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SUMMARY

Maize is one of the most important cereal crops in many countries all over the world. In Egypt maize is considered the third cereal crops after rice and wheat.

Maize is liable to be attacked by several diseases, which can be considered the major disease i.e. late wilt, common smut and downy mildew. Recently the downy mildew of maize caused by *Peronosclerospora sorghi* (Weston and Uppal) shaw, has become a serious disease in Egypt.

The present investigation was carried out during 1997-2000 growing seasons at Gemmeiza Agricultural Research Station. The results obtained could be summarized as follows:

1-Histo-pathological studies of the fungus showed that the hyphae are hyaline, branched, intercellular. The width of the hyphae ranged from 3.4-4.1 with an average of 3.81 μ . The haustoria are hyaline, spherical, the measurements of haustoria ranged from 5.1-6.8 μ with an average of 6.01 μ . The haustoria formed as vesicles globos from thin measured branched hyphae of mycelium.

2- Conidia are hyaline with thin wall and oval of nearly spherical. The measurements of conidia ranged from 13.7 to 20.5 x 13.7 to 27.4 μ with an average of 15.4x18.5 μ . Conidiophores were erect, hyaline, dichotomously branched with basal cells, the basal cell was knobbed at the bottom. The

measurements of conidiophors ranged from 109.0 to 164.4 μ with an average of 135.6 μ . Conidia germinate by giving 1-2 germ tubes. The measurement of germ tube after 24 hours, reached 157.5 μ in length and 3.4 μ in the average width.

- 3- Oogonium and antheridium are hyaline, spherical. They were found on the same hyphae or on different hyphae. Oogonium large than antheridium, the measurement of oogonium ranged from 25.4-29.0 μ with an average of 27.22 μ . The measurement of antheridium ranged from 17.1-20.5 μ with an average of 18.9 μ in diameter.
- 4- Oospores with thick light yellow wall were found in the infected tissues of plants aged 80.90 and 100 days, they are spherical and measurements ranged from 34.2-47.9 μ with an average of 39.0 μ . Oospores germinate directly by giving germ tube varies in width from 3.4 to 6.7 μ . with average of 4.46 μ , and during germination the, thick yellow wall of the oospore pushes out through the oogonial wall and grows into a germ tube.
- 5- Histo-pathological studies on structure of the fungus from host plant (maize and sorghum) indicated that, oospores were observed only in leaf tissues of the sorghum genotypes, but no oospores were observed in infected tissues of different maize cultivars at any stage of plant growth.
- 6- Number of conidia of *P. sorghi* produced on the systemically infected leaves of both maize and sorghum plant at 30, 40, 50

- day old. No conidia were produced at 10, 20 and 60 days old on both maize and sorghum genotypes. The highest number of conidia was produced on Sudan grass leaves at 40 day old.
- 7- The highest efficiency of biocontrol agents against the conidia produced on maize and sorghum were *T. hamatum*, *T. viride* and *T. harzianum* followed by *B. Subtilus*, *G. virens* and *G. delequescen* while *P. floescens*, was, the lowest effective.
 - 8- The number of conidia produced was completely inhibited with Apron at the rate of 50 p p m and each of Ridomil mancozeb . and Ridomil plus at the rat of 100 p p m.
 - 9- Germination of *P. sorghi* conidia was completely inhibited under the effect of Apron at 50 p p m. and eash of Ridomil plus and Ridomil mancozeb at 125 p p m. Also Apron at the rate of 25 and each of Ridomil plus and Ridomil mancozeb at the rate of 25, 50, 75, 100 p p m caused partial inhibition.
 - 10- Oospores germination were increased by increasing storage period. The highest percentage of germination (67.29) when storage period increased to 48 months, while the lowest germination of oospores (31.26%) was recorded at 12 months.
 - 11- The best of biocontrol agents on oospores germination were *B.subtilus*, *T. hamatum*, *T. harzianum* and *T. viride*, while the lowest effective biocontrol agents were *G. virens*, *G. delequescenes* and *P. floescens*.

