

Pistachionut rust disease and its management under arid temperate conditions of Himachal Pradesh

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ABSTRACT

Pistachionut (*Pistacia vera* L) is an important nut crop. Studies on its cultivation have been initiated at Regional Horticultural Research Station, Sharbo, Kinnaur of Dr YS Parmar University of Horticulture and Forestry and various other locations in arid temperate region of Himachal Pradesh. Rust caused by a fungus *Pileolaria terebinthi* (DC) Cast has been reported to be a major disease on this nut crop. The pathogen attacks both leaves as well as fruits and produces typical rusty pustules. The fungus produces uredial and telial stages on infected plant parts under natural conditions. The urediniospores are one-celled, round to ellipsoid while teleutospores are one-celled, pedicellate and typically discoid. The pathogen perpetuates under field conditions on bark of twigs and fallen infected leaves and fruits under orchard conditions. For the management of the disease a field experiment was conducted at Sharbo, Kinnaur during 2008 and 2009. Seven different fungicides namely, Baycor (0.05%), Bayleton (0.05%), Blitox-50 (0.3%), Contaf (0.05%), Indofil M-45 (0.3%), Punch (0.05%) and Score (0.03%) were applied as foliar spray on pistachionut cultivar Kerman. The first spray was given at the time of expression of the disease symptoms and two other sprays at 15 days interval. The data on disease intensity were recorded at the time of fruit harvest. All the fungicides tested reduced the disease index significantly over control during both the years. Baycor, Bayleton, Contaf, Punch, Score and Indofil M-45 were observed to be effective fungicides against the disease.

Key words: Pistachionut, rust, *Pileolaria terebinthi*, fungicides, disease management

INTRODUCTION

Pistachionut (*Pistacia vera* L) is a highly priced nut native to middle-east Asia. Presently, there is no commercial cultivation of pistachionut in India. However, studies on its cultivation are being carried out at Regional Horticultural

Research Station, Sharbo, district Kinnaur, Himachal Pradesh. The studies were initiated at two locations, Sharbo and Boktu in district Kinnaur in 1985-86 by planting Iranian seedlings. The plants have been in bearing since 1995. After seeing the initial success in pistachio cultivation, a bud wood orchard of two commercial cultivars namely,

Kerman (main variety) and Peters (pollinizer), imported from Tucson, USA, was established at Sharbo during 2001 with the help of National Horticulture Board. Later on, under the Desert Development Project, a multi-location trial to study the performance of these two commercial cultivars was laid out at various locations in Pooh area of Kinnaur district of Himachal Pradesh during 2003. Rust caused by the fungus *Pileolaria terebinthi* (DC) Cast has been reported to be a major disease on this nut crop (Bhardwaj 1995). The pathogen mostly attacks the leaves but under severe conditions it also attacks the fruits (Chitzanidis 1995). The disease results early defoliation and also reduces the fruit quality and yield. Keeping in view the importance of the disease and availability of meagre information in the literature especially under Indian conditions, the present studies were undertaken.

MATERIAL AND METHODS

The present studies were undertaken at Regional Horticultural Research Station, Sharbo, district Kinnaur, HP during 2008 and 2009. The place is located in dry temperate region of north-western Himalaya at an elevation of 2,100m above msl. The symptoms of the disease were recorded as the disease appeared. The observations on pathogen were recorded under microscope as per standard methods. The disease management trial was laid on cultivar Kerman using eight

treatments with three replications. The experiment was laid in a Randomised Block Design assuming single plant as one plot. Three applications of fungicides were made at an interval of 15 days between two sprays.

The first spray was given just after the observation of first symptoms of the disease. The observations were recorded at the time of fruit harvesting. Fifty leaves were collected randomly from each replication based on the area covered by the rust pustules and were subjected to disease grades on 0-5 scale. The disease index was calculated as per the formula of McKinney (1923).

