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SUMMARY

Powdery mildew disease attacked cucumber plants in open fields and protected cultivations, reflecting a serious damage for the infected plants and results a great yield loss. The present investigation aimed to study some pathological features of the pathogen on cucumber hybrids. The results obtained from investigation could be summarized as follows:

1- The values of powdery mildew disease severity during the spring season of 2002/2003 were generally higher than those recorded during autumn and / or summer seasons. Where the highest value of mean disease severity was recorded at Sakha (Kafr ElSheikh) followed by those at (Gamasa) Demiatte and at Nubariya (Behira). On the other hand, the lowest values of powdery mildew severity on cucumber were recorded during the summer season at Oseim (Giza) followed by those at Qaha (Qalubiya) and Shibin Elkom (Minufiya).

2- Symptoms of powdery mildew observed on cucumber cotyledons two weeks after planting and on true leaves after three weeks. Symptoms appeared as white fungal growth develops on cucumber leaves and green stems. They appeared as tinny, white to dirty gray lesions.

3- The fungal growth is primarily asexual spores (conidia). It usually develops first on crown leaves, on shaded lower leaves, and spread to cover both leaf surfaces with a white fluffy powdery mass of superficial mycelium and conidia. Older plants are affected first. Plants may senesce prematurely and infected leaves usually wither and die.

4- According to the criteria of conidial stage, the causal fungus of powdery mildew on cucumber hybrids under open fields and greenhouse conditions in Egypt is *Sphaerotheca fuliginea* (Schlechtend.: Fr.) Pollacci. The perfect stage of *S. fuliginea* was not observed under each open fields and greenhouse conditions.

5- Swollen conidia were oval or barrel shaped containing fibrosin bodies. Germ tubes were short and thick, sometimes forked from the side of the conidium. These criteria were associated with *S. fuliginea*.

6- As for host range, *S. fuliginea* infected all cantaloupe, squash watermelon and cucumber tested cultivars and differed among them in percentage of disease incidence and disease severity.

7- Pathogenic variability of naturally occurring of *S. fuliginea* based on the infection type (IT) against different cucumber hybrids results the disease reaction. Disease reaction indicated that some variability was evident among the isolates in virulence pattern as the isolate from El-Ayat (Giza) were highly virulent. Other isolates collected from Baltim (Kafr El-Sheikh), El-Kasassin (Ismailia), Gamsa (Demiatte), Nubariya (Behira), Qaha (Qalubiya) and Shibin El-Kom (Minufiya) were similar showing low virulence pattern.

8- On the basis of their response to the pathogen (isolate from El-Ayat, Giza) which exhibited high virulence level the tested hybrids could be divided into three groups:

a- The first group included resistant (R) hybrids (Deligt Green, Marmar, Medina, Premo, Sweet Crunch, Thamin and Yasmina).

b- The second group comprised partial resistance (PR) hybrids (Joy and Sure Green).

c- The third one contained susceptible (S) hybrids (Afdal, Beit Alpha, Betostar, Chinease long, Deltastar, Green Bowl, Hesham, Maram, Nile, Pasandra, Rawa, Sahara and Shrouqe).

9- Expression of four components of resistance to *S. fuliginea i.e.* disease incidence (DI), disease severity (DS), peak severity (PS) and area under the disease progressive curve (AUDPC) was studied in different cucumber hybrids. All components showed significant variation among hybrids, and correlations between components were significant.

10- Electrophoresis of Protein banding patterns of eight cucumber hybrids revealed the possibility of using electrophoretic technique to differentiate cucumber hybrids reaction against powdery mildew disease.

11- Cluster analysis, based on similarity levels generated from cluster analysis of electrophoretic technique, divided cucumber cultivars into two subcluster (SL = 82.09%). The higher SL, included the susceptible hybrids (Afdal, Beit Alpha and Rawa) which formed a subclusters (SL = 96.57%). The other treatments which included the partial resistant hybrids (Joy and Sure Green) and the resistant ones (Sweet Crunch and Thamin) which formed the another subcluster (SL = 88.52%).

12- Powdery mildew severity and AUDPC varied according to planting dates with showing significant differences between disease severities at different dates. The 1 *st* date (1 *st* September) was the most appropriate planting date, where the lowest disease severity and AUDPC values. These followed by the 2 *nd* date (15 *th* September). The planting at 3 *rd* (30 *th* September) was unsuitable due to the highest disease severity and AUDPC values.

13- Increasing nitrogen dose increased the severity of powdery mildew and AUDPC values in cucumber. Increasing of potassium dose decreased disease severity and AUDPC. No effect could be detected among the three tested levels of phosphorus on both the disease severity and AUDPC.

14- The lowest disease severity and AUDPC were obtained with K (200 kg) and N (100 kg) + K (200 kg) + P (300 kg) / feddan. However, the highest disease severity and AUDPC were obtained when N (400 kg) + K (50 kg), N (400 kg) + P (75 kg) and N (400 kg) + K (50 kg) + P (75 kg)/ feddan were applied. Increasing potassium dose added to nitrogen or phosphorus decreased disease severity and AUDPC.

15- Both potassium and sodium phosphate salts controlled the disease severity as compared with the untreated check. Also, all tested concentrations of phosphate salts decreased powdery mildew severity. Significant differences were detected in the interaction between phosphate salts and cucumber cultivars. It could be concluded that potassium phosphate salts were more effective in controlling powdery mildew on cucumber than sodium phosphates. The most effective treatments were K_2HPO_4 and KH_2PO_4 with significant differences with check. These followed by sodium salts Na_2HPO_4 and NaH_2PO_4. Also, increasing the phosphate salts concentration decreased disease severity.

16- All tested fungicides reduced powdery mildew severity at all intervals of spraying. The systemic fungicides were most effective than the contact ones in controlling the disease.

17- Topas followed by Sumi-8 and Pancho followed by Afugan, Bayfidan, Bellkute and Trifimine were the most effective fungicides in reducing powdery mildew severity on cucumber. On the other hand, Karathane, Soril 81 and Sulphonil were also effective against the disease and it may be applied only before disease incidence as protectant fungicides.