

Management of major Insect pests of tomato using multiple resistant Tomato Hybrid Arka Rakshak

Abstract

An attempt was made to demonstrate multiple resistant tomato hybrid Arka Rakshak for resistance against fruit borer and fungal diseases in field. Crop damage caused by tomato borer, whitefly and thrips borer was measured on the basis of damaged fruits, leaves separately. In order to assess the per cent fruit damage, the damaged fruits on five randomly selected tagged plants were counted as against total available fruits on the observed plants. Evaluation of host plant resistance in tomato using multiple resistant tomato hybrid Arka Rakshak for resistance against major insect pests of tomato were conducted during Kharif season of 2015 - 16 in the 10 farmers field at Karumandurai village of Salem district. The pretreatment count of leaf curl infection /plant was ranged from 5.64 to 6.22. The leaf curl infection in plant ranged from 3.22 to 12.92 per cent, 6.86 to 16.32 per cent and 7.82 to 24.62 per cent in vegetative, flowering and fruiting stage respectively. The yield was worked out based on the healthy fruits harvested. The economics of multiple resistant tomato hybrid Arka Rakshak, variety sivam and untreated control were computed on the basis of current labour cost, cost of inputs and average market rate of tomato fruits.

Key words: Arka Rakshak, Tomato Hybrid, Multiple Resistant

Introduction

Tomato, as an important commercial vegetable crop, make the farmers towards a tendency of heavy use of insecticides in an over ambitious approach to knock down the fruit borer *Helicoverpa armigera* (Lepidoptera: Noctuidae) Hubner, a polyphagous destructive pest. Consequently, this notorious pests affect the tomato in shoot and fruits, cause yield loss, unfit for consumption and consumption and marketing and made it as a global problem. In severe cases of infestation, more than 80 per cent fruits get damaged. It causes about 18-55% loss to tomato crop in India and in recent years tomato leaf curl virus (ToLCV) and early blight incidence yield loss has been reported up to 40-50% . Tomato leaf curl virus is the major problem faced by the farmers which leads to major yield reduction[3]. Sujeet Kumar and Ramanjini Gowda (2016) reported that ArkaRakshak moderately resistant to leaf curl disease. The tomato is known for its nutritive value and combined in many different dishes and eaten in different ways as a fresh vegetable or made into soup or sauce. It is a low calorie vegetable, low in fat, has no cholesterol and is an

excellent source of anti-oxidants, dietary fiber, minerals, potassium and vitamins. Eating tomatoes has been promoted as helping to prevent some human diseases (cancer and heart diseases) and improving the immune system response [4-6]. Using insecticides and fungicides is inevitable for the management of insect pest and disease incidence but it causes resurgence, resistance and residue problems in the agroecosystems. In order to dispel the disadvantages due to chemicals, alternative strategies are tried, among which exploring and exploiting host plant resistance in tomato is considered ecologically safe and economically viable. Keeping this in view, an attempt was made to demonstrate multiple resistant tomato hybrid Arka Rakshak for resistance against fruit borer and fungal diseases in field.

Materials and Methods

Evaluation of host plant resistance in tomato using multiple resistant tomato hybrid Arka Rakshak for resistance against major insect pests of tomato were conducted during *Kharif* season of 2015 - 16 in the 10 farmers field at Karumandurai village of Salem district.. Hybrid Arka Rakshak was transplanted in the mainfield with the spacing of 75 cm x 45 cm .The agronomic practices were uniformly followed in all the locations. The fertigation schedule recommended for the tomato by the TamilNadu Agricultural University was followed. The experiment was conducted with 3 treatments and 10 replications. Three treatments *viz.*, multiple resistant tomato hybrid Arka Rakshak, variety sivam and untreated control. Crop damage caused by tomato borer, whitefly and thrips borer was measured on the basis of damaged fruits, leaves separately. In order to assess the per cent fruit damage, the damaged fruits on five randomly selected tagged plants were counted as against total available fruits on the observed plants. The fruit damage was recorded during each harvest and expressed as percentage of damaged fruits to the total fruits harvested. The yield was worked out baed on the healthy fruits harvested. The economics of multiple resistant tomato hybrid Arka Rakshak, variety sivam and untreated control were computed on the basis of current labour cost, cost of inputs and average market rate of tomato fruits.

