



Original Research Article

Status of Diseases in Sweet Orange and Acid Lime Orchards in Andhra Pradesh, India

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ABSTRACT

Keywords

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Citrus is considered as one of the most important tropical fruit crop in India. It plays a vital role in the fruit economy of the country next to mango. Citrus cultivation in India is facing plethora of production constraints viz., non-availability of disease free planting material, bud wood transmissible diseases, general neglect, scarcity of water and poor management practices, cultivation in unsuitable soils. Beside this, *Citrus* spp. are prone to attack by more than 150 diseases and disorders caused by fungal, viral and few bacterial pathogens right from nursery level to bearing stage resulting in considerable yield losses. In the present study survey was conducted for five consecutive years i.e from 2008-2012 to observe incidence of diseases caused by fungal, bacterial and viral pathogens and micronutrient deficiencies viz., Fe, Mn and Zn in six different major sweet orange and acid lime growing districts of Andhra Pradesh (AP) viz., Anantapur, Chittoor, Mehaboob Nagar, Nalgonda, Prakasam and West Godavari districts. Diseases of sweet orange and acid lime with their incidence (%) and severity (PDI) were recorded. In sweet orange, the higher incidence viz., citrus yellow mosaic (7.36% – 38.18%) followed by citrus greening (9.96-35.71 PDI), Dry root rot (3.75-15.27%) and bud joint rot (2-10%) were observed across the six districts. Incidence of scab (3.2-16.35 PDI), twig blight (9.92-13.6%), were also observed along with Zinc (20.87-50.17%) and Magnesium (20.1-29.13%) deficiency. In case of acid lime bacterial canker (100%), bark eruption (10.67-20.86%), citrus greening (13.7-21.18%), root rot (6.13-18.18%), twig blight (10.25-21.88 PDI) and longitudinal bark and wood disease (3.8-6.88%) were the major diseases. Iron deficiency (5.98-10.67%) was also observed in most of the young orchards.

Introduction

Citrus is considered to be one of the most remunerative fruit crops of India, having a lasting niche in the international trade and

world finance. The most important commercial citrus in India is the mandarin orange followed by the sweet oranges and

acid limes. Citrus crop has significant importance in fruit economy of the country and as the second largest industry in India with respect to area and third largest with respect to production, although India ranks sixth among top citrus producing countries of the world. In India, citrus is primarily grown in AP, Maharashtra, Punjab, Karnataka, Uttaranchal, Bihar, Orissa, Assam and Gujarat. AP occupies first place in citrus production by producing 1,805.64 tonnes constitutes 24.19% share of total production in India. Citrus cultivation in India is facing numerous production constraints including diseases caused by fungal, viral and few bacterial pathogens (Fig. 1) right from nursery level to bearing stage resulting in considerable losses.

Materials and Methods

Extensive survey was conducted in commercial sweet orange and acid lime orchards in seven major growing districts viz., Anantapur, Chittoor, Mahaboobnagar, Nalgonda, Prakasam and West Godavari districts of AP during 2008 to 2012. In each district, 5 orchards each of sweet orange and acid lime were surveyed to know the prevalence and distribution of diseases each year. Diseases were recorded on the basis of characteristic symptoms on leaves, branches and fruits. The incidence and severity of different diseases were recorded. Disease incidence was expressed in percentage and calculated by counting number of plants showing specific symptoms of disease in a field in case of virus diseases, HLB and root rot diseases. Where as severity was recorded in case of localized diseases using 0-4 scale (0= No infection; 1 = traces to 10%, 2 = 10-25%, 3 = 25 – 50% and 4 = > 75%) and per cent

disease index (PDI) was calculated based on the following formula.

$$PDI = \frac{\text{Sum of all ratings} \times 100}{\text{Total number of leaves/fruits} \times \text{Maximum rating value}}$$

