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Evaluation of grafted brinjal (*Solanum melongena*) for doubling yield in climate resilient condition

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Abstract

A field experiment on grafted brinjal *Solnum meloagena* L. was conducted at Agoor village, Villupuram district, Tamil Nadu, India, during November 2020-December 2021. Turkey berry (*Solanum torvum* Sw.) resistant to verticillium wilt and bacterial wilt (*Ralstonia solanacearum*), was used as rootstock for grafting of brinjal. Seeds of Turkey berry were soaked in water for 12,24 and 36 hours and sown in 98 cavity protrays containing well decomposed cocopeat and raised beds. The germination was significantly higher when Turkey berry seeds was soaked for 36 hours and sown in protrays. After 30 days of Turkey berry sowing, brinjal seeds were sown in 98 cavity protrays. The scion from 30-35 days old brinjal was grafted on 55-60 days old rootstock, Turkey berry using grafting clips and kept under shade net. The crop duration was significantly higher in grafted brinjal compared to seedlings. The grafted brinjal was maintained up to one year. The fruit yield was significantly higher in grafted brinjal (6.01 kg / plant and 60.6 t / ha) compared to seedlings (3.12 kg / plant and 30.14 t / ha). The gross income was significantly higher in grafted brinjal than seedlings. The net income of ₹.5,41,300/- was recorded with benefit cost ratio of 2.51 in grafted brinjal. Shoot-borer infestation was less and easily manageable in grafted brinjal. The fruit-borer infestation (11.70%) was lower in grafted brinjal than seedlings (21.55%). There was no wilt incidence in grafted brinjal.

Key words: Grafted brinjal, Turkey berry, Rootstock, Germination, Grafting, Shoot-borer, Fruit-borer, Wilt, Yield, Net income

Grafting enhances nutrient uptake (Santa-Cruz *et al.*, 2002), duration of harvesting and fruit quality (Colla *et al.*, 2006). Grafting enhances water and nutrient uptake and nutrient-use efficiency (Santa-Cruz *et al.*, 2002), to extend the duration of harvest time and to improve fruit quality (Colla *et al.*, 2006). Brinjal (*Solanum melongena* L.), is susceptible to many pests and diseases. The losses caused by shoot and fruit-borer (*Leucinodes orbonalis* Guenee) vary from season to season. Yield loss of brinjal is high due to shoot and fruit-borer (Jat and Pareek, 2003). Integrated pest management strategies were effective in controlling shoot and fruit borer in eggplant (Pandey *et al.*, 2016). Grafting with rootstocks can provide added vigour, fruit quality (Kumbar *et al.*, 2021) and resistance to abiotic stress, insect pests and diseases. Grafting reduces pesticides to manage soil-borne diseases (Bletsos *et al.*, 2003) and salinity (Singh *et al.*, 2024). Turkey berry (*Solanum torvum* Sw.) is resistant to verticillium wilt (Alconero *et al.*, 1988) and bacterial wilt (Yenare *et al.*, 2023) caused by *Ralstonia solanacearum* (Ramesh *et al.*, 2016) and used as rootstock (Bodakonda *et al.*, 2017) for grafting of brinjal. Graft compatibility and success was significantly influenced by scions and rootstocks (Deepa Adiveppa *et al.*, 2024). The survival rate of grafted plants using Turkey berry rootstock was good (Petran and Hoover, 2014). Keeping in view, technology demonstration of location-specific intervention was conducted at farmers fields in most vulnerable district to impart knowledge and provide confidence to cope up with adverse climate conditions.

Materials and Methods

Demonstration on cultivation of grafted brinjal was conducted at Agoor village, Tindivanam Taluk, Villupuram district, Tamil Nadu, India, during November 2020-December 2021. Seeds of Turkey berry (*Solanum torvum* Sw.) were soaked in water for 12, 24 and 36 hours and sown in raised beds and 98 cavity protrays containing well-decomposed cocopeat. Germination started from 15 days and continued up to 30 days. After attaining 2 - 3 leaf stage, Turkey berry seedlings were transplanted in 50 cavity protrays containing well-decomposed cocopeat. After 30 days of Turkey berry sowing, brinjal seeds were sown in 98 cavity protrays.

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The scion from 30 - 35 days old brinjal cultivar PLR 2 was grafted on 55 - 60 days old rootstock, Turkey berry using grafting clips and kept under shade net. After graft union was successful, brinjal grafts cultivar PLR 2 were distributed to farmers. The grafts were transplanted at a spacing of 0.8 m x 0.8 m. After establishment, data on yield, pest and diseases incidence was recorded. The data were subjected to statistical analysis (Panse and Sukhatme, 1985).

The incidence of shoot-borer, fruit-borer and wilt were recorded as %.

Shoot-borer (%) = number of shoot borer affected branches/total number of branches × 100

Fruit-borer (%) = number of fruit-borer infested fruits/total number of fruits × 100

Wilt = number of wilt affected branches/total number of plants × 100

Results and Discussion

The germination of Turkey berry seeds was significantly higher when seeds soaked for 36 hours and sown in protrays followed by sown in raised beds (Table 1). The germination was uniform in protrays. The higher germination recorded in seeds soaked for 36 hours might be due to leaching of germination inhibitors. The crop duration was significantly higher in grafted brinjal compared to seedlings. The grafted brinjal was maintained up to one year. Yield is significantly increased by manures and micronutrients (Jat *et al.*, 2023). The fruit yield was significantly higher in grafted brinjal (6.01 kg / plant and 60.6 t / ha) compared to seedlings (3.12 kg / plant and 30.14 t / ha).

The double yield was recorded in grafted brinjal compared to brinjal seedlings (Sudesh et al., 2021). The higher yield was recorded in grafted brinjal by Quamruzzaman *et al.*, 2018. The gross income was significantly higher in grafted brinjal than seedlings. The net income of ₹.5,41,300/- was recorded higher in grafted brinjal with benefit cost ratio of 2.51 compared to seedlings with benefit cost ratio of 1.34.

Shoot-borer (*Leucinodes orbonalis* Guenee) was less (9.34%) and easily manageable in grafted brinjal. The fruit-borer infestation (11.70%) was lower in grafted brinjal than seedlings (21.55%). Grafting of vegetables is an effective for managing pathogens and pests (Louws *et al.*, 2010). There was no wilt incidence in grafted brinjal while wilt incidence was recorded in seedlings (20.44%). The freshness of brinjal fruits harvested from grafted plants was also good after harvesting.

Conclusion

It is concluded that there is two-fold increase in yield in grafted brinjal over seedlings. The net income of ₹.5,41,300/- was recorded in grafted brinjal. The damage due to shoot-borer and fruit-borer was lower in grafted brinjal. There was no wilt incidence in grafted brinjal.

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Table 1: Germination percentage of Turkey berry seeds in raised beds and protrays

Treatment	Germination (%)
Turkey berry seeds sown in raised beds	-
Turkey berry seeds soaked in water for 12 hours and then sown in raised beds	2.39
Turkey berry seeds soaked in water for 24 hours and then sown in raised beds	35.92
Turkey berry seeds soaked in water for 36 hours and then sown in raised beds	64.78
Turkey berry seeds sown in protrays	-
Turkey berry seeds soaked in water for 12 hours and then sown in protrays	4.15
Turkey berry seeds soaked in water for 24 hours and then sown in protrays	50.23
Turkey berry seeds soaked in water for 36 hours and then sown in protrays	87.77
SEd	1.15
CD (0.05)	2.31

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