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EVALUATION OF APPLE CULTIVARS TO POWDERY MILDEW

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Abstract

Apple powdery mildew caused by the fungus *Podosphaera leucotricha* is widely spread both in fruiting orchards and in tree nurseries in Pakistan. The disease is serious in orchards grown at Murree. Powdery mildew can affect trees directly by killing fruiting spurs and causing russet on fruits. Twenty-six apple cultivars from USA (6), UK (5), Germany (7), Lebanon (6), Korea (1) and Pakistan (1) were evaluated for their reaction to powdery mildew disease according to 0-5 scales at Hill Fruit Research Station, Sunny Bank, Murree during 2001. Out of 6 USA cultivars 3 showed range of mean disease severity 0.3-1.5, out of 5 cultivars from UK 3 showed 1.2-1.4, out of 7 cultivars from Germany 5 showed 0.5-1.3, out of 6 cultivars from Lebanon 5 showed 0.4-1.3 and one cultivars from Korea showed 1.4 mean disease severity indicating cultivar resistance.

Introduction

Apple (*Pyrus malus*), an important fruit of Pakistan is infested by a number of insect pests and diseases in which powdery mildew causes considerable damage to the fruits. The disease is seen on young leaves as soon as the bud burst into leaf. Under heavy infection, shoot may also become weakened. Small patches of white and gray mildew are seen on the under surface of young leaves which later extends on both surfaces of leaves which become narrower with curled margin, somewhat twisted and crinkled. There is partial defoliation leaving small leaves at the end of shoots. Even flower may be attacked in which case no fruit is formed. Young twigs are stunted. The mycelium is superficial which sends haustoria into epidermis. The diseased portions which keep hanging on trees, affected bud scales, fallen twigs and leaves help the fungus to perennate. The disease can be managed with application of fungicides, resistant cultivars and other cultural methods (Reuveni *et al.*, 1998, Efanov, 2000, Reuveni, 2000, Evans *et al.*, 2000, Barden & Marini *et al.*, 1998). Urbanietz *et al.*, (1999) assessed apple cultivars susceptibility to powdery mildew and observed variability in level of their resistant to this disease. Experiments were carried out for the evaluation of apple germplasm against powdery mildew disease.

Material and Methods

Twenty-six apple cultivars obtained from USA (6), UK (5), Germany (7), Lebanon (6), Korea (1) and Pakistan (1) were tested during 2001 against powdery mildew at the Hill fruit Research Station Sunny Bank Murree which has an average elevation of 2210 meters above sea level with a mean precipitation record of 1400-1600 per annum.

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Table 1. Response of apple cultivars against powdery mildew disease.

Cultivars	Mean	Range	Reaction
USA			
Winter Banana	3.0	2-5	MS
Sky Spur	1.5	1-2	R
Nugget	1.9	1-3	MR
M-C-Intosh	3.7	3-5	S
Golden Russet	0.3	0-1	R
Newton Yellow	0.5	0-1	R
UK			
English No.3	1.4	1-2	R
English No.1	4.1	3-5	S
Winter Greening	1.5	1-2	R
Gearnny Smith 1	1.2	1-2	R
Gearnny Smith 2	4.2	4-5	S
Germany			
Jeorge Cave	2.8	2-4	MS
Rottor Boss	1.3	1-2	R
Jonathon	4.7	4-5	HS
Granen steiner	1.3	1-2	R
German Apple No2	0.5	0-1	R
German Apple No1	0.5	0-1	R
Tangier	1.0	0-2	R
Lebanon			
Golden Lebanon	1.3	1-2	R
Starking	0.6	0-2	R
Jaint Geniton	0.6	0-1	R
Golden Delicious	1.2	1-2	R
Double Red Lebanon	0.4	0-1	R
Starking Delicious	4.7	4-5	HS
Mangnolia golden	1.4	1-2	R
Quetta Amri	1.7	1-3	MR

Four trees of each cultivar and five observations on each tree were recorded on 0-5 severity scale where 0-no infection 1,1-5% leaves infected, 2, 6-25% leaves infected 3, 26-50% leaves infected, 4, 51-75% leaves infected, 5, 76-100% leaves infected. For response value mean severity 0-1.5 was represented as resistant, 1.6-2–moderately resistant, 2.5-3 –moderately susceptible, 3.5-4 susceptible and 4.5-5 highly susceptible.

Results and Discussion

Disease severity 3-5 was recorded on M-C-Intosh indicating that it was susceptible. Out of six cultivars from USA viz., Sky spur, Golden Russet and Newton Yeliow remained resistant. Similarly out of five cultivars from UK. English No.1 showed mean disease severity 4.1 with susceptible response. The cultivars English No 3 Winter Greening and Gearnny Smith were found resistant (Table 1). Out of seven cultivars from Germany, Jonathan gave 4.7 mean disease severity and showed high susceptible reaction.

The cultivars Rottor Boss, Granen Steiner, German Apple No 2, German Apple No 1, and Tangier were resistant (Table 1). Out of 6 cultivars from Lebanon, one from Korea and one from Pakistan, the cultivar Starking Delicious from Lebanon showed mean disease severity 4.7 and it was highly susceptible.

The cultivars from Lebanon, Golden Lebanon, Starking, Jaint Geniton, Golden Delicious and Double Red Lebanon were resistant. One cultivar Magnotia Golden from Korea remained resistant and one from Pakistan, Quetta Amir showed moderately resistant reaction (Table 1). The present results are partially similar to the previous reports of Reuveni *et al*., (2000), Efanov, (2000), Evans *et al*., (2000), Barden & Marini (1998), Washington *et al*, (1998) and Urbanietz *et al*, (1999). Powdery mildew incidence % age was highly variable with respect to cultivars and source of germplasm. There is need to further study on molecular marker to identify resistant gene linked to mildew, characterization of new sources of genetic resistance, studying the variation of the pathogen, developing and utilizing new selection strategies.

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