

Survey of Diseases and Pest on Pomegranate from Solapur District

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Abstract:

Punica granatum L., a member of the Punicaceae family, is one of Maharashtra's most significant fruit crops. In Maharashtra, districts like Solapur, Sangli, Satara, Ahmednagar, Nasik, Dhule, Pune, Aurangabad, Osmanabad and Latur are the biggest producers of pomegranate. Majority of the production is hampered due to diseases and pest during the harvesting time. To understand the disease and pest situation on pomegranate, a roving survey was conducted in 2020-2021 in major pomegranate growing areas of Solapur district. Solapur district consist of 11 tehsils out of which Sangola, Pandharpur, Mangalwedha, Malshiras, Mohol, Madha together constitute 95% total area under pomegranate cultivation. Sangola ranks first among these entire pomegranate producing tehsils (31.74 %). A severe case of Bacterial blight produces a 50-100 % reduction in pomegranate output. Thrips and aphids are a nuisance that may be found in all of Solapur districts. All available literatures scanning manifest that 91 insects, 6 mites and 1 snail pest attacks on pomegranate in India. Considering the high market value of pomegranate fruit it is serious need to overcome problem of various diseases that reduces the production. It is indeed required lots of research work in the area of pest and disease management of this highly important fruit.

Keyword: *Punica granatum*, Bacterial blight, Thrips, Aphids

INTRODUCTION:

Pomegranate (*Punica granatum* L.) belongs to family Punicaceae is one of the chambered, globose fruit bearing deciduous shrub of arid and semi-arid regions of the world (Ippikoppa *et al.*, 2017). Latin word Pomegranate means 'Apple with many seeds'. It is one of the ancient edible fruits believed that originated from modern day Iran where it was firstly cultivated in 2000 B.C. and proliferated up to the Mediterranean countries. Among the total worlds pomegranate production 76% contributing countries are China, India, Iran, Turkey and USA (Murugan Sankaran, 2014). Pomegranate has a wide range of medicinal benefits, which has increased its market demand and export value in India over the previous few decades increasing pomegranate productivity and being one of the world's largest exporters (Jain and Desai, 2018). In India, Maharashtra accounts for 69.26% of total countries pomegranate production followed by Karnataka, Andhra Pradesh, Gujrat and Tamil Nadu (Suramwad *et al.*, 2018). In Maharashtra, Solapur, Sangli, Satara, Ahmednagar, Nasik, Dhule, Pune, Aurangabad, Osmanabad and Latur districts immensely produces pomegranate. Out of these districts Solapur district is leading in pomegranate cultivation and production so called as 'Pomegranate city' (Rede *et al.*, 2018). Solapur district consist of 11 tehsils out of which Sangola, Pandharpur, Mangalwedha, Malshiras, Mohol, Madha together constitute 95% total area under pomegranate cultivation. From these highest pomegranate producing tehsils Sangola ranks first (31.74%) (Kharat *et al.*, 2019). Depending on market demand, rate, water availability pomegranate flowering carried out in two to three seasons which is Ambe bahar (Jan-Feb), Mrig bahar (June-July) and Hasta bahar (Sept-Oct) (Jain and Desai, 2018). Pomegranate plant is much more vulnerable to various diseases caused by microbes and pests. Controlling these diseases is challenging after spreading on whole field and causes 60-80 % loss of yield in India (Mondal and Mani,

2009). Easily observable disease symptoms are leaves infected with various size and colored spots, Stem with blighting and dieback and fruits with cutaneous to deep down fruit lesions which results in fruit rotting (Xavier *et al.*, 2019).

Some crucial insect pests are fruit borer, fruit fly, thrips and bark eating caterpillar. Several diseases such as leaf and fruit spot, rot and wilt damages pomegranate plant enormously (Chandra *et al.*, 2010). Severe attack of bacterial blight causes 50-100 percent loss of pomegranate yield (Ashish and Arora, 2016). Also, some physiological disorders like fruit cracking, sun scald, internal breakdown (Aril decolouration) damages pomegranate. All available literatures scanning manifest that 91 insects, 6 mites and 1 snail pest attacks on pomegranate in India (Balikai *et al.*, 2011). Considering this the present study is designed to know the various pests and diseases affecting pomegranate in study area.

