantified by UV spectrophotometer, HPLC and GCMS (Rachev et al., 1993; Madhavan and Shreedhar, 1986; Zeiglar, 1980).

Preparation of different concentration of PGRs:

Different concentrations (00%, 5%, 10% and 15%) of extracted PGRs were prepared in distilled water and used for further study.

Number of flower:

Two sprayings of different conc. of PGRs ware conducted with ten daysinterval.Numbers of flowers werecounted on 30th day of first spraying.

Number of fruits:

Pomegranate plants were analyzed to study effect of extracted PGRs on number of fruits per plants. Followed to pretreatments, these plants were additionally treated with different concentration of *Trichoderma* extract at the time of flowering. These plants were sprayed thrice with different concentration of extract; seventy two hours duration was kept between two treatments. Numbers of fruits per plant were counted on 60th day of first treatment.

Weight of fruit:

Weight of individual fruit (pomegranate) was measured at the time of harvesting.

Results and Discussions:

Plant growth regulators are known to play significant role in pomegranate (Chaudhary and Desai, 1993). Pawaret al. (2005) recorded highest yield in variety Mridula of pomegranate in Maharashtra with 75 ppm GA3 treatment. Whereas, Mohamed (2004) recommended that treatment of 150 ppm of GA3 is useful to obtain highest fruit yield.

To find out effect of *T. harzianum* PGRs on productivity of pomegranate cultivar Bhagva was selected. Two spraying schedules of different concentration of extracted PGRs were undertaken. In first schedule two sprays of PGRs were applied with 10 days intervals at onset of flowering. While in second schedule two sprays of PGRs were applied at fruiting stage with 72 hours of interval. Crop growth productivity was analyzed by growth parameters such as number of flowers, number of fruits per plants and weight of individual fruits (Table 1).

Results expressed in table 1 indicated that all treatment significantly increases number of flowers. Highest number of flowers were observed in 15% concentration (886), followed by 10% concentration (803) and least number in control (563). However spraying of culture extract significantly reduces fruit set over the control (131), on the contrary all treatments showed significant gain in fruit size. Maximum average weight of fruit was obtained in 15% conc. (445), followed by 10% and 5% over the control (225gm). These findings confirmed that *T. harzianum* PGRs significantly promote number of flowers and size of fruits by decreasing number fruits.

Table 1: Effect of *Trichoderma* culture broth on Pomegranate

Parameter studied	Concentration of culture filtrate			
	0%	5%	10%	15%
Number of flowers	563.33 ± 77.67	690.00 ± 40.92	803.30 ± 32.14*	886.66 ± 88.95**
Number of fruits	131.66 ± 12.58	109.00 ± 07.81	105.00 ± 8.8	109.13 ± 18.14
Size of fruit at maturity	225.66 ± 20.81	296.6 ± 49.30*	438.30 ± 36.17**	445.00 ± 21.79 **

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Figure 1: Effect of *Trichoderma* culture broth on Pomegranate

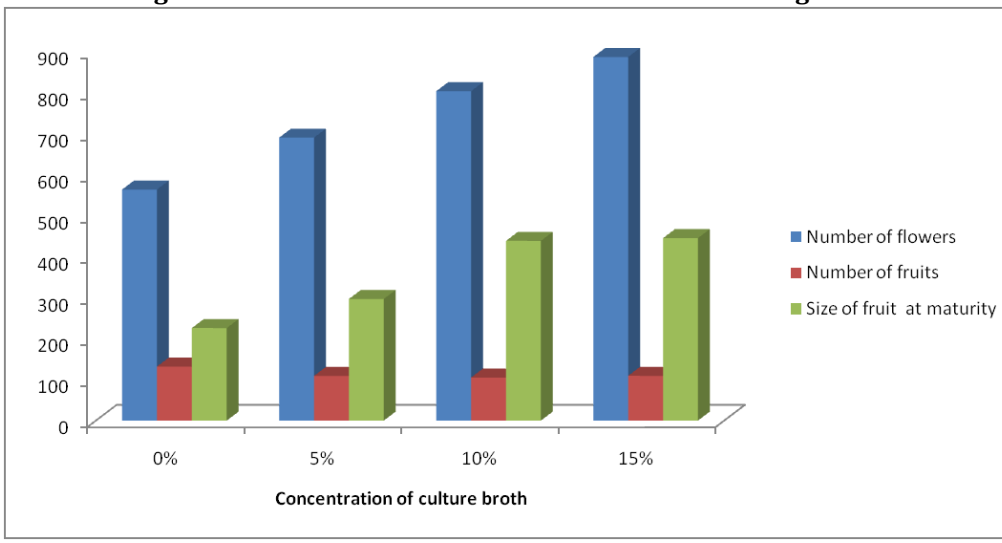
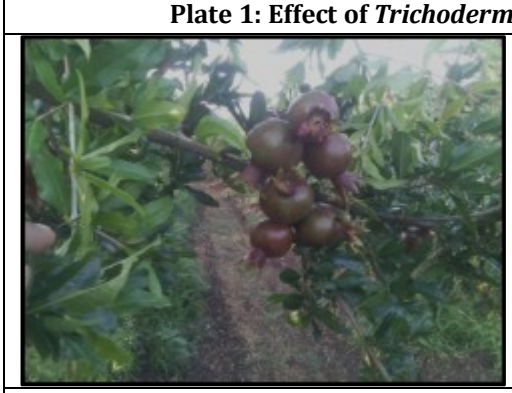


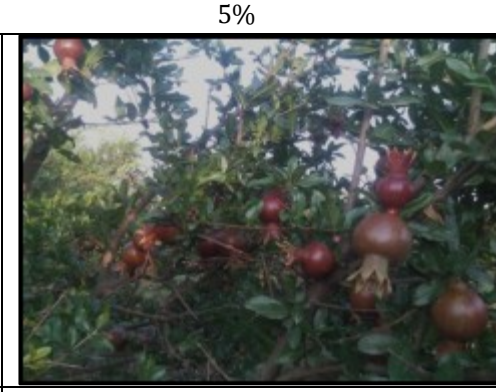
Plate 1: Effect of *Trichoderma* PGRs conc. on Pomegranate



Control

5%

10%



15%

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