Results and Discussion

A systematic survey on the occurrence of diseases associated with acid lime and sweet orange was carried out in seven major growing areas and the data revealed that in case of sweet orange 18 diseases and 14 diseases in case of acid lime were observed in AP. In sweet orange highest incidence of citrus greening (HLB) (36.16%) followed by citrus yellow mosaic (CYMV) (35.18%), canker (35.64%), citrus tristeza virus (CTV) (24.95%), dry root rot (13.22%) and twig blight (13.20PDI) diseases were recorded in Nalgonda followed by Prakasam and Mahaboobnagar districts. Gopal *et al.* (2010) reported that greening incidence was high in Prakasam district (30.3%) followed by Anantapur (28.8%), and Kadapa (17.3%) in AP. Das (2008) in his survey report also indicated that the incidence of greening ranged from 9–46% in Sathgudi sweet orange. Gopal *et al.* (1999) and, Reddy *et al.* (1972) reported that citrus greening was the main cause of sweet orange decline in A P. Reddy (1982) reported that, mortality is certain even at low level of incidence of greening (6-16%). It was also observed that mortality of tree was fast and certain when combined infection of greening and dry root rot occurs. However, present study reveals that canker, CTV, dry root rot and twig blight (Table 1) are occurring in major proportion in AP.

Table.1 Incidence of different diseases of sweet orange in different districts of Andhra Pradesh during (2008-2012)

Diseases	Ananthapur	Nalgonda	W.Godhavari	Chittoor	Mehaboobagar	Prakasam
CYMV (%)	14.89	35.18	15.67	7.36	27.36	31.65
Huanglongbing (HLB) (%)	36.16	21.70	9.96	27.35	31.15	30.07
YCV (%)	0.00	0.00	0.00	0	0	0
Twigblight (PDI)	13.20	10.25	11.56	2.73	9.93	10.52
<i>Diplodiagummosis</i> (%)	2.64	4.36	1.55	2.34	2.34	3.58
Phytopthoragummosis (%)	2.55	3.52	2.67	10.5	2.15	2.87
Root rot(%)	13.22	11.24	7.9	3.75	10.35	10.55
Sooty mold (%)	3.15	2.35	8.55	0	0	1.01
Pre-harvest stem rot (%)	4.41	4.38	0.16	4.56	8.58	18.45
Pink disease %)	0.50	1.00	1.00	1	1	0.5
Powdery mildew (PDI)	0.00	0.00	0.00	0	0	0
Scab (PDI)	13.77	11.33	12.37	7.34	16.34	8.25
Canker (PDI)	7.65	8.40	35.64	7.96	8.86	3.25
CTV (%)	1.50	1.00	24.15	1.5	1.5	1
Zn deficiency (%)	34.95	30.43	1.11	25.6	35.65	20.87
Mg deficiency (%)	22.72	23.96	15.67	16.46	20.46	20.11
Sun burn (%)	5.69	2.84	9.96	4.65	8.85	6.87
Bud Joint Rot (%)	6.20	7.97		2.51	3.89	6.96

Fig.2 Incidence of different diseases of acid lime in different districts of Andhra Pradesh during (2008-2012)

