DISEASE INSECT REACTIONS OF SWEET PEPPER UNDER THE FIELD CONDITIONS OF BANGLADESH

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ABSTRACT

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The study was conducted at Bangabandhu Sheikh Mujibur Rahman Agricultural University, Salna, Gazipur-1703, during October, 2000 to March 2001 to find out the resistant source of diseases and insects of sweet pepper under field condition. The incidence of thrips was calculated and grading was done slightly modified on the basis of mean percentage plant infection as highly resistant (o %), resistant (1-5 %), moderately resistant (6-20 %), moderately susceptible (26-50 %) and susceptible (51-100 %). From the field performance study it was evident that the genotypes SP011 was highly resistant whereas, SP002, SP006, SP010 and SP012 were observed to be resistant to Thrips. In case of Mites, none of the genotypes was highly resistant but SP002, SP006, SP007 and SP011 were categorized as resistant. Incidence of yellow leaf curl virus, potato virus-Y and fusarium wilt were not severe and graded as resistant to highly resistant under field conditions. Yield per hectare was the highest (27.00 t) in SP009 followed by SP006 (26.24 t/ha) and it was the lowest in SP002 (5.06 t/ha).

Key words: Resistant sweet pepper, reaction of insect and disease, yield

INTRODUCTION

Sweet pepper (*Capsicum annuum* L.) is one of the most important vegetable crops grown extensively throughout the world especially in the temperate countries (Manchanda and Singh, 1987). The pungency in pepper is due to an alkaloid known as capsaicine and peppers are characterised as sweet, hot or mild depending on capsaicine ($C_{18}H_{27}O_3N$) content. It is rich sources of vitamins A and C (Mac Gillivary, 1961 and Macrae *et al.*, 1993). The green or matured red fruits of sweet pepper are used in cooking of various dishes but common use as raw salads.

In many countries, it seems to be one of the popular green vegetables. But it is not widely cultivated in Bangladesh. In recent years, sweet peppers are found to be cultivated in the farms of different research institute, many government and private farms near Dhaka City. It is also found to be cultivated in pot in city dwellings. Now a days, the demand of sweet pepper is very high in Chinese and big restaurant. The cultivation of sweet pepper seems to be promising in respect of its yield. Unfortunately, very little attempts were taken to cultivate the crop under Bangladesh conditions. But, some farmers grow sporadically to meet the requirements of the foreigners residing in Dhaka (Rashid, 1999). The most important factors that affect its cultivation drastically are the insect and disease problem. It has been reported that sweet pepper is attacked more than a dozen of fungal, two dozens of viral, several bacterial and nematode diseases which cause severe yield loss to the crop throughout the world (Green and Kallow 1994, Martelli and Quacquarelli 1982). For commercial cultivation with profitable yield, it requires to develop insect and disease resistant variety. Considering the severe problem of disease and insect, the present field performance study was done to find out the insect pest and disease reactions and yield of 12 open pollinated sweet pepper accessions under Bangladesh conditions.

MATERIALS AND METHODS

The experiment was carried out at the research farm of the Bangabandhu Sheikh Mujibur Rahman Agricultural University, Salna, Gazipur, Bangladesh during October, 2000 to March 2001. Seeds of sweet pepper were kept in cool room at 4^0C temperature for about four and half months, so, after taking out from the cool room, the seeds were kept for 3-4 hours at normal air temperature in the laboratory. To minimize Tobamoviruses (TMV. ToMV and PMMV) seed infection, seeds were soaked in a 10% (w/v) solution of Trisodium Phosphate (TSP) for 30 minutes and transferred them to a fresh solution of 10% TSP for two hours and rinsed in running water for 45 minutes. They were then soaked in water for 24 hours in order to facilitate germination. Sowing medium on plastic tray was autoclaved at 120^0C for 2 hours and then cooled to the normal temperature by spreading the soil on the surface of the concrete floor. Each tray was then covered with one layer of newspaper and watered with a fine meshed sprinkler once in a day until emergence. Ten days after sowing when the seedling attained 3 leaf stage, they were transferred to the polybag each 12.75 X 10.15 cm size and filled with potting media comprising soil, composed and sand at the ratio of 3:1:1. The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. The unit plot size was 5.0 X 1.0 m and the plants were spaced 50 X 50 cm and block to block distance was 1.0 X 0.5-m. Forty five day old healthy seedlings were transplanted in the experimental plots on 26 December

2000. Manures and fertilizers were applied as recommended for chili. Intercultural operation was done as and when required. The data pertaining to the following characters were recorded from randomly selected 5 plants from each plot. The incidence of thrips was calculated and grading was done slightly modified on the basis of mean percentage plant infection as described by Kudagamage (1977) as followed:

Grade	Percentage
Highly Resistant (HR)	0
Resistant (R)	1-5
Moderately Resistant (MR)	6-20
Moderately susceptible (MS)	21-50
Susceptible (S)	51-100

Scoring scale of TYLCV of tomato was done with the scale (Anon. 1998) such as 0= No infection = HR; 1 = 1-25 % plant infection = R; 2 = 26-50 % plant infection = MR; 3 = 51-75 % plant infection = MS; 4 = 76-100 % plant infection = S; 5 = 76-100 % plant infection but mild infection = HS. and (S) = Susceptible: 76-100 % infection, but mild to moderate symptoms.