Study area:

Solapur one of the district in Maharashtra (India) famous for Pomegranate and located in south-western part of Maharashtra between 17° 39' 35.7" N and 75° 54' 22.9" E, closest to the border of Karnataka. Average rainfall in the district is 600 to 700 mm. The temperature ranges from 16°C to 40°C, though at the peak may reach 45°C. The district has an area of 14895 sq.km. Major fruit crops are pomegranate, ber and grape.

METHODOLOGY:

Survey of present work carried out in 2019-2021 in Sangola, Pandharpur, Mangalwedha, Mohol, Malshiras tehsils of Solapur district. The purpose of present work is to investigate and enlist various diseases occurring on pomegranate in Solapur district. Keeping this in view data was collected by authors with the help of scheduled personal interviews of randomly selected farmers to fulfill

the objectives of present investigation. The collected primary data analyzed and arranged in tabular form (Table1) to bring out useful conclusion. Identification of diseases and pest was done by naked eye prediction and diseases scoring scale and with the help of pathologists.

Table.1 Important pests and diseases of Pomegranate found in study area.

Sr. No.	Name of disease	Causal organism	Symptoms	Parts affected	Control measure	References
Various attacking pests						
1	Aphids	<i>Aphis punicae</i> Passerini	fruit rot, sooty mold on honeydew, yellowing of leaves, leaf drop, wilting of terminal shoots	Leaves, stem	Dimethoate, Thiamethoxam, Lambda-Cyhalothrin, Imidacloprid	Mohi-Ud-Din <i>et al.</i> , 2019
2	Bark-eating Caterpillar	<i>Indarbela</i> sp.	bore into the trunk or junction of branches make zig zag galleries,	Bark, stem	Carbaryl, quinalphos, methomyl, fenvalerate	Balikai, R. A. <i>et al.</i> , 2011
3	Mealybugs	<i>Ferrisia virgata</i> , <i>Planococcus lilacinus</i>	yellowing of leaves, shedding of flowers and tender fruits	Leaves, Flowers, Fruit	chlorpyrifos + dichlorvos, malathion, <i>Dicrodiplosis californica</i>	Balikai, R. A. <i>et al.</i> , 2011
4	Pomegranate fruit borer	<i>Deudorix isocrates</i>	Bores into young fruits, fruit rotting, dropping	Young fruits	<i>Bacillus thuringiensis</i> , Quinalphos, Flubendiamide,	Khandare <i>et al.</i> , 2021
5	Shot hole borer	<i>Xyleborus perforans</i> (Wollastan)	small shot holes on roots, main trunk, wilting and finally leads to death of the tree	Root, Stem	Chlorpyrifos, tridemorph, carbendazim, monocrotophos	Jagginavar and Krishna Naik, 2004, Balikai <i>et al.</i> , 2011
6	Stem Borer	<i>Coelosterna spinator</i> , <i>Zeuzera</i> sp.	holes on bark of main stems, excreta and dry powdered material found near the basement of plants	Stem	Dichlorvos, Copper oxychloride, Quinalphos chlorpyrifos, phosphamidon	Balikai, R. A. <i>et al.</i> , 2011
7	Thrips	<i>Scirtothrips dorsalis</i> , <i>Rhipiphorothrips cruentatus</i>	Leaf tips turn brown and get curled, drying and shedding of flowers and scab on fruits	Leaves, Flowers, Fruits	acetamiprid, spinosad, deltamethrin, methyl oxydemeton,	Balikai, R. A. <i>et al.</i> , 2011
Diseases						
1	Alternaria Fruit Spot	<i>Alternaria alternata</i>	Small reddish brown circular spots on the fruits, becomes larger as a result fruit rot	Fruit	Captan, Bavistin, SAAF, Z78, Tilt, Folicur	Kumar <i>et al.</i> , 2017
2	Anthraxnose	<i>Colletotrichum gloeosporioides</i>	hard, dark brown to black necrotic lesions on fruits, spots on leaves and calyx region	Leaves, stem, flowers, fruits	Mancozeb, Copper hydroxide, Ziram, Captan, Chlorothalonil, carbendazim, arbandazim, Difenconazole, Thiophanate	Xavier <i>et al.</i> , 2019
3	Botryosphaeria stem canker and shoot blight	<i>Neofusicoccum parvum</i> , <i>Lasiodiplodia</i>	small brown lesions expand and develop into large swollen cankers, deep cracks	Stem, shoot	Difenconazole, prochloraz, Hexaconazole, Thiophanate Methyl	Xavier <i>et al.</i> , 2019