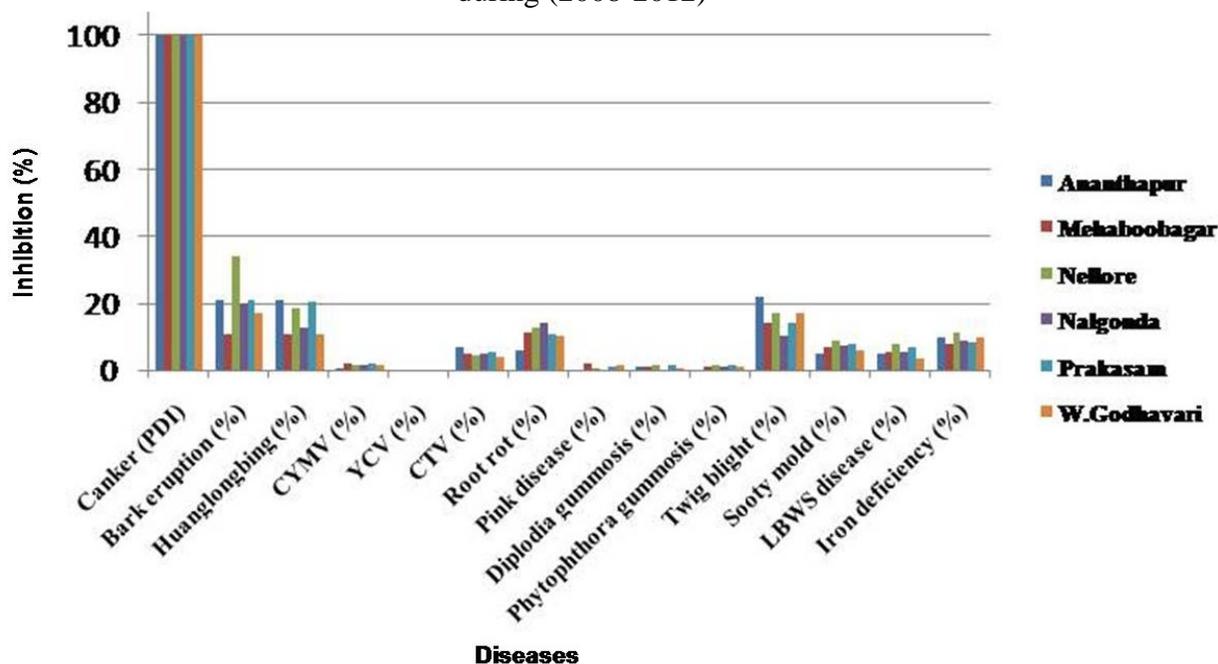


Fig.1 Important diseases in Sweet orange and Acid lime A) Citrus Yellow Mosaic Virus (CYMV); B) Huanglongbing (HLB) (Greening); C) *Citrus Tristeza Virus*; D) Canker lesions on leaves and fruit; E) Yellow corky vein ; F) Scab on Rangpurlime fruit ; G) Oozing of gum at the base of tree trunk ; H) Dry root rot; I) Longitudinal bark and wood.



It was reported that twig blight might be due to many reasons like diseases, nematodes attack, mineral deficiencies etc. Since sweet orange is grown in poor soils, sweet oranges are more prone to micronutrient deficiencies. Among them, Zinc deficiency (35.65%) followed by Magnesium deficiency (23.96%) were prevalent (Table 1). Gopal *et al.* (1999) also stated that, sweet oranges are mainly grown in red sandy soils, which are poor to medium in fertility, besides being shallow and calcareous in nature which produce shallow and restricted root system and induce mineral deficiencies (Zn, Fe and Mg).

In case of acid lime among the 14 diseases observed, bark eruption (33.96%), followed by twig blight (21.88PDI) greening (21.18%) and root rot (14.17%) were recorded high and iron deficiency was 11.20% (Fig. 2). The perusal of the data indicated that fungal diseases viz., gummosis and root rot caused by *Phytophthora* and *Diplodia*, pink disease caused by *Pellicularia* spp. and viral diseases like citrus yellow mosaic (CYMV) and yellow cork vein (YCV) are very less in AP. Chenchu Reddy *et. al* (1999) also stated that one of the causal organisms of root rots of acid lime is *Phytophthora* spp, in AP. Slow decline in acid lime due to bark and wood splitting disease caused by *Botryodiplodia theobromae* was observed (3.5-10 %) in old gardens, which is affecting both tree life and yield (Gopal *et al.*, 2005). This disease was first reported by Gopal *et al.* (2005) causing 10-15% incidence in acid lime orchards in AP. It is observed that severe incidence of canker, bark eruption, twig blight, tristeza and longitudinal bark and wood split are the primary factors which attributed to the reduction in the life span of the acid lime and decline of the acid lime orchards in AP.

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