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SUMMERY

Brown spot disease caused by *Bipolaris oryzae* is the most destructive foliage disease of rice in Nile Delta Governorates of Egypt namely, Kafr El-sheikh, Dakahlia, Gharbia, Damietta, El-Beheira and El-Sharkia. This study was conducted to study the integrated management of the disease in such area. Results obtained throughout investigation can be summarized as follows:

1. Survey study of brown spot disease conducted in the six different Governorates of the Delta revealed the widespread of the disease in all Governorates. Damietta ranked the first in this respect during 2004 and 2005 seasons.
2. Pathogenicity of nine isolates of *B. oryzae* isolated from diseased rice leaves and grains varied in their virulence. The most virulent isolate was no. 7 followed by no. 8.
3. Evaluation of sixteen rice cultivars toward infection with *B. oryzae* no. 7 indicated that all cultivars differed in their susceptibility. However, Giza 177, Giza 178 and Sakha 103 cvs. were the most susceptible cvs. and exhibited the highest disease severity % (73.34, 69.9 and 60%). While Sakha 104 and Hybrid II cvs. were the least susceptible ones (14%) and (10%) respectively. Results also, indicated that infection of rice cultivars with such fungus caused a remarkable decrease in chlorophyll and phenol contents.
4. Filtrates of antagonists to be tested were examined for their inhibitory action to the pathogen. It is clear from the obtained results that the culture filtrate of *Bacillus* spp. number 5 had the highest effect which inhibited mycelial growth of the pathogen. Culture filtrate also, reduced

number of fungus spores. However, isolate of *Bacillus sp.* number 5 had the highest effect in this respect.

5. A number of 7 fungal antagonistic isolates belonging to *Gliocladium delyenses*, *Gliocladium verins*, *Trichoderma hamatum*, *Trichoderma kongii*, *Trichoderma viride*, *Trichoderma harzianum* and *Trichoderma sp.* were screened. The majority of these bioagents have antagonistic effect against the fungus under study. The best results were obtained by *Gliocladium verins*, while five isolates i.e., *Gliocladium delyenses*, *Trichoderma hamatum*, *Trichoderma kongii*, *Trichoderma viride*, *Trichoderma harzianum* and *Trichoderma sp.* gave score number 2. However, all the antagonistic isolates were effective against *B. oryzae*.
6. The obtained results revealed that extracts of six different plants i.e., Pick tooth (*Ammi visnaga*), Horse weed (*Conyza discoridis*), Artemisia (*Artemisia judaica*), Rosemary (*Rosmarinus officinalis*), Liquarice (*Glycyrrhiza glabra*) and Soosan bulbus (*Pancarium maritimum*) as well as three essential oils i.e. *Minthe viridis* (Mint), *Syzygium aromatum* (Clove) and *Eucalyptus globules* (Blue gum), suppressed growth and sporulation of the causal fungus *B. oryzae*. The effect of these extracts was obviously increased by increasing their concentrations. It is clear from such results that the extracts from flowers of Pick tooth (*Ammi visnaga*) was the most effective against *B. oryzae* by retarding the linear growth of the fungus at 1500 ppm. Extracts of Artemisia (*Artemisia judaica*) occupied the second rank in inhibiting the linear growth of the

fungus. Essential oils were effective as inhibitors *in vitro* to growth of *B. oryzae*. All tested oils inhibited the fungus growth at concentration of 500 ppm, however, Mint oil was the best among the tested oils.

7. Field experiment concerning application of each plant extracts (*Ammi visnaga*, *Conyza discoridis* and *Rosmarinus officinalis*) and essential oils (*Menthe viridis*, *Syzygium aromatum* and *Eucalyptus globules*) as spray on rice plants twice once just after leaf spots started to appear, and the second spray just after flowering stage. The obtained results indicated that each of the applied plant extracts at the rate of 3500 ppm or each of the tested oils at the rate of 1 and 2.5 ml/L significantly reduced disease incidence.
8. The obtained results indicated that salicylic acid when applied on rice seedlings in a greenhouse at concentration of 2, 4 and 6 mM significantly reduced the brown spot disease incidence of artificially inoculated plants. However, it is clear from the results that application of SA before inoculation with spore suspension of the fungus induced resistance in plants compared with treatments after inoculation.
9. The obtained results revealed that the bioagents *Trichoderma harzianum* and *T. hamatum* as seed treatment gave satisfactory control to seedling blight similar to those obtained by the fungicide Vitavex as indicated by increasing yield and thousand grain yield.
10. Concerning the relation between sowing method and brown spot disease incidence, the obtained results indicated that

transplanting was the best method of sowing in decreasing the severity of disease and also, decreased grain discoloration as well as increased weight of 1000 grains rice.

11. Effect of sowing dates on disease severity under field conditions was studied. Disease incidence was increased significantly by late sowing dates (June first) for the tested rice Hybrid one percentage of discolored grains increased by increasing infection severity with late sowing dates in the two seasons.
12. Fertilizers played an important role in reducing disease severity of brown spot resulting in increasing grain yield. Application of inorganic nitrogen (46 N urea plus 5 m³ Farm Yard Manure / fedden) gave the best results since they reduced the disease severity and consequently increased rice yield of Sakha 101 cv.. Increased or decreased amounts of inorganic N fertilizers lead to increase of disease severity. However, urea fertilizer was the best among all tested inorganic N fertilizers.
12. Spraying microelements: Zinc sulfate or calcium chloride and or iron sulfate on Giza 177 rice cv. decreased the disease severity. However, iron sulfate proved to be the best in this respect although differences were not significant in 2006 growing season.