RESULTS AND DISCUSSION

Symptomatology

The first symptoms of the disease were noticed in the last week of July. The rust sori were small, roundish, hard and brown to black in colour. The pustules were initially scattered and later on coalesced to form a hard dry crust on the leaf surface. The disease symptoms were rarely observed on the fruits. The sori on the fruits were similar to that of leaves. The severely infected leaves dried up early and dropped off the plant prematurely. Bhardwaj (1995) has also described the similar symptoms of rust on pistachio leaves but he could not observe the symptoms on fruits. Chitzanidis (1995) has observed that in Greece rust infection on fruits was more damaging than

the infection on leaves as that caused the fruits to become misshapen and consequently dry. In the present study, however, the leaf infection was more in comparison to the fruit infection.

Etiology

The microscopic observations of the diseased samples revealed uredial and telial stages of the rust fungus. Both the stages of the fungus were observed on leaves under field conditions. Uredia were formed first on the infected leaves and were subepidermal in origin and brown in colour. Urediniospores were brown in colour, one-celled, ellipsoid, mostly ridged or beaked in longitudinal or spiral pattern and measured 30-57 x 19-22 µm. Telia were subepidermal in origin and dark brown to black in colour. Teleutospores were dark brown, one-celled with one germ pore and wall pigmented, pedicellate, typically discoid and measured 28-42 x 19-28 µm. The pedicel was light in colour or sometimes hyaline and measured 100-158 x 6-11 µm. The present findings corroborate with the observations of Bhardwaj (1995) and Hamzehzargani and Banijashemi (2002) with very little difference in spore size.

Management

The data in Table 1 reveal that all the fungicides tested reduced the disease index of pistachionut rust significantly over control during both the years of experimentation. However, Bayleton, Score, Baycor, Punch, Contaf and Indofil

M-45 sprayed plants showed very less disease index ie 4.8 to 6.1 per cent in 2008 and 6.3 to 8.1 per cent in 2009 as compared to 53.9 and 74.2 per cent in 2008 and 2009, respectively in control plants. The effect of Blitox was significantly lesser than EBI fungicides and Indofil M-45. The effect of EBI fungicides on disease severity was statistically at par with each other. Bhardwaj (1996) has also observed Bayleton, Baycor and Dithane M-45 as effective fungicides in controlling the rust on the leaves of non-bearing pistachionut seedlings. In Greece, Chitzanidis (1995) has also recommended spray applications of dithiocarbamate fungicides against pistachio rust.

It can be inferred from the present study that EBI fungicides viz Bayleton, Score, Baycor, Punch and Contaf and ethylene-bis-dithiocarbamate fungicide Indofil M-45 provided 90 per cent disease control. These fungicides effectively controlled rust disease of pistachio and hence can be recommended against this disease under arid temperate conditions of Himachal Pradesh.

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Table 1. Effect of various fungicides on the severity of pistachio rust on cv Kerman

Fungicides	conc (%)	Disease Index (%)			Disease Control (%)		
		2008	2009	Mean	2008	2009	Mean
Baycor (bitertanol)	0.05	5.4 (12.31)*	7.0 (14.38)	6.2 (13.57)	90.0	90.6	90.3
Bayleton (triadimifon)	0.05	4.8 (11.89)	6.3 (13.81)	5.6 (12.81)	91.1	91.6	91.3
Blitox-50 (copper oxychloride)	0.30	14.3 (20.13)	19.7 (25.31)	17.0 (22.58)	73.5	73.6	73.5
Contaf (hexaconazole)	0.05	5.3 (12.10)	6.9 (14.19)	6.1 (13.30)	90.2	90.8	90.5
Indofil M-45 (mancozeb)	0.30	6.1 (13.30)	8.1 (15.84)	7.1 (14.27)	88.7	89.1	88.9
Punch (flusilazole)	0.05	5.2 (11.98)	6.8 (14.04)	6.0 (13.03)	90.4	90.9	90.6
Score (difenoconazole)	0.03	4.9 (11.92)	7.1 (14.60)	6.0 (13.03)	90.9	90.4	90.6
Control (unsprayed)	-	53.9 (50.83)	74.2 (69.38)	64.1 (60.13)	-	-	-
CD _{0.05}		(4.12)	(7.03)				

*Figures in parentheses are arc sine transformed values

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