Sr. No.	Name of disease	Causal organism	Symptoms	Parts affected	Control measure	References
		<i>theobromae</i>	and numerous fruiting bodies, stems are slowly girdled and then plant dies			
4	Cercospora	<i>Pseudocercospora punicae</i>	Black, minute spot circular on ring, presenting on ugly look to the fruits, Minute leaf spots, Scattered, irregular, brown with yellow halo around spot	Fruit, leaf	(Copper oxychloride + Copper hydroxide), Mancozeb, Sulphur, Thiophanate Methy	Xavier <i>et al.</i> , 2019
5	Gray mold / Botrytis Fruit rot	<i>Botrytis cinerea</i>	gray coating of spores, having grayish-white mycelium and black sclerotia on fruit surface	Fruit		Munhuweyi <i>et al.</i> , 2016
6	Oily spot (Bacterial Blight)	<i>Xanthomonas axonopodis pv. punicae</i>	Small, brown, water-soaked spots with yellowish border and brown centre, irregular necrotic patches	Leaves, twig, fruits	(Paushamycin + copper oxychloride) Bactinash, Copper Hydroxide, <i>Pseudomonas</i> sp., <i>Bacillus</i> sp. and <i>Trichoderma</i> sp.	Ashish and Arora, 2016
7	Root knot Nematode	<i>Meloidogyne incognita</i>	Gall (knots) on the roots, branches and twigs dies, yellowing and falling of mature plant	Roots	Phorate, Azadirachtin, Carbofuran, Paecilomyces lilacinus, <i>Pseudomonas fluorescens</i> and <i>Trichoderma harzianum</i> .	Singh <i>et al.</i> , 2019
8	Wilt	<i>Ceratocystis fimbriata</i> , <i>Xyleborus fornicates</i> and <i>X. perforans</i> <i>Fusarium oxysporum</i> , <i>Rhizoctonia solani</i> and <i>Meloidogyne incognita</i>	leaves turn to pale green/yellow, separation of bark, brown discoloration in stem region and the roots, branches mortality	Leaves, Stem roots	Benlate, carbendazim, Mancozeb, Propiconazole, <i>Bacillus subtilis</i> , <i>Trichoderma</i> sp.	Sharma <i>et al.</i> , 2010
Physiological Disorders						
1	Fruit creaking	Boron, calcium and potash deficiency, improper irrigation	fruits can split/crack open and arils are exposed	Fruit	Boron, calcium and potash, proper irrigation	Ikram <i>et al.</i> , 2020
2	Internal Breakdown / Aril decolouration	Changes in juice	arils become soft, light creamy brown to dark blackish-brown and unfit for consumption,	Fruit (aril)	Proper irrigation, harvest as soon as fruit become mature	Shivashankar <i>et al.</i> , 2012
3	Sun scald	High temperature	Surface skin of fruits facing afternoon sun turns dark brown, High temperature along with excessive light, drought responsible	Fruit	Kaolin, Proper irrigation, bagging/covering	Lal and Sahu, 2017

Survey sheet of Diseases and Pests on Pomegranate**Name of the Farmer:** Mr. Vinod Ankush Bagal.

- **Address:** A/P Khilarwadi, Tal-Sangola, Dist. Solapur
- **Soil:** Black
- **pH:** 1) Soil: 7-8

