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CURRENT SCENARIO OF GUAVA WILT IN HARYANA

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ABSTRACT
Guava (*Psidium guajava* L.) is cultivated in neglected soils because of its hardiness, but guava wilt is proving major bottleneck. Therefore, keeping its seriousness; soil samples collected from 20 districts orchards of Haryana during 2011-15 from rhizoplane for identification of pathogen(s), estimation of nematode(s) population per 200cc soil and soil status analysis. Guava wilt incidence of 0-12% was observed. There was no wilt incidence in Jhajjar, Mewat and Kurukshetra, but it was noticed maximum in Rewari (12%) and Sonipat (10%). There was no wilt incidence upto 5 years old plants but with increase in plant age there was significant enhance in disease incidence. There was range of deficit to sufficient nutrients but in infected plant it was deficit (< 10 P kg/ha, < 300 K kg/ha and < 0.30% organic carbon < 250 kg/ha) of nutrients. Allahabad Safeda (6.3%) was found more affected by wilt as compared to other cultivars Banarsi Surkha (4.5%) and L-49 (2.0%). *Fusarium oxysporum* and *Fusarium solani* were found associated with wilted plants. Root knot nematode, *Meloidogyne* spp has frequency of occurrence of 18.3% and population ranging from 42 to 312 larvae/200cc soil. There was no incidence of *Meloidogyne* spp in Jind Jhajjar and Rohtak in gauva wilt infested soil.

INTRODUCTION

Guava (*Psidium guajava* L.) is an important subtropical fruit crop in most of the states because of its hardiness. It is successfully cultivated in neglected soils and but adversely affected by biotic and abiotic stresses. Wilt is the most destructive disease of guava and causes 5–60 per cent production loss in India (Misra, 2006). In general, losses due to wilt in guava around Lucknow area varies from 5-60 per cent (Misra and Shukla, 2002, Gupta *et al*. 2010). Being soil-borne in nature and it is difficult to manage. The affected plants symptom conspicuous with yellow coloration accompanied with slight leaf drooping and curling at the terminal branches, ultimately drying and premature shedding of leaves take place. Twigs become bare and fail to bring forth new leaves or flowers. During September- October, complete wilting of plants is seen with almost dried leaves and small dried black fruits hanging on the branch. Fruits of all the affected branches remain underdeveloped, become hard, black and stony. The entire plant becomes defoliated and eventually dies. It was recorded that out of total wilting plants, around 17 per cent plants, which initially show some symptoms of wilting, ultimately escape/resist wilting (Misra and Pandey, 2000). The finer roots show black streaks, which become prominent on removing the bark (Das Gupta and Rai, 1947). The roots also show rotting at the basal region and the bark is easily detachable from the cortex. The cortical regions of the stem and root show distinct discoloration and damage. Light brown discoloration is noticed in vascular tissues. Wilted plants later shows bark splitting. The pathogen attacks young as well as old fruit bearing trees but older trees are more prone to the disease (Misra and Shukla, 2002). Keeping in view the significance of the disease in an important fruit crop in Haryana, for mapping surveys were conducted in order to know the status of guava wilt and further chalk out strategy of management at farmer's orchards to mitigate the disease through edaphic factors.

MATERIALS AND METHODS

For mapping guava wilt incidence, requisite soil samples (500g) were obtained from feeder root zone of guava wilt infested plants of 94 orchards from 20 districts of Haryana having orchards size of 1-20 acre with age of 4-25 years. Collected soil samples were subjected for isolation and identification of associated plant pathogens through Koch postulate and nematodes through Cobb standard procedure, estimation of soil nutrition K(potassium) by flame photometer, P(phosphorus) by using Olsen's method, pH by electrometric method, Ec (electrical conductivity) by digital conductivity meter and organic carbon were also analyzed through UV spectrophotometer method (Anonymous, 2009). Disease incidence was calculated on basis of per cent infected plants by taking into account of observed orchards (Misra and Shukla, 2002).

On soil samples analysis, pathogens were isolated from 94 samples and were raised on potato dextrose agar medium. Isolated pathogens were multiplied on sorghum grains and inoculated in feeder root zone @ 20g/plant on 2 years old seedling of Allahabad Safeda raised in triplicate pots for approval of Koch postulates through infected stem hole inoculation technique (Mishra, 2006) and to find the wilted associated pathogens in plants through soil samples analysis.

RESULTS AND DISCUSSION

For assessing the guava wilt incidence and its mapping in 20

Table 1: Guava wilt incidence in different district of Haryana

District	Cultivar	Guava wilt incidence (%)	Age(years)
Bhiwani	Allahabad Safeda	5	15
	Allahabad Safeda	2	6
	L-49	2	12
Mahendergarh	L-49	2	14
Rewari	Allahabad Safeda	12	16
Jhajjar	L-49	0	8
Rohtak	Allahabad Safeda	2	10
Gurgaon	Allahabad Safeda	8	20
	Allahabad Safeda	2	10
	L-49	2	12
Palwal	Allahabad Safeda	5	20
	Allahabad Safeda	2	10
Faridabad	Allahabad Safeda	5	25
Mewat	Allahabad Safeda	0	25
Karnal	Allahabad Safeda	5	25
	L-49	2	12
Kurukshetra	Allahabad Safeda	6	12
	L-49	0	8
Kaithal	L-49	2	14
Yamunanagar	L-49	2	15
	Allahabad Safeda	6	15
Panipat	L-49	3	15
	Allahabad Safeda	6	13
Sonipat	Allahabad Safeda	10	16
	Allahabad Safeda	3	6
Hisar	Allahabad safeda	7	20
	L-49	2	16
Jind	Allahabad Safeda	4	15
	L-49	1	14
Sirsa	Allahabad Safeda	5	18
	Banarsi Surkha	4.5	
Fatehabad	Allahabad Safeda	6	15
Ambala	Allahabad Safeda	5	15
	Allahabad Safeda	2	6
	L-49	2	12