- 12- The inhibition power of each fungicide on the oospores germination was completely with Apron at the rate of 50 p p m, Ridomil plus and Ridomil mancozeb at 75 p p m.
- 13- Detection and identification of pathotype of *Peronosclerospora sorghi* was performed according to symptoms of the downy mildew on five sorghum lines which were susceptible to pathotypes of *P. sorghi*, by DNA isolation and RAPD technique the results showed that all isolate of *Peronosclerospora sorghi* from susceptible lines were similarity at 98.53%, 91.26 and 87.19% when used three primers (no 1, 4 and 6) respectively.
- 14- Both chlorophyll (a), chlorophyll (b) and total chlorophyll contents in healthy leaves of the least susceptible (inbred line 629) were lower than that of the highly susceptible (T.W.C 310 and Sordan 79). Infection reduced the content of chlorophyll (a), chlorophyll (b) and total chlorophyll in all cultivars.
- 15- Infection with downy mildew increased the total hydrolysable carbohydrates in leaves of the least susceptible (inbred line 629) and the highly susceptible cultivars (T.W.C 310 and Sordan 79).
- 16- Infected maize and sorghum leaves contained lower amount of nitrogen and phosphorus than the healthy leaves and contained higher amount of potassium than the healthy leaves of cultivars.

- 17- Seed transmission study showed that the disease was transmitted through seeds which were sown at the next day after harvest. No infection was observed on seedlings of maize or sorghum when seeds were stored for 6 months.
- 18- Host rang for *Peronosclerospora sorghi* of family geraminaceae in both summer and winter seasons showed that the most infected species belong to sorghum and maize cultivars, while no infection was recorded on any cultivators of wheat barley and rice.
- 19- Under greenhouse conditions, artificial inoculation with conidiospores at different ages showed that the highest degree of infection of maize hybrids by S.D.M. when these seedlings were inoculation at 7 days after sowing. Artificial inoculated with oospores were significant in producing disease symptoms to both maize hybrids when soil infestation with oospores, with sowing, at 4 days and at 8 days after sowing.
- 20- Ten sorghum differential lines were tested to determination pathotype in Egypt showed that, all lines were used are proved that there are pathotype 2 in Egypt.
- 21- Under field conditions evaluation of white maize hybrids and their parents against downy mildew disease showed that inbred line 628 and inbred line 629 and maize hybrids; namely T.W.C 3052 and T.W.C. 3057 were highly resistant.

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- 22- Evaluation of yellow maize hybrids showed that all maize hybrids tested ranged in between highly susceptible and susceptible. Pioneer dahb was the most resistant ones (highly resistant).
- 23- Some imported sorghum genotypes showed that most resistant against SDM. While the local sorghum genotypes ranged between moderately resistant, moderately susceptible and highly susceptible while, the reported genotypes were highly resistant.
- 24- Increasing nitrogen doses increased the infection whereas increasing phosphorus and potassium doses decreased the downy mildew infection.
- 25- Under field condition, the effect of plant density on downy mildew incidence showed that increasing sowing distance decreased the percentage of infection.
- 26- Decreasing the time between irrigation's increased the percentage of infection with downy mildew.
- 27- Under field condition the best of biocontrol agents against *P. sorghi* were *T. viride* followed by *T. hamatum*, *T. harzianum* and *B. subtilis*. The least effective biocontrol agents were *G. virens* and *G. delectans*.
- 28- The results of comparison between the efficiency of Apron as seed dressing, Ridomil plus and Ridomil mancozeb as foliar spray at different ages when sprayed three time at 7, 14 and

21 days after planting showed that Apron at rate of 2g/Kg, Ridomil plus at the rate of 3g/L and Ridomil mancozeb at the rate of 4g/L gave a complete control of the disease.

29- The results showed that downy mildew infection reduced the yield of all infected maize hybrids causing a significant loss.