2) Water: 7

- **Temperature:** 30-40°C
- **Humidity:** 70-80%

Sr. No.	Infection	Causal organism	Month	Plant Parts infected	Control Measure		
					Physical	Biological	Chemical
Diseases							
1	Bacterial blight	<i>Xanthomonas axonopodis pv. punicae</i>	Oct-Nov	Leaves, twig, fruits	Use healthy plant material planting, destroy infected fruits by burning	<i>Bacillus subtilis</i> , <i>Pseudomonas fluorescens</i>	1% Bordeaux, Bluecopper, Stripro, r 2-bromo, 2-nitro propane-1, 3-diol, (copper oxychloride + sticker), bactinashak
2	Root knot nematodes	<i>Meloidogyne incognita</i>	All season	Roots	Use nematode free plant sapling for planting, Destroy infected plants	Neem cake solution, Tagetes sp. Cultivation, <i>Paecilomyces</i> Sp., <i>Pseudomonas</i> Sp., <i>Trichoderma</i> Sp.	M45, SAAF, Chloropyriphus, Carbofuran 3G, Fluensulfone
3	<i>Cercospora</i>	<i>Cercospora punicae</i>	All season	Fruit and leaves	Destroy infected parts		M45, Thiophanate, Hexacohazole
4	Alternaria Fruit Spot	<i>Alternaria alternata</i>	All season	Fruit	Destroy infected fruits		Mancozeb, captaf
Pests							
5	Thrips	<i>Scirtothrips dorsalis</i> , <i>Rhipiphorothrips cruentatus</i>	All season	Young twig	Remove and destroy infected parts, blue sticky traps	<i>Hippodamia convergens</i> (large ladybeetles), hover flies, green lacewings	Dimethoate, methyl oxydemeton,
6	Aphides	<i>Aphis punicae</i> Passerini	All season	Young twig	Remove and destroy infected parts	Neem oil, Azadirachatin, neem alkaloid and neem seed karnal extract	Monocrotophos, malathion
7	Stem borer	<i>Coelosterna spinator</i> , <i>Zeuzera sp.</i>	Sept-Dec	Stem	Prevent plants from becoming weak, use light traps with 200watts sodium bulb, Pruning of dead branches	Elm leaf beetle, spiders, tachinid flies, braconid wasp, damsel bugs	Dichlorvos 76, Dichlorvos solution
8	Shot hole borer	<i>Xyleborus perforans</i> (Wollastan)	Sept-Dec	Shoot	Prevent plants from becoming weak, use light traps with 200watts sodium or mercury bulb Pruning of dead branches	Geru paste with insecticides	Lindane, carbaryl, chlorpyriphos, tridemorph
Physiological disease							
9	Fruit crack	-	All season	Fruit	Cultivate tolerant varieties irrigate properly	Proper irrigation	Boron, Calcium

