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Rejuvenation of the *neglectosis* affected Nagpur mandarin orchards

Vinod Anavrat*

Central Citrus Research Institute,
Nagpur-440 033, India.

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ABSTRACT

The predominant causes of untimely decline of the Nagpur mandarin orchard are neglecting the symptoms of decline, aptly called as *neglectosis*. The present study was undertaken in Nagpur district of Maharashtra during 2012-2014. It was aimed at assessing efficacy of the orchard rejuvenation technology to augment yields on farmers' fields. Treatments associated with rejuvenation were taken up after ascertaining the causes of decline. The comprehensive treatment comprised removal of all the dry woods and shoots followed by foliar spray of Carbendazim @ 1gm/lit of water, pre and post monsoon Bordeaux paste applications, control measures for bark eating caterpillar, proper irrigation practices and nutritional corrections. After application of the recommended fertilizer schedule, the orchard gained vigour that was also reflected in the increase in overall yield. The application of dichlorvas 0.1% @5 ml/larval hole gave complete control of bark eating caterpillar (*Inderbela* sp.). With the timely application of the technologies, the yield of *ambia* bahar obtained at three different locations (11.81, 14.40 and 16.38 tons/ha respectively) exhibited the feasibility of rejuvenation technology demonstration.

Key words: Decline, Nagpur mandarin, Rejuvenation, Technology demonstration.

INTRODUCTION

Nagpur mandarin is a main citrus fruit crop of Central India. Due to its distinct taste and flavor, it continues to occupy a place of prominence in India and abroad. There is continuous increase in Nagpur Mandarin acreage, but large number of orchards are also declining. The prevalence of such dichotomy hindered the increase in average production and productivity. In developed countries, the average productivity of citrus is 25 tons/ha whereas it is only 9-10 tons/ha in India. Due to decline, the orchards in the prime age of 8 to 16 years are affecting the productivity.The symptom ranges from drying of twigs, presence of insect pests and diseases on large scale and give sickly appearance of the orchard. Arresting the decline and prolong the orchard life, consequently boosting the production and productivity becomes an issue of concern. Although general neglect of the orchard and ignorance of various packages of practices contribute to decline, there are many intervening factors. Under such situation, demonstration of the technology of rejuvenation helps farmers feel reassured about viability of the technology of rejuvenation. In a village setting, due to peer group influence, the positive feedback about results of rejuvenated orchard generates ambience of hopefulness. Hence the demonstrations were undertaken to ascertain the constraints in maintaining the Nagpur mandarin orchards in good conditions and reassure the growers about viability of rejuvenation technology in farmers' field.

MATERIALS AND METHODS

The orchard rejuvenation technology demonstrations were carried out at three different orchards during 2012-14 (2 years). Total three orchards of different age group were selected at three locations *viz.*,Astikala, Wathoda and Waroda in Kalmeshwar taluka of Nagpur district. To record the actual status of the orchard before imposition of the rejuvenation technology, the orchards selected for demonstration were photographed and also video-graphed. It was intended to facilitate the comparison of these orchards after rejuvenation. The bench mark yield data before initiating the demonstration was recorded. In each orchard, 70-99 plants were marked for the trial and appropriate treatments given to rejuvenate the plants.

In demonstration plots, the treatments to rectify the causes associated with decline started after ascertaining the causes. Removal of all the dry woods and shoots with the immediate foliar spray of Carbendazim @ 1gm/lit of water. Two Bordeaux paste applications on the tree trunk before and after monsoon. For the control of bark eating caterpillar (BECP), 0.1% Dichlorvas @ 5 ml/larval tunnel was injected with disposable syringe followed by cotton swabbing. Other

*Corresponding author's e-mail: vinodanavrat@gmail.com.

insect pest control measures as per situation were followed. Irrigation water was not allowed to stagnate in basin near the tree trunk. Nutritional status was ascertained through soil testing and corrected through soil application of 1200 g N in three split doses during April, August and November,600 g P_2O_5 in two split doses during August and November, 300 g K_2O in November besides $ZnSO_4$, $FeSO_4$, $MnSO_4$ @100 g each mixed with 25 Kg FYM per tree during June. Periodic monitoring of the selected orchards was done and observations on incidence and intensity of citrus insect pests especially bark eating caterpillar (BECP), intensity of Phytophthora induced gummosis etc were recorded. At the end of *ambia* crop season (2013-14) the yield data were collected from demonstration sites.

