



Management of citrus orchards under drought like conditions



National Research Centre for Citrus
(Indian Council of Agricultural Research)
Amravati Road, Nagpur - 440 033
(Maharashtra), India

Foreword

Citrus is one of the most important fruit crops of the country keeping in view its contribution in total fruit production, people employed in its industry throughout the country and livelihood it is providing to the people. Due to changing climate, rainfall has become erratic all over the country. Its impact is felt more in central India where Nagpur mandarin belt exists. The 'Mrig' (Monsoon blossom) crop of Nagpur mandarin is totally dependent on rainfall distribution from June to October and total precipitation received. 'Ambia' (spring blossom) crop of this mandarin is dependent on water availability for irrigation during summer which in turn depends on total rainfall received.

In the year 2014, monsoon is delayed and as per India Meteorological Department (IMD) forecast, rainfall is going to be deficient to some extent. In this context strategy to be followed by the citrus growers of the region has been brought out by NRCC, Nagpur. The bulletin covers soil and water conservation measures to be followed by citrus growers and advisory for water application through drip, crop management, agro-techniques and sustenance of crop. Insect pest incidence is also going to be changed with erratic monsoon.

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(M. S. Ladaniya)

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Compiled and Edited by

Dr. Milind Ladaniya
Dr. Anup Kumar Srivastava
Dr. Ambadas Huchche
Dr. Rajiv Marathe
Dr. C. N. Rao
Dr. Parameshwar Shirgure

Published by

Dr. Milind Ladaniya

Director
National Research Centre for Citrus
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Due to abundance of vitamins and minerals present in citrus fruits and their role in healthy human diet, the demand for these fruits is ever increasing in Indian and overseas markets. There has been phenomenal growth in citrus industry of India during last three decades. As of now citrus fruits are cultivated on 10.5 lakh hectares with a production of 100.90 lakh tonnes in India. However this industry is facing challenges especially due to global warming related climate change in the form of untimely rains, late arrival of monsoon, its unequal distribution, deficit monsoon etc. Since most of the citrus orchards in central and western India as well as parts of Andhra Pradesh are dependent on well water, tube wells and storage reservoirs, deficit monsoon has a direct adverse effect on the availability of irrigation water to citrus orchards. Therefore, to tide over such crisis in drought like situation, the scientists of NRCC have given this advisory for management of citrus orchards in central India.

Soil and water conservation measures :

- Conserve *in-situ* soil moisture by light hoeing, weeding and subsequent mulching with dry weed/grasses in citrus tree basins. Rain water harvesting ponds should be dug at low land to collect the rain water.
- Deepening of rain water harvesting ponds should be immediately taken up to store rain water.
- Continue the drip/micro-irrigation even in rainy season when the dry spell prolongs to 20-25 days. The drip system should not be removed from the field keeping in view erratic monsoon.
- Interculture operations as harrowing should be done across the slope of the land to conserve the moisture received during intermittent rains.
- The deficit irrigation (10-20 % less than the recommended irrigation schedule) should be regulated through drip system. The minimum water requirement of mandarin and acid lime during deficit monsoon months is given in Table 1.
- Partial root wetting irrigation should be adopted. For this irrigation should be applied at only outer periphery area of the canopy.
- Foliar spray of salicylic acid (2-3%) has been very effective in citrus for combating short term water deficit stress to crop.
- Water should be applied to trees through pipes to avoid losses. The double ring basin method of irrigation should be followed. Similarly in high water deficit (drought) situation, less quantum of water per plant with minimum length of interval between two irrigations may be followed.
- The grass/straw or plastic mulch should be provided to the citrus trees having bearing of Ambia flush. The heavy fruit of the Mrig bahar should be avoided or should be de-fruited.
- As per the forecast of India Meteorological Department (IMD), heavy rains are expected during the month of July and August, 2014 under these circumstances

measures as filling of farm ponds with runoff water may be done. To reduce seepage losses, spreading of plastic at the base of pond may be under taken. In case of heavy rains, surface open drains should be dug out in the lowlands of citrus orchards.

- In slopy land half-moon trenches (3-4 feet long) may be opened at upper side of each tree at about 5 feet distance from main trunk of grown up trees and 2-3 feet from small trees. Trenches should be opened in such a way that run off water along the slope get stored in them.
- New citrus plantation should be done on 'Bedding System' (Wide beds / ridges of 60 cm height at the middle, tapering towards both the ends up to 120 cm followed by furrows) of plantation. This system will remove excess rainwater with non-erosive velocity in case of heavy rains and conserve rainwater in case of less rains.

Water requirement of Nagpur mandarin during June to October

- Young aged mandarin plants - 12-20 liters/day/plant
- Middle aged mandarin plants 40-64 liters/day/plant
- Fully grown mandarin plants 80-135 liters/day/plant

Water requirement of acid lime during June to October

- Young aged acid lime plants - 8-18 liters/day/plant
- Middle aged acid lime plants 36-55 liters/day/plant
- Fully grown acid lime plants 60-88 liters/day/plant

Table 1 : Water requirement of Nagpur mandarin and acid lime (liters/day/plant) during monsoon months (June-October).