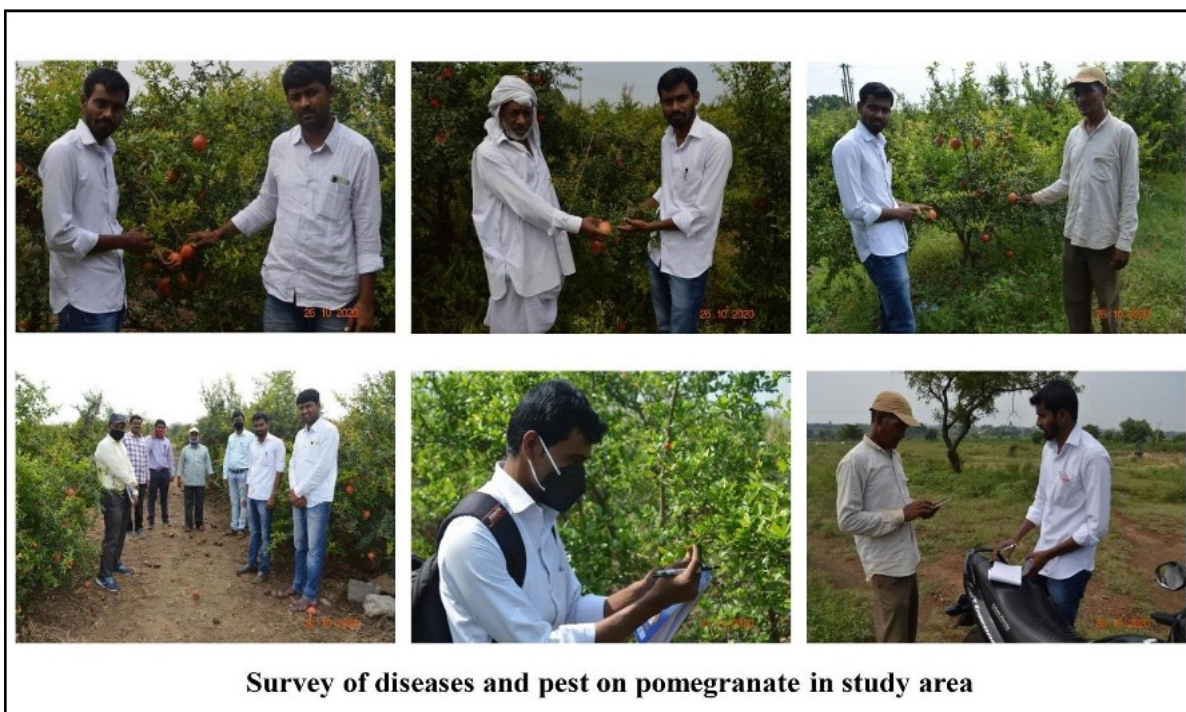
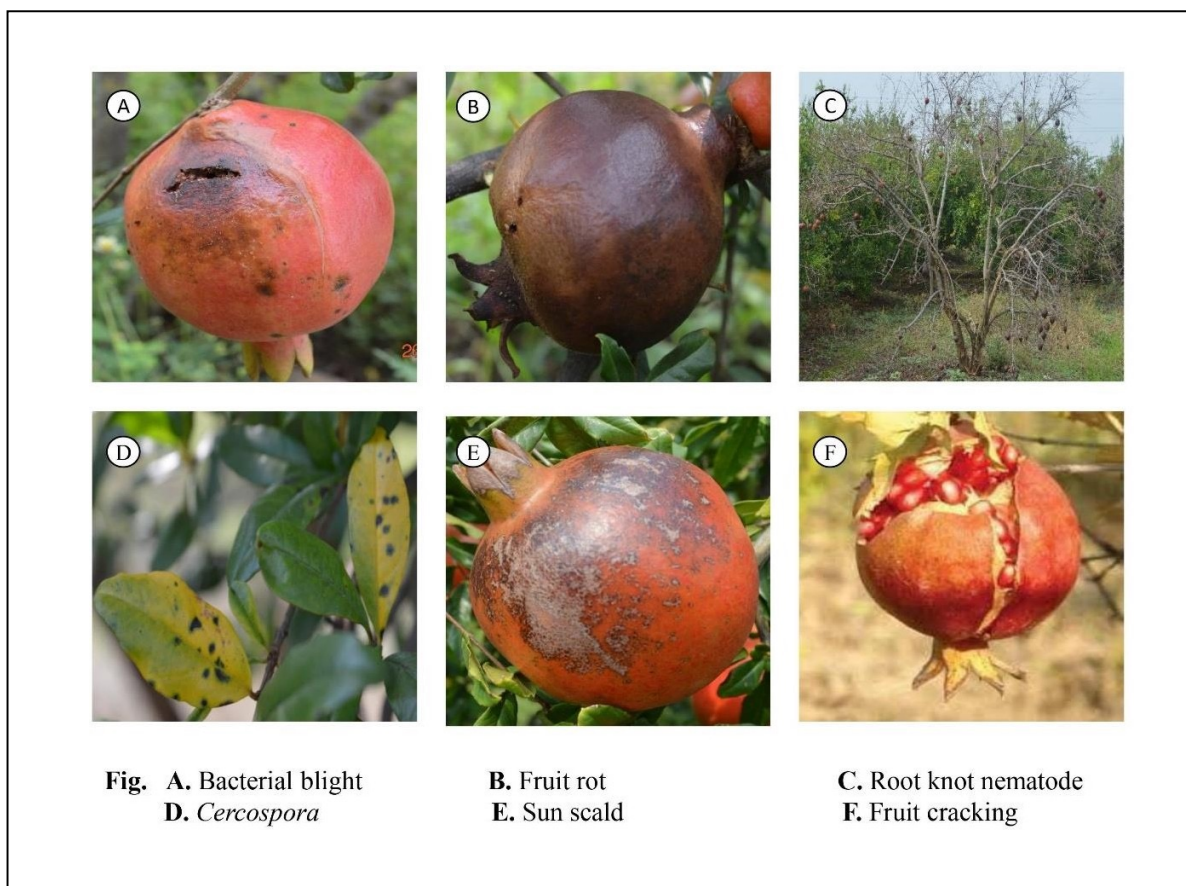
Survey of Diseases and Pests on Pomegranate from Solapur District

- **Name of the Farmer:** Mr. Phate Vishal Mahadev
- **Address:** A/P Gadegaon, Tal-Pandharpur Dist. Solapur
- **Soil:** Black
- **pH:** 1) **Soil:** 7.5

