



## Reactions of 18 potato cultivars against black scurf disease caused by *Rhizoctonia solani* Kuhn

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### Abstract

Eighteen potato varieties/cultivars were evaluated against black scurf disease under field conditions on 25-11-2015 in Plant Virology Research Area, Ayub Agriculture Research Institute, Faisalabad. Experiment was conducted under Randomized Complete Block Design (RCBD). Out of these eighteen varieties no immune variety was found. Three varieties/lines (FD 74-21, FD 73-73 and SL 15-10) were found resistant. Only one variety/line i.e FD 61-3 showed moderately resistant. Six varieties/lines (simply red, FD 63-1, SL 5-2, SL 9-4, FD 78-51 and SL 14-15) exhibited moderately susceptible reaction. Eight varieties/lines (FD 71-1, FD 77-4, SL 15-10, FD 78-36, FD 76-67, Sante, FD 35-36, FD 76-18) were found susceptible against black scurf disease.

**Keywords:** Resistant, Black scurf, *Rhizoctonia solani*, Potato.

### Introduction

Potato (*Solanum tuberosum* L.) belonging to Solanaceae family, is starchy, tuberous food crop. Following rice, wheat, and maize, potato is the fourth largest food crop all over the world (IYP, 2008). In Pakistan it is the most prominent vegetable possessing 16-22% starch that is used in multiple combinations with meat, rice and mutton. Demand of potato consumption is increasing day by day, however average per acre yield is stagnant due to some biotic and abiotic stresses. Pathogenic diseases are among the most common and major yield hindering biotic stresses in Pakistan. For the last few years, soil and seed-borne diseases have become main threat to potato production in Pakistan (Ahmad et al., 1995). Black scurf (*Rhizoctonia solani*) is major diseases present in almost all production zones of Pakistan. This disease can arise on potato plants at some time during planting to harvest and potato plants are most seriously damaged at early stages soon after planting. This leads

to killing of underground sprouts resulting in reduced patchy stand of weak plants and consequent yield reduction (Hooker, 1981). Promising potato sprouts may become infected causing girdling and stem crumple. Black to dark brown sclerotia become apparent on the outside of mature tubers (Carling & Leiner, 1986; Frank, 1981). The disease causes a reduction in the size of young tubers as well as in produce (Carling & Leiner, 1986; Dillard et al., 1993; Leach & Webb, 1993). The tuber symptoms comprise of cracking, deformity and pitting leading to poor quality tubers.

Black scurf is identified by very small black sclerotia on the effected tuber surface. This disease also causes a russetting or checking on the tuber surface these symptoms are confused with those of common scab. Keeping in view the damage caused by these diseases it was imperative to categories the advanced cultivars

of potato possessing resistance or tolerance toward the black scurf.

## Materials and Methods

Disease screening nursery comprising of 18 varieties/ advanced lines was established in the research area of Plant Virology Section Plant Pathology Research Institute Faisalabad, Pakistan, during 2015-2016. Seed tubers were obtained from Potato Research Institute, Sahiwal, Pakistan. The tubers were cultivated in sick plot with natural infested soil that was developed by continuous growing of potatoes lines / varieties. The sick soil provides a natural reservoir of commonly occurring soil borne tuber diseases.

The germplasm was sown on 25.11.2015, keeping a distance of plant to plant and row to row distances as 20 cm to 75 cm, respectively. The plot size was 7m x 0.75 m. The agronomic and plant protection measures in all 3 replications of all the entries were homogeneously treated. The trial was conducted according to the RCBD with three replications. During the design sampling probability sampling was chosen, the sample was considered as representative and the sampled units had probability of equal chance of selection in general data dissemination System (Boyko and Hill, 2009).

Tubers were harvested at plant senescence and washed and each tuber was scored for black scurf according to a visual tuber surface cover score ranging from 0 to 6 disease rating scale developed by Ahmad *et al* (1995).

**Table.1. Disease rating scale for assessment of black scurf disease of potato.**

Sr. No.	Area affected	Rating	Degree of susceptibility/Resistance
1	no symptoms	0	Immune
2	less than 1 %	1	Resistant
3	1-10 %	2	Moderately resistant
4	11-20 %	3	Moderate susceptible
5	21-50 %	4	Susceptible
6	above 50 %	5	Highly susceptible

## Results and Discussion

Out of 18 varieties/lines (FD 74-21, FD 73-73, SL 15-10, FD 61-3, simply red, FD 63-1, SL 5-2, SL 9-4, FD 78-54, SL 14-15, FD 71-1, FD 77-4, SL 15-10, FD 78-36, FD 76-67, santé, FD 35-36, FD 73-18) screened against black scurf disease caused by *Rhizoctonia solani* no variety/line was found immune. Three varieties/lines (FD 74-21, FD 73-73, SL 15-10) were categorized as resistant. Only one variety/line (FD 61-3) expressed moderately resistant reaction. Six varieties/lines (simply red, FD 63-1, SL 5-2, SL 9-4, FD 78-51, SL 14-15) exhibited moderately susceptible response. Eight varieties/lines (FD 71-1, FD 77-4, SL 15-10, FD 78-36, FD 76-67, Sante, FD 35-36, FD 76-18) were found susceptible against black scurf disease. The most appropriate method to overcome on black scurf of potato is the use of resistant varieties. Different potato cultivars have different response against the black scurf disease of potato. From the results it was cleared that three varieties/lines showed resistant response, One variety was moderately resistant, six varieties were moderate susceptible against the disease and eight varieties/lines were susceptible. These results were matched to Jeger *et al.*,

(1996) who performed an experiment in which they concluded that there is no immune variety against black scurf disease. These results shows equivalent correspondence to the findings of Rauf *et al.*, 2007 who used fifteen potato cultivars against black scurf disease of potato under greenhouse conditions. They found Cardinal variety resistant while Desiree was highly susceptible against the pathogen. These results also agree those of Naz *et al.*, 2008 in which 5 potato varieties/cultivars were checked against black scurf disease. Out of these five cultivars of potato Desiree variety showed high susceptibility against the pathogen while Cardinal variety was resistant against *Rhizoctonia solani*. In 1969 Desiree was approved in Pakistan and since then this cultivar was widely cultivated especially in Punjab. However, it is now established that this cultivar has become highly susceptible to *Rhizoctonia solani*. So, now cultivation of Desiree variety should be avoided. Cardinal is high yielding red skinned variety, released in 1975 in Pakistan and since then this variety showed resistance response against the *Rhizoctonia solani*. It should be grown in black scurf disease susceptibility area to minimize the disease incidence (%).

## Conclusion

FD 74-21, SL 15-11 and FD 73-73 were found the most resistant varieties against the black scurf disease of potato. So we should grow these varieties/lines in our soils to avoid the damage from this disease

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