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BLACK ROOT ROT IS A GREAT MENACE TO STRAWBERRY CULTIVATION

***Chaturbhuj Meena[1], I.B. Maurya[2], P. Bhatnagar[3]and Ashok Kumar[4]**
[1]Assistant Professor, Plant Pathology, [2]Professor and Head, Vegetable Science,
[3]Assistant Professor, Fruit Science, [4]Assistant Professor, Biotechnology
College of Horticulture & Forestry, Jhalawar, Rajasthan
E-mail: cbmeena76@yahoo.com (**Corresponding Author*)

Abstract: Black root rot of strawberry is often referred to as a disease complex, because many different factor including living and non-living. Among the living factor fungi like *Pythium, Rhizoctonia and Fusarium*, is very common. The field experiment was laid out at CHF Jhalawar Rajasthan with Six varieties of strawberry including Winter Down, Fortuna, Elyana, Suberina, Cristal and Safari. Disease incidence in revealed that minimum disease incidence was observed in cv. Cristal 23.96 per cent which is significantly less as compared to other cultivars while maximum incidence was observed in cv. Safari i.e. 85.42 per cent.
Keywords: Strawberry, Black Root Rot, Cristal, *Pythium, Rhizoctonia*.

Introduction

Strawberry, *Fragariaxananassa* (Western) Duchesne ex Rozier (Family Rosaceae) is a hybrid of two native Americansps; *F. chiloensis*and *F. virginiana,* was first developed in the France in 17th century. It is small fruit, grown thought out the world.Itis deep red in color with unique shape and flavor. It grows well under temperate climate but also grown be grown in tropical and subtropical climates. The major strawberry producing countries in the world are USA, Spain, Japan, Poland, Korea, Australia, Turkey, New Zealand and Russian federation (Sharma *et al*., 2009, Pandey, 2014). The United States is the world largest producer of strawberries accounting for about 30 per cent of the world strawberry production (Morgan, 2012). In India, it is being cultivated near the vicinity of metropolitan cities, some area of Himachal Pradesh, Haryana, Jammu and Kashmir Uttrakhand (Dehradun) and Maharashtra etc. The Panchgani-Mahabaleshwer region of Maharashtra grows more than 85 percent of country's strawberries. Presently, strawberry cultivation is spreading in plain of Indian

Figure 1 Healthy root in left side and diseased root in right side

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climatic condition. The farmers have also started its cultivation in Rajasthan in small pockets because it is a high value and short duration income generating fruit crop. Anumber of varieties of strawberry i.e. Sweet Chalie, Festivel, Camrosa, Belrubi, Winter Dawn, Senga Senga, Chandler, Gorella Douglas, Ofra, Phenomenol, Selva, Red Coat Torrey, Pajero, Confectura, are notable among the growers in different region of India. Although, many biotic and abiotic factors including temperature, humidity, diseases caused (by fungi, bacteriaand viruses) and pests are great menace to its cultivation. Amongst the disease, black root rot (Figure1) is one of the most important problem affecting strawberries in commercial planting. Black root rot of strawberry is often referred to as a disease complex, because many different factors including living and non-living. Among the living factor fungi like *Pythium, Rhizoctonia and Fusarium*, are very common. The present investigation aimed to find out resistant/tolerantvariety of strawberry against black root rot pathogen.

Symptoms: Black root rot is more common in areas where strawberries have been planted for many years but symptoms also occur in newer planting. It generally become apparent during first fruiting year. Above ground symptoms (Figure 2) often are renowned first in low area or places where soil is especially wet, heavy and trampled. The first symptoms of BRR are often missed. Infected plants have poor growth and produce less and smaller fruit. As the disease becomes more severe, plants are clearly underdeveloped. Plants may wilt and the edges of leaves turn brown or a 'scorched' appearance. Plants continue to decline and often die after the high stress of fruit production. In larger patches, disease often starts in low lying areas or areas with poor drainage. Each year the mortality of infected plants expands.

Figure 2 Above ground symptom of BRR of Strawberry

Plants displaying the above symptoms should be carefully dug up and washed, keeping intact as much of the root system as possible. A healthy plant will have young roots that are creamy white with multiple fine root hairs and older roots will have a dark brown to black woody outside layer but a white interior. Plants with BRR are often described as 'rat tail' because most of the finer feeder roots are rotted away leaving only the thick anchor roots. The remaining young roots have random gray to reddish brown sunken blotches. These lesions can expand to cover large areas of the

root. The infected roots are soft and mushy. When touched, the outer layer often falls away, leaving only a thin strand from the core of the root.

Cause: One or more of the black root rot pathogens are commonly found in soils. Disease develops when plants are stressed by drought, water-logged soils, winter injury, poor nutrition, and root feeding by lesion nematodes (*Pratylenchus penetrans*) or insects. *Rhizoctonia* sp., *Pythium* sp., and *Fusarium* sp. are root rotting fungi that infect and rot roots of stressed strawberry plants. This complex interaction of root rotting pathogens, environmental factors and other pests is known as black root rot. Root tips and young feeder roots may be completely rotten and fall off. Infection in older roots is limited to the outer tissues of the root; leaving a white core that is unaffected. The disease commonly occurs in fields with a long history of strawberries where the pathogenic fungi had significant time to build-up their numbers.

Materials and methods: The field experiment was laid out at CHF Jhalawar Rajasthan with six varieties of strawberry including Winter Dawn, Fortuna, Elyana, Suberina, Cristal and Safari. The experiment was designed in Randomized Block Design with four replication having 4 m^2 (24 plant) per replication on raised bed. The observation was recorded on disease incidence.

RESULTS

Table 1: Incidence of Black root rot in different strawberry cultivar

Variety	***Average number of plant per 4 m^2**	***Number of plant died per 4 m^2**	***Number of plant live per 4 m^2**	***Per cent disease incidence**
Winter Dawn	24	19.25	4.75	80.21
Fortuna	24	11.75	12.25	48.96
Elyana	24	19.5	4.5	81.25
Suberina	24	12	12	50.00
Cristal	24	5.75	18.25	23.96
Safari	24	20.5	3.5	85.42
SEm+-				10.43
CD				22.24
CV				23.94

*average of four replication

Disease incidence in (Table 1 and Figure 3-8) revealed that minimum disease incidence was observed in cv. Cristal 23.96 per cent (Figure 3) which is significantly less as compared to other varieties while maximum incidence was observed in cv. Safari i.e. 85.42 per cent (Figure 4). This is also revealed that cv. Cristal may tolerant to Black root rot of Strawberry.

Figure 3

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

Figure 3-8 Incidence of **BRR** in different strawberry cultivar

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