2) Water: 7-7.5

- **Temperature:** 30-35°C
- **Humidity:** 70-80%

Sr. No.	Infection	Causal organism	Month	Plant Parts infected	Control Measure		
					Physical	Biological	Chemical
Diseases							
1	Bacterial blight	<i>Xanthomonas axonopodis</i> pv. <i>punicae</i>	Oct-Nov	Fruits	Remove and destroy infected fruits	<i>Bacillus subtilis</i> , <i>Pseudomonas fluorescens</i>	Blue copper fungicide, Cuprina, Blitox, Value gold, Streptomycin sulphate
2	Anthraxnose	<i>Colletotrichum gloeosporioides</i>	All season	Leaves, stem, flowers, fruits	Remove and destroy infected parts		Arbendazim, Difenconazole, Thiophanate, thiophanate,
3	Root knot nematodes	<i>Meloidogyne incognita</i>	All season	Roots	Remove and destroy infected parts	Neem cake solution, Tagetes sp. cultivation, <i>Pasteuria</i> sp., <i>Pasteuria</i> sp., <i>Pochonia</i> sp., <i>Bacillus firmus</i> , <i>Trichoderma</i> sp.	M45, SAAF, Chlorpyrifos, Phule Trichoderma plus
4	Gray mold / Botrytis Fruit rot	<i>Botrytis cinerea</i>	All season	Fruit	Destroy infected fruit		
5	Wilt	<i>Ceratocystis fimbriata</i> , <i>Xyleborus fornicatus</i> and <i>X. perforans</i> <i>Fusarium oxysporum</i> ,	All season	Whole tree	Planting material (sapling) should be wilt free, soil sterilization with formalin, create proper drainage,	Neem cake, Karanj cake, Mahua Cake, <i>Bacillus subtilis</i> , <i>Trichoderma</i> sp., <i>C. fimbriata</i>	(Chlorpyrifos + carbendazim), carbendazim, Mancozeb
Pests							
6	Thrips	<i>Scirtothrips dorsalis</i> , <i>Rhipiphorothrips cruentatus</i>	All season	Young twig, fruit	Remove and destroy infected parts, blue sticky traps	large lady beetles, hoverflies, green lacewings, predaceous gall midges	Triazofos, Spinosad, Fipronil, chlorpyrifos, imidacloprid,
7	Aphides	<i>Aphis punicae</i> Passerini	All season	Young twig, fruit, flower	Remove and destroy infected parts	Neem oil, azadirachtin, neem seed karnal extract	Acetamidrid, Dimethoate, Imidacloprid
8	Mealybugs	<i>Ferrisia virgata</i> , <i>Planococcus lilacinus</i>	Sept-Dec		Prune affected parts and destroy by burning	<i>Cryptolaemus montrouzieri</i> (8-10 in no.), <i>Scymnus epius</i> ,	Soap solution, Applaud, Buprofezin, powder of Quinalphos,
9	Bark-eating Caterpillar	<i>Indarbela</i> sp.	Sept-Dec	Bark	avoiding over-crowding of trees, removing all infected webs, cotton wool soaked in carbon disulphide/ petrol/ kerosene and seal with mud		Fenvalerate, quinalphos, carbaryl, dichlorvos, Emamectin benzoate



RESULT AND DISCUSSION:

After two-year survey and identification of various pests and diseases attacking on pomegranate it was observed that Pomegranate fruits and foliage are susceptible to various decay causing pathogens. Fruit disease refers to a combination of several disorders that result from the infection of plant material and manifest in various external and internal symptoms. Bacterial blight and fruit rot causes serious problems to the field by decreasing productivity. Fruit infections occur in all producing areas and can cause serious losses to yield. Postharvest losses up to 25% from disease infections are common.

CONCLUSION:

For the prolong storage periods of pomegranate and to achieve an all year round fruit supply, the physiological disorders and diseases of pomegranate must be understood. The control measures require the assessment of postharvest infections as well as field infections. This review provided a comprehensive overview on diseases associated with pomegranate and highlighted on the need for further research towards better understanding of the disease epidemiology. Complete sanitation practices during pre- and postharvest handling and storage can significantly hinder rate of fruit decay. Pomegranate disease control traditionally relies on the use of chemical pesticides and fungicide. Future research interests favour non-chemical postharvest treatments of pomegranates fruits.

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