

# Screening of Citrus Varieties Against Citrus Canker (*Xanthomonas campestris* pv. *citri*) Under Rainfed Climate of Pothwar

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## ABSTRACT

Screening of 15 citrus varieties against citrus canker (*Xanthomonas campestris* pv. *citri*) was carried out under rainfed climate during 1994 and 1995 at Barani Agricultural Research Institute, Chakwal. The studies concluded that trend of canker incidence was similar towards leaves, branches and fruits of 11 varieties. Hybrid (Pine apple x Musambi), Musambi, Kinnow and Pearl had less incidence trend towards fruits. It was found that Hybrid, Palestine lime, Early navel and Pine apple (containing > 40% diseased leaves) are susceptible to canker. Feutrell's early, Kinnow, Orlando and Musambi (having > 20% < 40% diseased leaves) are moderately susceptible. Fremont, Wilking, Honey, Jaffa, Pearl and Blood Red (showing > 5 < 20% diseased leaves) are moderately resistant while Fairchild, with < 5% diseased leaves, is resistant variety.

**Key Words:** Citrus varieties; Citrus canker; Lesion; Leaf; Branch; Fruit

## INTRODUCTION

Citrus canker, caused by bacteria, is one of the major diseases. It is widely distributed throughout the growing countries of the world (Knorr *et al.*, 1957). It occurs commonly in citrus growing area of Punjab (Hafiz & Sattar, 1952). Canker has its own conspicuous importance which may affect the plant health and fruit development adversely. Fluctuation of disease correlates with rainfall and temperature (Graham *et al.*, 1989). It can be a serious disease if frequent rainfall occurs during shoot emergence and early fruit development (Saleem & Tariq, 1992).

Canker attacks leaves, twigs, young branches and fruits commonly (Knorr *et al.*, 1957). Leaves on 30 cm apical portion of branch are highly susceptible (Awan *et al.*, 1992). Intensity of infection varies with the species and varieties (Falico-de-Alcaraz, 1986).

Different citrus varieties are under study in Pothwar climate of the Punjab for commercial cultivation. To screen out citrus varieties, various aspects of its production have been studied. This study is also a part of previous research work to screen out citrus varieties against canker disease.

## MATERIALS AND METHODS

The experiment was conducted to screen out citrus varieties, grafted on rough lemon, against canker disease at Barani Agricultural Research Institute, Chakwal

during 1994 and 1995. During the study rainfall occurred 575 mm per annum while 58% of total rainfall was received during July to September and mean temperatures of these periods of both years ranged from 22.46 to 34.36°C with 79% relative humidity. Experiment was laid out according to RCB design having five replications with one plant per replication. Four branches, taking one branch from each side of plant, were selected randomly and the following parameters were observed on 30 cm apical part of branch during September in both years.

- Diseased leaves x 100
1. Diseased leaves (%) =  $\frac{\text{Diseased leaves}}{\text{Total leaves}} \times 100$
- Total lesions on leaves
2. No. of Lesions per Leaf =  $\frac{\text{Total lesions on leaves}}{\text{Total leaves}}$
- Diseased branches x 100
3. Diseased Branches (%) =  $\frac{\text{Diseased branches}}{\text{Total branches}} \times 100$
- Diseased fruits x 100
4. Diseased Fruits (%) =  $\frac{\text{Diseased fruits}}{\text{Total fruits}} \times 100$

Varieties were categorized into following four groups on the basis of diseased leaves (%).

1. Resistant =  $\leq 5$
2. Moderately resistant =  $> 5 \leq 20$
3. Moderately susceptible =  $> 20 \leq 40$
4. Susceptible =  $> 40$

## RESULTS AND DISCUSSION

It is evident from the Table I that trend of canker incidence on different parts of plant varied with varieties. Eleven varieties have same trend of canker incidence towards their leaves, branches and fruits. Other four varieties viz: Hybrid (Pine apple x Musambi), Musambi, Pearl and Kinnow depicted less disease incidence on fruits.

**Table I. Disease incidence on leaves, branches and fruits**

Varieties	Leaves (%)	Lesion per leaf	Branches (%)	Fruits (%)
Hybrid (S.orange)	97.01a	6.11a	100a	37.08f
Early navel(-do-)	46.12c	2.24b	80d	94.23a
Pine apple (-do-)	40.18d	2.35b	90c	69.31b
Musambi (-do-)	27.88f	1.39d	65f	22.05h
Jaffa (-do-)	16.22g	1.30d	65f	23.05h
Blood Red (-do-)	18.38g	1.51cd	75e	26.07g
Orlando (Tangelo)	31.29e	2.28b	95b	62.02c
Pearl (-do-)	16.31g	1.35d	80d	1.41i
Palestine(S.lime)	66.18b	6.22a	100a	59.00d
Kinnow (Mandarin)	33.26e	2.07bc	75e	4.16k
Honey (-do-)	10.59h	1.39d	55h	16.58i
Wilking (-do-)	8.34hi	0.58e	60g	16.12i
Fremont (-do-)	7.17i	0.56e	45i	17.14i
Fairchild (-do-)	2.13j	0.28e	25j	12.11j
Feutrell's (-do-)	34.33e	1.59cd	95b	44.14e
LSD value	3.193	0.613	2.92	1.162

As regard diseased leaves, canker affected the highest number of leaves of Hybrid (97.01%). Palestine lime, Early navel and Pine apple showed 66.18, 46.12 and 40.18% diseased leaves, respectively. Orlando, Kinnow and Feutrell's early, having 31.29 to 34.33% diseased leaves, were at par statistically with each other. Musambi contained 27.88% diseased leaves. While canker affected from 16.22 to 18.38% leaves of Jaffa, Pearl and Blood red. Fairchild declared a least affected variety possessing 2.13% diseased leaves only. Fremont and Wilking have more diseased leaves than Fairchild but lesser than other varieties. Wilking has also non significant difference with Honey.

As regard lesions per leaf, it was found highest in hybrid and palestine lime which contained more than 6 lesions per leaf. Kinnow, Early Navel, Orlando and Pine apple showing from 2.07 to 2.35 lesions did not differed significantly with each other. Fairchild, Fremont and Wilking showed lowest number of lesions per leaf i.e. less than 0.6. Disease attacked 100% branches of hybrid and Palestine lime, followed by Orlando, Feutrell's early having 95% affected branches. Disease affected 55 to

80% branches of Honey, Wilking, Jaffa, Musambi, Blood red, Kinnow, Pearl, Early navel. Fairchild was at bottom with 25% affected branches, followed by Fremont (45%).

In case of fruits, Early navel was at top with 94.23% affected fruits followed by Pine apple (69.31%), Orlando (62.02%) and Palestine lime (59%), Feutrell's early (44.68%), Hybrid (37.41%), Blood red (26.07%). All differed significantly with each other. Musambi and Jaffa contained 22.05 to 23.05% diseased fruits. Incidence of canker did not show significant difference on Wilking, Honey and Fremont which have 16.58 to 17.14% diseased fruits. Lowest affected fruits (1.41%) was found in Pearl, followed by Kinnow and Fairchild in ascending order.

This study is correlated with previous report (Falico-de-Alcaraz, 1986), that infection varies with the species and varieties. It is obvious in this study that Fairchild, Fremont and Wilking are least affected varieties. Similar results were reported in study of Leite - Junior *et al.*, (1987) and Arif *et al.*, (1962-64). Chowdhary (1951) mentioned that canker affects Washington navel orange severely. Similar results were found in our findings that sweet oranges are severely affected.

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