Month	Nagpur mandarin		
	1-3 years age	4-7 years age	8years and above
June	20	64	135
July	16	53	110
August	12	40	80
September	13	42	90
October	15	50	110
Acid lime			
June	18	55	88
July	12	49	84
August	9	36	60
September	8	38	65
October	10	44	68

Management of Mrig crop (Monsoon blossom) flowering and fruiting:

- If water is available, for orchards going in for *Mrig* cropping (July flowering), irrigation may be applied 200 litres/plant at 4-5 days intervals to ensure normal flowering.
- Foliar application of GA₃ 1g with urea 1 kg in 100 litres of water may be given at the time of flowering.
- There are some orchards in which vegetative growth flushes are seen all over the orchard with practically no flowering. In such orchards there is need to spray

chlomequat chloride 2000 ppm (4 ml of commercially available formulation per litre of water) three times at 10 days interval in the month of July. This will ensure late flowering of *Mrig* crop in late August if good rains are received that time otherwise heavy irrigation shall be followed for good flowering.

- In case good rains are received in July second fortnight and August first fortnight, for late flowering orchards, fertilizer application in soil with 300 g N, 200 g P₂O₅ and 200 g K₂O twice in the months of August and September may be followed.
- For increasing fruit size in late flowering *Mrig* cropping orchards foliar applications of monopotassium phosphate or urea or potassium nitrate or diammonium phosphate at the rate of 1.5 kg along with 2,4-D or GA₃ at 15 ppm in 100 litres of water at monthly interval may be given in August and September.
- Excessive rains during July-August may lead to excessive humidity in the foot hill areas near Satpuda ranges leading to oblong fruit disorder. Maintain the orchard weed free which will improve orchard microclimate thereby avoiding the incidence of this disorder.
- In case of insufficient rains macro and micro-nutrients may be applied through foliar sprays (Table 2).

Management of *Ambia* crop (Spring blossom) of citrus fruits:

- Due to less than normal rainfall in June and July months the citrus orchards bearing *Ambia* bahar fruits may be continued with drip irrigations at the rate of at least 40-60 litres of water per plant per day.
- Orchards irrigated with conventional irrigation methods may be irrigated at an interval of 4-5 days in the absence of normal rains.
- In case of non-bearing plants, pruning may be done on priority to minimize the canopy load which will reduce the water requirement of the plants.
- In the orchards where there is inadequate irrigation source (to be assessed at the end of October), no fruiting of *Ambia* crop be taken in December-January following and at least subsistence irrigations by micro-irrigation systems @ 5-10 litres of water may be provided to survive the plantations during summer.
- For deblossoming of *Ambia* crop either 600 ppm of naphthalene acetic acid (60 g NAA powder dissolved in 100 ml of 5 % NaOH solvent prepared by mixing 50 g NaOH pellets in one litre of water) or 7 % urea (70 g urea dissolved in one litre of water) may be sprayed when flowering occurs.
- Fertilizers doses which are normally recommended in monsoon months should be curtailed to 50 % of the recommended doses. Foliar sprays of macro and micro-nutrients advisable to citrus growers. Instead of application of fertilizers through soil, foliar applications as shown in table 2 may be followed.

Table 2 : Foliar sprays of macro and micro nutrients.

Nutrients	Concentration	Time of Spray
Nitrogen	Urea 1000g in 100 lit. of water	In third week of July
Zinc+Manganese +Iron+Boron	ZnSO ₄ (500g)+MnSO ₄ (500g)+ FeSO ₄ (500g)+Borax(250g) in 100 lit water	August first week

Note : Repeated sprays of above nutrients may be given in last week of August and September, respectively for nitrogen and micronutrients.

Plant protection:

In the context of existing weather conditions (continuous dry spell with intermittent scarce rainfall) incidence of citrus psylla, thrips and mites on young flush of *Mrig* season could be encountered. Hence prophylactic insecticide sprays for citrus psylla thrips and mites may be given as follows:

- Incidence of citrus psylla could be seen prominently during dry spells. Spray dimethoate 1.5 ml/l or imidacloprid 0.5 ml/l or thiamethoxam @0.3 g/l when incidence is observed.
- Spinosad @ 1.5 ml/l or imidacloprid @ 3 g/l may be sprayed against citrus thrips.
- Dicofol @1.5 ml/l or wettable sulphur @3 g/l or propargite @ 1 ml/l may be sprayed against citrus mites.
- Male attracting fruit fly traps may be installed in the orchard in the month of September
- A second spray may be given of the above pesticides if required.
- During the month of July-August in the event of excessive rains (>50 mm rainfall in 24 hours) there is likelihood of attack of *Phytophthora* fungus on the fruit causing brown rot of maturing fruits. To control this, two sprays of fosetyl aluminium 2.5 g/l may be given at monthly interval.



Rain Water Harvesting Pond



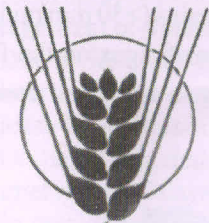
Black Polyethylene Mulch



Drip Irrigation System



Planting on Raise bed with Laterals



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हर कदम, हर उगर
किसानों का हमसफर

भारतीय कृषि अनुसंधान परिषद

AgriSearch with a human touch

National Research Centre for Citrus

(Indian Council of Agricultural Research)

Shankar Nagar P.O., PB No. 464, Nagpur - 440 010

(Maharashtra), India

Phone : 91-0712-2500813, 2500249, 2500615

Fax : 91-0712-2500813

E-mail : citrus8_ngp@sancharnet.in

Web Site : <http://www.nrccitrus.nic.in>