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Grafting studies in Brinjal for the management of soil borne diseases and nematode

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Abstract
The experiment was conducted during *Kharif* seasons of 2018-19 at AICRP (Vegetables) RHREC, Dharwad, Karnataka. The experiment was laid out in a randomized block design (RBD) with six treatments with four replications. Significantly higher plant height of 150.17 cm, number of fruits per plant (61.67), average fruit weight of 59.59 g, fruit yield per plant of 4395.29 g, fruit yield per hectare of 375.69 q and lower per cent diseases incidence of 1.25 per cent were registered under the treatment T_1 (Root stock: *Solanum torvum* Scion: Any popular hybrid of the region (MAHY Super-10). While treatment T_2 (Root stock: Surya Scion: MAHY Super-10) found to be on par with T_1 with regard to yield per hectare (342.18 q/ha) and per cent diseases incidence of 7.78 per cent.

Keywords: Grafting, brinjal, nematode, growth and yield

Introduction
Soil borne diseases are considered a major limitation to crop production. Soilborne plant pathogens such as *Rhizoctonia spp., Fusarium spp., Verticillium spp., Sclerotinia spp., Pythium spp., and Phytophthora spp.* can cause 50%–75% yield loss for many crops such as wheat, cotton, maize, vegetables, fruit and ornamentals as reported to date (Baysal and Kabir 2018) [1]. In the United States, soilborne plant pathogens are responsible for about 90% of the 2000 major diseases of the principal crops (Mokhtar and Mougy 2014) [5]. They often survive for long periods in host plant debris, soil organic matter, free-living organisms or resistant structures like *microsclerotia, sclerotia, chlamydospore* or oospores. Accurate diagnosis of a particular disease is difficult due to the similarity in symptoms such as seedling damping of root blackening, root rot, stunting, wilting, yellowing, bark cracking and twig or branch dieback which in turn makes the disease harder to manage. To control these disease outbreaks, conventional synthetic chemical fungicides and fumigants need to be applied at regular intervals throughout the growing season of the crop. However, it should be noted that there are evident issues with the use of synthetic fungicides which include ecological disturbance, human health hazards, damage to aquatic ecosystems, reduction of beneficial microorganisms in the soil and even ozone layer depletion. With the increasing environmental constraints, alternatives to broad-spectrum fungicides and fumigants are being developed and put into use. However, these alternative disease-management methods either have inconsistent results (Keinath and Batson 2000) [3]. or are less effective than methyl bromide. The use of fungicides against soil borne plant pathogens can help to manage some diseases, in contrast, frequent and indiscriminate use can increase environmental and health concerns and lead to development of fungicide resistance Christopher *et al*., 2010 [2]. Some environment-friendly approaches such as the use of crop rotation, soil solarization, anaerobic soil disinfestations, soil steam sterilization, bio fumigants, resistant cultivars/varieties or grafted plants and biocontrol products have been developed to control soil borne diseases while maintaining the environment. Studies on disease suppressive soils have led to the development and adoption of new approaches and to a better understanding of soil microbial community responses. These advances show that active management of soil microbial communities could be an effective method to develop natural suppression of soil borne plant pathogens.

As soil comprises a full ecosystem including many fungi, bacteria, insects, nematodes and other microbes, it is very important to understand those interactions to develop a soil health management strategy instead of focusing on individual disease causing species

Material and Methods

The experiment was conducted during *Kharif* seasons of 2019-20 at AICRP (Vegetables) RHREC, Dharwad, Karnataka, (15.475° N latitude, 74.979° E longitude and 655 m altitude), The experimental soil was well drained and sandy loam in texture. The experiment was laid out in a randomized block design (RBD) with six treatments with four replications. The experimental fields was ploughed three times and all the cultural practices were done as per the package of Practices of University of Horticultural Sciences Bagalkot. The treatments Details shown in table No.1

