
Studies on some aspects of wilt disease of guava (*Psidium guajava* L.)

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Single inoculum treatment revealed that wilting started after five months in case of F_3 and F_1 , while after one month with FO_p and M_p with least percentage which later increased gradually. Disease development on two cultivars (AS and L-49) of guava in three sets of experiment revealed that wilting started after six months and no wilting was observed till four months except 8% and 12% wilting with L-49 and AS cultivars with $F_3 + M_p$ set after one and two months respectively. There was variation in wilting incidence in three cultivars (AS, AC, CH) of guava seedlings in host specificity study.

Key words : Guava, wilt disease

INTRODUCTION

Guava - the people of the poors, being grown commercially as a cash plantation crop, is rich in nutritive value, vitamins and minerals. Leaves are used in tanning in sole and heavy leather tannage, flowers are used for cure of bronchitis and eye sores. Thus economically and medicinally guava plantation is of much significance but plantation suffers from destructive wilt disease since long (Das Gupta and Rai, 1947; Prasad *et al.*, 1952; Tandon, 1961; Pandey and Dwivedi, 1985). Dwivedi *et al.* (1988) have reported this disease as syndrome where fusaria were dominant. These pathogens affect the guava plantation crop at different stages. Keeping this in view the present paper aims to study the effect of age of plants in disease development, host specificity and improve guava clones for disease resistance.

MATERIALS AND METHODS

The experiment was performed in pot and conducted in two parts as under :

1. Effect of age on disease development and improve guava clones for disease resistance.
 2. Host specificity study.
1. The experiment number 1 was performed in two phases as follows : The young guava seedlings (cv Allahabad Safeda) transplantation in soil with

(a) Single inoculum [amendment] and (b) Mixed inoculum [amendment].

For the above amendments, *Fusarium solani* (F_s), *F. longipes* (F_l), *F. oxysporum* f. sp. *psidii* (F_op) and *Macrophomina phaseolina* (M_p) were selected as the test pathogens.

For single inoculum, [amendment] garden soil was fumigated with 4% formaldehyde for 10 days by covering thick gunny bag. After 3 weeks, the soil was distributed in earthen pots at the rate of 2 kg per pot [for each set of experiment]. Replicate of five was prepared for treatment and control. Fungal inoculum, 0.2% (w/w), of each pathogen (grown on sterilized oat grains) was mixed with the soil separately. Control pots were left without inoculum. Seedling of different ages were transplanted to these pots in the following manner : Set no. 1 (2 months old) Set no. 2 (5 months old) Set no. 3 (8 months old).

Seedlings (already raised in sterilized soil of cv Allahabad Safeda (4 months old) transplanted in each pot containing fungal inoculum-amended soil and control soil. Pots, watered with equal volume of distilled water to maintain the moisture content, were kept in a green house and incidence of wilt was recorded monthly for five months. After the incubation period, partially or completely wilted seedlings were taken out from the pots and bits (1 cm) of infected parts were inoculated on Czapek-Dox agar plates. Isolated organisms were compared with the original cultures of individual ones.

For mixed inoculum the fungal inocula of the pathogens were mixed in the following manner :

Set 1 *Fusarium solani* (F_s) + *F. oxysporum* f. sp. *psidii* (F_op) + *F. longipes* (F_l).

Set 2 *Fusarium solani* (F_s) + *Macrophomina phaseolina* (M_p).

Set 3 *Fusarium oxysporum* f. sp. *psidii* (F_op) + *Macrophomina phaseolina* (M_p)

The mixture of inocula in the above sets was added to sterilized soil at the rate of 0.2% (w/w) in each pot. Young guava seedlings of cvs Allahabad Safeda (AS) and Lucknow-49 (L-49) (raised in sterilized soil) of different age groups (1, 2, 4 and 6 months) were transplanted in each set, keeping five replicate pots. Pots were watered regularly with equal quantity of distilled water to maintain identical moisture level in the pot soil. Control set was maintained without adding fungal inocula. Wilting incidence of guava seedlings was recorded after isolating the pathogens on Czapek-Dox agar plates by transferring bits and sections of wilted parts.

Another experiment was performed to study host specificity range with different guava cultivars and wilt pathogens separately following Koch's postulates. The test pathogens selected were *Fusarium solani*, *F. longipes*, *F. oxysporum* f. sp. *psidii* and *Macrophomina phaseolina*. The seeds of three guava cultivars (Allahabad Safeda - AS, Apple Colour - AC and China - CH) were selected. The seedlings were raised on sterilized pot soil in green house from seeds surface sterilized with 0.1% HgCl₂ solution for 5 min. Fungal inoculum [0.2% (w/w)] of each pathogen prepared on sterilized oat grains was mixed thoroughly with sterilized soil in earthen pots. A set of five pots for each pathogen and five for control (without inoculum) was maintained. Seedlings (6 months old) were transplanted to each pot containing fungus inoculated soil and control soil. Pots were watered regularly to maintain identical moisture level of pot soil. The incidence of wilt

was recorded after three months.