RESULTS AND DISCUSSION

The results of soil fertility evaluation, after harvesting of the *ambia* bahar fruits are presented in Table 1. Prior to the technology intervention, the available Cu, Fe, Mn and Zn micronutrients, were deficient in all the three orchards. After application of the recommended fertilizer schedule, the orchard gained vigour that was also reflected in increase in yield. The adopted fertilizer schedule consisted of soil application of 1200 g N, 600 g P, 300 g K in split doses and 100 g $ZnSO_4$ +100 g $FeSO_4$, 100 g $MnSO_4$ at once

The bark eating caterpillar, observed invariably in the decline orchards, besides the incidence of gummosis recorded during March 2014 is presented in Table 2. The application of dichlorvas 0.1% @5 ml/larval hole gave complete control of bark eating caterpillar (*Inderbela* sp.) in the two orchards. However, in the orchard at Astikala fresh bores of BECP were seen in some trees, as the farmer apprehensive about fruit drop, allowed the weeds to proliferate during Oct-December. To keep the foliage feeders like citrus psylla under control, foliar spray of systemic insecticides like imidacloprid @ 0.5 ml/lit was carried out and to check the incidence of mites, foliar spray of dicofol @ 2ml/lit was done. In March, foliar spray of 2,4-D @15 ppm + urea 1 % + Carbendazim 0.1% was given for the control of fruit drop.

In all the three orchards, twig blight caused by colletotrichum fungus and *Phytophthora* induced gummosis constituted the major disease problem. The gummosis lesions on bark were scrapped with sharp knife followed by application of the fungicidal paste of Mefenoxam. After initial severe pruning of dead wood followed by spraying of carbendazim@ l g /L plus Mefenoxam and Fosety-Al @2.5g/ L alternately besides the pre-monsoon and post monsoon Bordeaux paste application considerably reduced the disease intensity.

The results at three different locations in farmers' field presented in Table 3 indicated that, with the timely application of the technologies recommended by National

TABLE 1: Status of soil fertility and plant nutrition (2013-14)

Name of the village	Org carbon 0.38-0.62	N 94.8-154.8	P 6.6-15.9	K 146.8-311.9	Cu 2.5-5.1	Fe 10.9-25.2	Mn 7.5-23.2	Zn 0.59-1.26
	(%)				(mg/kg)			
Astikala	0.63	134.4	10.69	257.0	2.10 (0.14)	13.48 (0.26)	9.23 (3.11)	1.07 (0.14)
Wathoda	0.67	165.2	10.60	251.0	2.22 (0.08)	12.78 (0.17)	10.74 (2.81)	0.99 (0.32)
Waroda	0.68	156.8	10.06	206.5	2.28 (0.04)	12.71 (0.03)	9.85 (0.93)	1.03 (0.06)

**Figures in parentheses indicate the status of micronutrients just before the technology intervention during 2012-13*

TABLE 2: Status of bark eating caterpillar (*Inderbela* sp.),twig blight and gummosis after rejuvenation

Name of the village	No. of trees	BECP (holes/tree)2012-13	BECP (holes/tree)2013-14	Gummosis (lesions /tree)2012-13	Gummosis (lesions /tree)2013-14
Astikala	70	270(3.85/tree)	10(0.14/tree)	139(1.98/tree)	20(0.28/tree)
Wathoda	93	230(2.47/tree)	0	433(4.65/tree)	24(0.25/tree)
Waroda	99	267(3/tree)	0	208(2.10/tree)	39(0.39/tree)

TABLE 3: Impact of technology on fruit yield

Name of the village (age of orchard)	No. of trees	Av. Fruit weight (gm) 2013-14	Av. fruits/ tree(Kg)	No. of actual bearing trees/ha.	Yield/Per ha (ton) 2012-13	Yield/Per ha(ton) 2013-14
Astikala(12)	70	135	350 (47.25)	250	8.5	**11.81**
Wathoda(17)	93	145	450 (63.0)	260	5.5	**16.38**
Waroda(11)	99	160	400 (64.0)	225	7	**14.40**

Research Centre for Citrus (now CCRI) the yield of *ambia* bahar substantially improved than the normal average yield in all the three orchards. Similar findings were reported by Rajesh Kumar (2014) and Rakesh Kumar (2013)

CONCLUSION

In Nagpur mandarin, the problem of viruses is not serious as that of Mosambi sweet orange especially in central India. Hence there is generally a gradual decline of orchards giving sufficient indications and adequate time to rectify the constraints prevalent in the orchard. Citrus decline is not the problem of or in the orchard alone, but also of the orchardist's mental makeup. The owners' casual attitude and reluctance in approaching the authorities for rectifying the malady is the main reason of Nagpur mandarin decline. The social-economic factors equally contribute to decline as it is directly linked to the grower's achievement motivation (m*Achievement*). If the orchard owner is not an absentee landlord, the percentage of Nagpur mandarin decline will substantially come down. With the application of basic technology package of production and plant protection, all the three *neglectosis* affected orchards craving owners' attention were successfully rejuvenated. The yield obtained in all three orchards was more than average productivity of 9-10 tons per ha. Similar studies may be conducted in Mosambi sweet orange. It would give an idea as to what extent the viral diseases are responsible for slow or quick decline or is it again due to similar reasons prevalent in Nagpur mandarin.

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