Table 1: Treatment Details

T1:Root stock: *Solanum torvum* Scion: Any popular hybrid of the region (MAHY Super-10)
T2: Root stock: Surya Scion: MAHY Super-10
T3: Seedling plant of above hybrid (MAHY Super-10)
T4. Seedling plant of Manjari
T5: Seedling plant of Surya
T6: Seedling plant of *Solanum torvum*

Results and Discussions

Significantly higher plant height of 150.17 cm, number of fruits per plant (61.67), average fruit weight of 59.59 g, fruit yield per plant of 4395.29 g, fruit yield per hectare of 375.69 q and lower per cent diseases incidence of 1.25 per cent were registered under the treatment T_1 (Root stock: *Solanum torvum* Scion: Any popular hybrid of the region (MAHY Super-10). While treatment T_2 (Root stock: Surya Scion: MAHY Super-10) found to be on par with T_1 with regard to yield per hectare (342.18 q/ha) and per cent diseases incidence of 7.78 per cent. Whereas lower yield per hectare of 146.78 q/ha was recorded in T_6 (Seedling plant of *Solanum torvum*), and significant higher incidence of PDI was noticed in T_4 (Seedling plant of Manjari) of 31.10 per cent. Grafting is a popular and valuable technique among farmers because it increases the fruit yield and enhanced overall plant vigor through efficient and increased water and nutrients uptake during the growing season (Lee *et al.* 2010). However, rootstock/scion combinations affect final size, yield and quality of fruits from grafted plants, both immediately postharvest and during prolonged storage. Similarly, Xu *et al.* (2005) [11]; Qi *et al.* (2006) [6] and Wu *et al.* (2006) [10] reported that grafting can increase yield since grafted plants are resistant to soil-borne disease, have strong root systems and increased photosynthesis. Many workers in different parts of the world have reported the influence of grafting on yield improvement. Salam *et al.* (2002) [7] demonstrated 3.5 times higher yield in watermelon due to larger fruit size, more fruit per plant, and improved plant survival rates. Similarly, Seong *et al.* (2003) [8] observed 27% more marketable fruit per plant in cucumber plants grafted onto pumpkin rootstocks than self-rooted cucumber plants. Rouphael *et al.* (2008) reported that cucumber grafted onto commercial cucurbita rootstocks under copper toxicity recorded higher yield (8.4 kg/vine) than non grafted plants. Sherly (2010) [9] observed the highest fruit yield per plant, when COBH 2 grafted onto *S. torvum* rootstock compared to non-grafted plants.

Table 2: Effect of grafting on growth, yield and soil borne diseases and nematode in Brinjal

Treatments	Plant ht.(cm)	No. of Fruits/ plant	Fruit yield /plant(g)	Average fruit weight (g)	Fruit yield/plot (kg)	Fruit yield q/ha	PDI (Bacterial wilt)	Incidence of root knot nematode
T1: Root stock: *Solanum torvum* Scion: Any popular hybrid of the region (MAHY Super-10)	150.17	61.67	4395.29	59.59	36.52	375.69	1.25	0.00
T2: Root stock: Surya Scion: MAHY Super-10	143.58	57.59	4028.59	57.31	33.26	342.18	7.78	0.00
T3: Seedling plant of above hybrid (MAHY Super-10)	82.00	27.92	1163.93	53.22	19.66	202.26	24.61	0.00
T4. Seedling plant of Manjari	83.09	26.50	1055.03	49.06	18.40	189.27	31.10	0.00
T5: Seedling plant of Surya	72.67	33.80	841.77	35.59	15.56	160.11	3.92	0.00
T6: Seedling plant of *Solanum torvum*	67.17	30.75	814.48	29.28	14.27	146.78	5.50	0.00
S.Em±	2.96	1.61	81.94	3.28	1.04	10.76	2.18	0.00
CD(0.05)	8.92	4.87	247.01	9.90	3.15	32.45	6.59	0.00
CV(%)	5.92	8.15	7.99	13.99	9.12	9.12	12.06	0.00

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