RESULTS AND DISCUSSION

Results of wilt incidence in seedling after different time intervals have been presented in Tables 1-3. Maximum (76%) wilting was observed with *F. oxy. f. sp. psidii* followed by 64%, 60% and 36% with *F. solani*, *Macrophomina phaseolina* and *F. longipes* respectively after 8 months. No wilting was recorded after one month interval with *F. solani* and *F. longipes* (Table 1)

Table 1. Wilt disease incidence in guava seedlings after different time intervals

Test pathogen	Wilt incidence after interval of		
	1 month	5 month	8 month
<i>Fusarium solani</i> (F _s)	-	40*(10)	64 (16)
<i>F. longipes</i> (F _l)	-	20 (05)	36 (09)
<i>F. oxy. f. sp. psidii</i> (F _o p)	12 (03)	36 (09)	76 (19)
<i>Macrophomina phaseolina</i> (M _p)	8 (02)	40 (10)	60 (15)
Control	-	-	-

*Mean of five replicates

Values in parentheses corresponds number of wilted seedlings (average of 25)

Table 2. Effect of mixed inoculum density of different pathogens on two cultivars of guava (AS and L-49) at different time intervals

Treatment of pathogen) Combination	Wilt incidence (%)			
	Time interval (month)			
	1	2	4	6
F _s + F _l + F _o p	AS -	-	-	52*
	L-49 -	-	-	60
F _s + M _p	AS -	12	-	64
	L-49 8	-	-	72
F _o p + M _p	AS -	-	-	60
	L-49 -	-	76	-
Control	AS -	-	-	-
	L-49 -	-	-	-

*Mean of five replicates

F_s = *F. solani*, F_op = *F. oxy. f. sp. psidii*, M_p = *M. phaseolina*

Table 3. Wilt incidence in guava seedlings of different cultivars (AS = Allahabad Safeda, AC = Apple Colour, CH = China)

Test pathogens	Percent wilt incidence		
	Cultivars		
	AS	AC	CH
<i>Fusarium solani</i>	80*	52	—
<i>F. longipes</i>	60	40	12
<i>F. oxy. f. sp. psidii</i>	88	60	20
<i>Macrophomina phaseolina</i>	68	08	—
Control	—	—	—

* Mean of replicate of five

Guava clones of two cultivars (AS and L-49) showed different levels of susceptibility against wilt disease by various pathogens depending on age of the seedlings. The result further showed that wilting takes place after 6 months. Maximum (76%) wilting was recorded after 6 months in set 3 with $F_{op} + M_p$ in L-49 cultivar combination followed by 72% and 60% with $F_s + M_p$ and $F_s + F_1 + F_{op}$ set respectively. No wilting was observed after 4 months except in combination of F_s and M_p with L-49 (8%) and AS cvs (12%) after 1 and 2 months respectively.

Study on host specificity revealed variation in the percentage of wilting in seedlings of different guava cultivars with different test pathogens compared to control where the seedlings were healthy. In China (CH) cultivar wilting was observed with F_s and M_p , while 12% and 20% wilting was observed with F_1 and F_{op} pathogens respectively (Table 3). In seedlings of cv Apple colour (AC), maximum (60%) wilting was with F_{op} followed by F_s (52%), F_1 (40%) and M_p (8%). In case of seedlings of AS, maximum (88%) wilting was observed with F_{op} followed by F_s (80%), M_p (68%) and F_1 (60%).

Observations on isolation and pathogenicity test with young guava seedlings in the present study, are in conformity with the findings of Das Gupta and Rai (1947), Chattopadhyay and Sengupta (1955), Chattopadhyay and Bhattacharjya (1968a), Pandey and Dwivedi (1985). Age of plants seems to play a role in disease development. In West Bengal, *Fusarium solani* and *Macrophomina phaseolina* are more prevalent in plants of less than one year old age and both are capable of inciting wilt either individually or in combination (Chattopadhyay and Bhattacharjya, 1968b). Susceptibility of guava cultivars to wilt pathogen depends on nature of the cultivar. The results on host specificity lead to the conclusion that seedlings of each guava cultivar were affected by different pathogens at different levels which suggest that it is not necessary that a particular pathogen causing wilt in a particular cultivar will cause the disease in other cultivar. It may be due to certain factors including edaphic, environmental as well as susceptibility of the seedlings of different guava cultivars towards infection by the pathogen.

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