Results and Discussion

The results on " Management of major Insect pests of tomato using multiple resistant Tomato Hybri Arka Rakshak revealed that pre-treatment count on whitefly/leaf was non-

significant in all treatments including the untreated control and it was ranged from 5.10 to 5.90 whiteflies/leaf. The whitefly infestation in leaf ranged from 2.80 to 8.30, 9.30 to 26.30 and 5.30 to 21.30 in vegetative, flowering and fruiting stage respectively. Among the treatments, T1 multiple resistant tomato hybrid Arka Rakshak recorded less infestation of 17.4 whitefly/leaf followed by T2 recorded 33.4 whitefly/leaf. The pretreatment count of fruit borer was ranged from 4.40 to 4.80 larvae/plant. The fruit borer infestation in fruit ranged from 2.30 to 7.40 and 1.01 to 7.10 in fruiting and ripening stage respectively. Among the treatments, T1 multiple resistant tomato hybrid Arka Rakshak recorded less infestation of 3.31 fruit borer larvae/plant followed by T2 recorded 5.40 larvae/plant. The pretreatment count of leafminer was ranged from 14.90 to 15.10 per cent infestation/plant. The leaf miner infestation in plant ranged from 8.27 to 31.75 per cent, 13.30 to 38.79 per cent and 10.10 to 35.20 per cent in vegetative, flowering and fruiting stage respectively. Among the treatments, T1 multiple resistant tomato hybrid Arka Rakshak 1 recorded less infestation of leaf miner 31.67 per cent followed by T2 recorded 40.46 per cent. The pretreatment count of leaf curl infection /plant was ranged from 5.64 to 6.22. The leaf curl infection in plant ranged from 3.22 to 12.92 per cent, 6.86 to 16.32 per cent and 7.82 to 24.62 per cent in vegetative, flowering and fruiting stage respectively. Among the treatments, T1 multiple resistant tomato hybrid Arka Rakshak recorded less infestation of leaf curl incidence 17.90 per cent followed by T2 recorded 26.56 per cent. Maximum fruit yield 11700 kg/ha with comfortable BC ratio of 2.53 was obtained in T1 multiple resistant tomato hybrid Arka Rakshak followed by T2 Sivam variety with highest BC ratio of 2.39. These results are in corroboration with the findings of Keshavareddy et al (2018) and Sujeet Kumar and Ramanjini Gowda(2016)

Conclusion

Based on the finding of this study, it is concluded that the tomato hybrid Arka Rakshak has multiple levels of resistance to fruit borers and fungal disease.

References

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Table 1. Management of major Insect pests of tomato using multiple resistant Tomato Hybri Arka Rakshak

Treatments	PTC No. of whitefly/leaf	No. of whitefly/leaf				PTC No. of fruit borer/plot	No. of fruit borer/plot				PTC Leaf miner (%)	Leaf miner (%)			
		Vegetative stage	Flowering stage	Fruiting stage	Total		Vegetative stage	Fruiting stage	Ripening stage	Total		Vegetative stage	Flowering stage	Fruiting stage	Total
T1 Arka Rakshak	5.10	2.80	9.30	5.30	17.4	4.50	-	2.30	1.01	3.31	15.10 (13.03)	8.27 (16.63)	13.30 (21.29)	10.10 (18.44)	31.67
T2 <i>Sivam variety</i>	5.90	5.67	17.37	10.30	33.34	4.80	-	3.30	2.10	5.40	14.90 (12.77)	13.56 (21.51)	14.70 (22.44)	12.20 (20.35)	40.46
T3 Untreated control	5.30	8.30	26.30	21.30	55.90	4.40	-	7.40	7.10	14.50	15.05 (12.97)	31.75 (34.18)	38.79 (39.40)	35.20 (36.28)	105.74
CD (5%)	0.040	0.26	0.81	0.78	-	0.019	-	0.25	0.31	-	0.010	1.25	1.47	1.48	-
SE(m)	0.013	0.08	0.26	0.25	-	0.006	-	0.08	0.10	-	0.003	0.40	0.48	0.45	-
SE(d)	0.019	0.12	0.37	0.36	-	0.009	-	0.12	0.14	-	0.004	0.57	0.67	0.64	-
CV%	0.686	4.34	4.25	5.87	-	0.389	-	5.52	8.43	-	0.06	4.79	4.93	5.16	-

Values are mean of eight replication. Values in the paranthesis are arc sine transformed values.

Table 2. Economics of Multiple resistant tomato hybrid against major insect pests of tomato

Treatments	PTC Tomato leaf curl (%)	Tomato leaf curl (%)				Yield (Kg/ha)	B:C Ratio
		Vegetative stage	Flowering stage	Fruiting stage	Total		
T1 Arka Rakshak	5.92 (14.06)	3.22 (10.28)	6.86 (15.08)	7.82 (16.13)	17.9	11700	2.53
T2 <i>Sivam variety</i>	5.64 (13.72)	5.60 (13.62)	8.42 (16.76)	12.54 (20.61)	26.56	11000	2.39
T3 Untreated control	6.22 (14.42)	12.92 (20.97)	16.32 (23.69)	24.62 (29.59)	53.86	8710	2.14
CD (5%)	0.019	0.65	0.66	1.05	-	341.67	-
SE(m)	0.006	0.21	0.21	0.34	-	111.56	-
SE(d)	0.009	0.30	0.30	0.48	-	157.77	-
CV%	0.12	4.05	3.33	4.41	-	3.01	-

Values are mean of eight replication. Values in the paranthesis are arc sine transformed values.