Table 2: Effect of plant age on guava wilt incidence status

Guava plant age (years)	Guava wilt incidence (%)
2-5	0.0
5-10	2.0
10-15	3.2
>15	5.7
CD(P=0.05)	0.9

Table 3: Reaction of different cultivar to guava wilt

Cultivar	Guava wilt incidence (%)
Allahabad Safeda	6.3
Banarsi Surkha	4.5
L-49	2.0
CD (P=0.05%)	1.7

districts of Haryana, there was incidence of 0-12% guava wilt on basis of 94 orchards survey and soil sampling. In present case soil samples analysis out of 94 isolates, 57 isolates of *Fusarium oxysporum* and *Fusarium solani* were able to cause wilting plants of Allahabad Safeda, but there was uncertainity over pathogenicity and Koch postulates approval, however, Gupta *et.al*.2010 were able to produce the wilting symptoms thereby get positive support from the present study that *Fusarium oxysporum* and *Fusarium solani* are the main pathogens responsible for the wilt disease of guava in India. There was no wilt incidence in Jhajjar, Mewat and Kurukshetra on account of management of pathogen by respondent orchard owner through carbendazim application in March, June, September and December (15g/plant) as suggested by Suhag and Khera,1986 which also corroborate the present finding and study of Misra and Pandey (1999) reported that though different fungicides viz. Bavistin, Topsin M, Indofil M-45, Thiram, Blitox check the various wilt pathogens with profuse spore mass production in the soil, once the effect of these fungicides diminishes pathogens increase its aggressiveness.

On analysis of soil nutrition including P, K,N and organic carbon, apart from Ec and pH there was availability of 6-27 P kg/ha, 142- 422 K kg/ha,<250 N Kg/ha and 0.15-0.60% organic carbon (Table 3), whereas pH was 7.0-9.0 and Ec 0.09-0.58dsm^{-1}. There was range of deficit to sufficient nutrients but in infected plant it was deficit (<10 P kg/ha, <300 K kg/ha, <250Kg/ha and <0.30% organic carbon). Similar observations were made by Suhag and Khera (1986) and Suman *et al*. 2013. They advocated that spread of wilt could be checked by judicious amendments of N and Zn, and which confirms the present study.

Table 4: Soil status of guava wilt infested orchards

Organic carbon (%)	pH	Ec (dSm^{-1})	P(kg/ha)	K(kg/ha)	N(Kg/ha)
0.15-0.6	7.0-9.0	0.09-0.58	6-27	142-422	<250

Table 5: Status of nematode infestation on soil sample analysis

District	Per cent *Meloidogyne* spp. infestation	District	Per cent *Meloidogyne* spp. infestation
Ambala	60	Kurukshetra	20
Faridabad	75	Mewat	50
Hisar	50	Panipat	60
Jhajjar	0	Rohtak	0
Jind	0	Sirsa	60
Kaithal	75	Sonipat	50
Karnal	33	Yamuna nagar	75

Therefore, abiotic stress condition judicious, balance and timely applications of soil nutrition in feeder root zone including N@1.5Kg/plant, P@ 1.25kg/plant and K@500g/plant per year by respondent orchard'owner and agronomic practices especially timely irrigation during fruit setting and development stage, and weed management through cultural operations, well drained soil or no water stagnation since feeder root are sensitive to anaerobic condition as there was no wilt incidence in Jhajjar, Mewat and Kurukshetra. In contrary to it, maximum disease incidence was noticed in Rewari (12%) and Sonipat (10%) because of not adopting proper production and protection practices (Table 1). There was no wilt incidence upto 5 years old plants but with increase in plant age there was significant acceleration in disease incidence (Table-2).

Allahabad Safeda (6.3%) was found more affected by wilt as compared to other cultivars Banarsi Surkha (4.5%) and L-49(2.0%). Misra (1999) reported the relative field tolerance of 20 guava cultivars and categorized them into different groups on the basis of their natural susceptibility. The cultivars Allahabad Safeda, Florida Seedling, Guinees, Hafsi, Karela, Mirzapuri Seedling, Nasik, Pear Shaped, Sindh, Superior and White Fleshed proved highly susceptible; Behat Coconut and Pourtgal as susceptible; Apple Colour, Chittidar, Seedless and Spear Acid, Superior Sour Lucidium, Red Flesh and Smooth Green as tolerant. Misra *et al*. (2003) identified F_1 population of *Psidium molle* × *Psidium guajava* free from wilt when grown in wilt sick plot which get also positive support from present study that relative genetic variation of cultivars towards resistance and susceptibility to pathogens.

On soil samples analysis, root knot nematode *Meloidogyne* spp having frequency of occurrence of 18.3% and population ranging from 42 to 312 larvae/200cc soil while *Pratylenchus* spp were found infested with population ranging from 100 to 200 larvae/200cc soil and frequency of occurrence of 18.3% besides several other plant parasitic nematodes. There was no incidence of disease in Jind Jhajjar and Rohtak because of timely carbofuran (13g/m^2) application in spring season (Table-4) which also get confirmation from Gomes *et al*.2013 reported that root exudates from guava seedlings help in parasitization of *Meloidogyne enterolobii* and *Fusarium solani* and ultimately affect growth and development that leads to guava decline but timely carbofuran application check *Meloidogyne* spp and *Pratylenchus* spp larval population..

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