SUMMARY

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The results of the present study could be summarized in the following points:

1. Powdery mildew of flax was surveyed in three flax-growing governorates in middle Delta (El-Gharbiya), north Delta (Kafr El-Sheikh), and east Delta (Sharqiya). Disease incidence and disease severity were used as criteria for evaluating disease intensity in the surveyed fields. The three governorates did not significantly differ in disease incidence and disease severity. Prevalence of the disease was evaluated within each governorate. Six locations were surveyed in El-Gharbiya and 3 locations in each of Kafr El-Sheikh and Sharqiya). The only significant differences in disease incidence and disease severity were observed within El-Gharbiya and Sharqiya, respectively. The highest disease incidence level of El-Garbiya Governorate observed in Santa, while the lowest disease was observed in El-Gemmeiza. The lowest levels of disease severity in El-Sharqiya were observed in Menia El-Kamh and Ibrahimia, while the highest levels were observed in Diyarb Nigm and El-Qanayat.

2. *Oidium lini* has three distinct morphotypes differ in shape of conidia: cylindrical conidia (morphotype 1), bullet-shaped conidia (morphotype 2), and barrel-shaped (morphotype 3). Morphotype 3 was never observed on the field-grown plant during the growing season. It was observed only on greenhouse-grown plants in September and October. The occurrence of this morphotype was restricted to cotyledons and

never spread to true leaves. It caused sever stunting followed by quick death of the infected plants.

3. The teleomorph of *O. lini* was identified by evaluating the relatedness between *O. lini* and some anamorphs of powdery mildew fungi whose teleomorphic taxonomy is well established. Three methods were used in the evaluation. They were: (1) biostatistical analysis of some quantitative morphological traits. (2) Serological interactions. (3) Sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE) of proteins. The obtained results of the three methods revealed that morphotype 1 and 2 belong to *Erysiphe polygoni* while morphotype 3 belongs to *E. cichoracearum*.

4. The influence of temperature and relative humidity (RH) on conidiospore germination and germ tube elongation of *O. lini* were evaluated on glass slides incubated at different combinations of temperatures and relative humidities. Germination of conidia as well as elongation of germ tubes occurred over a wide temperature range from 5-30°C; however, maximum spore germination and germ tube elongation occurred at 25°C. Spore germination and germ tube elongation occurred from 5.2 to 100% RH with an optimum of 100% RH for the two variables.

5. A diverse group of compounds were evaluated for control of flax powdery mildew on Giza 7 and Giza 8 flax cvs. under field conditions in 1995 and 1996, respectively in Sakha and El-Gemmeiza. Disease intensity variables (DI and DS) and agronomic traits were used as

criteria for evaluating the tested compounds. These compounds include fungicides (TFS, Bayfidan, Bayleton, and Rubigan), Film-Forming polymers (Nu-Film 17 and Super Film), and bicarbonate salts (Sodium, potassium and ammonium bicarbonates). Bayfidan and Rubigan were the best performing compounds in controlling flax powdery mildew. Of the eight sprays applied over the two years in the two locations, Bayfidan significantly reduced disease incidence seven times (87.5%), and disease severity five times (62.5). Rubigan significantly reduced disease incidence six times (76.0%), and disease severity five times (62.5). Bayfidan and Rubigan showed high level of efficiency in reducing disease incidence and disease severity after the second spray over years and locations.

6. Thirteen sowing dates were evaluated as to their effect on powdery mildew intensity variables and yield of flax cultivar Giza 5 in an outdoor pot experiment. It was evident that powdery mildew intensity variables reached maximum levels on young plants (late sowing dates) and decline considerable on adult plants (early sowing dates). The intensity of the disease on young plants was significantly reflect on deterioration of seed and straw production. According to the findings of this study, flax should be sown during November to minimize the losses in seed and straw production but not disease intensity.

7. Ten flax genotypes were evaluated under field and greenhouse conditions for powdery mildew resistance. genotypes 8 (110/3) and 9 (282/37/14/8) showed the highest level of susceptibility to the disease.

In the second year. However, they maintained high level of productivity, thus, straw yield and seed yield of these two genotypes did not significantly differ from Giza 7. Under greenhouse conditions, these two genotypes were more susceptible to the disease than Giza 7. However, their straw yield was higher than that of Giza 7. Taken together, it seems reasonable to conclude that these two genotypes are more tolerant to the disease compared to Giza 7.

8. Nine clay soil samples were obtained from different flax-growing areas. The relationships of flax powdery mildew to 22 physical and chemical edaphic factors of these soils were studied by simple correlation. It was found that EC, Ca^{++}, Na^{+}, Cl^{-}, and N were positively with correlated with disease incidence. Iron and coarse sand were positively correlated while K^{+} and Mg^{++} were negatively correlated with disease severity. HCO_3 was positively correlated with straw weight/plant. These results suggest that intensity of flax powdery mildew could be reduced by avoiding excess nitrogen fertilization and by addition of potassium or magnesium to the soil or foliar sprays.

9. Effects of seed rate, nitrogen fertilization and phosphorus fertilization on intensity of flax powdery mildew were studied under field conditions in 1995 and 1996. Effect of phosphorus fertilization on disease incidence in 1995 was variable depending on seed rate. In general, the overall means of all levels of phosphorus fertilization caused significant reductions in disease incidence. The overall means of nitrogen levels revealed that significant reduction were obtained by all

nitrogen rates except the rate of 70 kg/feddan, which was ineffective in reducing disease severity significantly. In 1996, seed rate, nitrogen rate, phosphorus rate, and their interactions were all nonsignificant sources of variation in disease incidence and disease severity. Evidently, nitrogen fertilization was important sources of variation in most of the tested agronomic traits each year. Non of the tested agronomic traits was affected by seed rate each year. Phosphorus was significant source of variation in straw yield/feddan only in 1995. Economically, the best treatment in 1995 was $S_1N_1P_0$ because this treatment consisted of the lowest seed and nitrogen rates and did not require the application of any phosphorus. At the same time, this treatment did not significantly differ from the highest seed yield of $S_4N_3P_1$. That is, the application of this treatment would save 45 kg of seeds, 30 kg of nitrogen and 15 kg of phosphorus without any significant loss in seed yield.