The incidence of PVY was recorded as 0-4 scoring scale as 0 = No infection = HR; 1 = 1-25% infection = R; 2 = 26-50% infection = MR; 3 = 51-75% infection = MS; and 4 = 76-100% infection = S.
Fusarium wilt of tomato, a devastating disease was recorded on 0-3 scale such as 0 = No infection = R; 1 = Leaf yellowing = MR; 2 = Leaf yellowing and plant wilting = MS; and 3 = Plant death = S.

RESULTS AND DISCUSSION

The results of the performance of 12 pepper genotypes under the field conditions as to the insect and disease reaction during fruiting stage on 15 February 2001 against Thrips (*Thrips palmi* Karny), sweet pepper mites (*Polyphagotarsonemus latus* Banks) and Aphids (*Aphis gossypii* Glover) were presented in Table 1.

The field screening was done following 0-7 scale (Anonymous 2001). The result of the study reveled that there had the variability among the lines in respect of Thrips and Mites infestation. The genotypes SP011 was found to be highly resistant to Thrips whereas, SP002, SP006, SP010 and SP012 were observed to be resistant. On the other hand, four genotypes namely SP004, SP007, SP008 and SP009 were moderately resistant. SP001 and SP005 were considered susceptible and SP003, the highly susceptible genotype.

Distinct differences were exhibited among the germplasms as per as the sweet pepper mites were concerned. The result showed that none of the genotytpes was highly resistant but four out of 12 lines were scored to be ranged from 0.33-1.00 and categorized as resistant. Contrary to this, fifty per cent germplasms which included SP003, SP005, SP008, SP009, SP010 and SP012 were moderately resistant. Only SP001 and SP004 were susceptible entries among the 12 as evident from mite's incidence scoring (0-7 scale). At the time of scoring, when Aphid infestation was concerned, the genotypes under study were found to be free from infestation.

The highest incidence was recorded in SP008 (5%) followed by SP002 and SP005. Among the genotypes, 9 were found highly resistant (HR) and 3 resistant to Yellow Leaf Curl Virus. In case of Potato Virus-Y, 9 genotypes showed to be highly resistant, and the rest three were found to be resistant. Among the tested lines, eight were found free from fusarium wilt and graded as highly resistant (HR) and four genotypes graded as resistant (R).

Table 1. Field screening of 12 sweet pepper genotypes against Thrips and Mites (0-7 scale)

Genotype	Thrips incidence	Reaction	Mites incidence	Reaction
SPOO1	5.67	MR	5.67	S
SPOO2	0.33	R	0.33	R
SPOO3	7.00	MR	3.00	MR
SPOO4	4.33	R	5.67	S
SPOO5	5.67	MR	2.33	MR
SPOO6	0.33	R	1.00	R
SPOO7	3.67	R	0.67	R
SPOO8	3.00	R	1.67	MR
SPOO9	4.33	R	1.67	MR
SPO10	0.33	R	2.33	MR
SPO11	0.00	HR	1.00	R
SPO12	0.67	R	1.67	MR

HR= Highly resistant, R= Resistant, MR= Moderately resistant, S= Susceptible and HS= Highly susceptible.

Table. 2. Incidence of Yellow leaf curl virus, Potato virus–Y, and Fusarium wilt in 12 sweet pepper genotypes under the field conditions.

Genotype	Yellow Leaf Curl Virus		Potato Virus-Y		Fusarium Wilt	
	Incidence (%)	Disease reaction	Incidence (%)	Disease reaction	Incidence (%)	Disease reaction
SPOO1	0.00	HR	1.65	R	1.65	R
SPOO2	1.65	R	0.00	HR	0.00	HR
SPOO3	0.00	HR	1.65	R	0.00	HR
SPOO4	0.00	HR	0.00	HR	3.35	R
SPOO5	1.65	R	0.00	HR	1.65	R
SPOO6	0.00	HR	0.00	HR	0.00	HR
SPOO7	0.00	HR	0.00	HR	0.00	HR
SPOO8	5.00	R	0.00	HR	0.00	HR
SPOO9	0.00	HR	5.00	R	0.00	HR
SPO10	0.00	HR	0.00	HR	0.00	HR
SPO11	0.00	HR	0.00	HR	0.00	HR
SPO12	0.00	HR	0.00	HR	1.65	R

The yield (t/ha) of the germplasm varied from 5.06 t/ha to 27.00 t/ha. The highest yield was produced SP009 (27.00 t/ha) followed by SP006 and SP008 and the lowest yield was produced SP002 (5.06 t/ha) followed by SP004, SP012 and SP001. Hernandez (1995) observed *Capsicum annuum* yield (t/ha) to be ranged from 0.27 to 6.28 ton but Hegde (1988) found sweet pepper yield varied from 12.63 t/ha to 15.39 t/ha at different moisture levels and 7.75 t/ha to 18.02 t/ha at different nitrogen level in India.

Table. 3. Individual fruit weight and number of fruit/plant, yield/plant and per plot of 12 sweet pepper genotypes when grown in the field.

Genotype	Yield (t/ha)
SPOO1	8.28
SPOO2	5.06
SPOO3	15.40
SPOO4	5.70
SPOO5	12.34
SPOO6	26.24
SPOO7	20.46
SPOO8	22.02
SPOO9	27.00
SPO10	19.70
SPO11	17.32
SPO12	8.90
Level of significance	**
CV%	10.46

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