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Summary

Rice false smut incited by *Ustilaginoidiea virens* (cook) is considered to be one of the most important disease attacking rice (*oryza sativa*) particularly in rice producing countries. such disease was recorded in Egypt on rice cv. Giza 171 at kalline district (Kafer El- Sheikh governorate), in 1997 by rice disease researchers at Sakha Research Agricultural Station.

Owing to late occurrence, information were not available in the Egyptian literature or at least were not some much. Consequently. the need was urgent to perform the present investigation so as to focusing high lights on certain topics relevant to physiologic and morphological aspects for the disease and its causal fungus, inoculation techniques, the reaction of local rice cvs. against the disease and the suggested controlling method originated from the local methods of rice cultivation.

The obtained results of the present work could be summarized in the following items:

1- The causal agent could be isolated from smutted grains of rice cvs. Grown in districts in rice growing governorates in Egypt .

2- Ten isolates were identified as *Ustlaginoidea virens* the causal agent of rice false smut .

3- Visual examination of the infected plants of rice cv. Giza 171, indicated that disease symptoms occurred during flowering stage passing through different intervals, ending with the formation of smutted grain (pseudosclerotia) having orange color ending with dark olivaceous color .

4- The final symptoms on rice crop occurred 15 days after heading at ripening stage as separated grains forming

pseudosclerotia or spore ball.

5- The longitudinal section in the infected seed revealed three layers, having white center.

6- The causal agent produces circular primary condiospores and secondary conidia having circular, or ellipsoid shape with orange color.

7- The following techniques for inoculation were suggested and applied :

1- inoculation during floating seeds on water.

2- inoculation during seeds immersion.

3-inoculation during immersion and covering seeds.

4- nursery soil infestation .

5- soil infestation for both nursery and field .

6- infestation of soil field .

7- tow injection before booting stage .

8- one injection during booting stage .

9- panicle immersion in spore suspension after heading.

10- spray by spore suspension after heading .

11- spread by dry spores.

The obtained results indicated that the highest disease severity (60%) were obtained when spikes were immersed in spore suspension, followed by two injections gave (23,53%) infection , while spore suspension gave (18,45%) . On the other hand, the least severity was recorded with permanent soil infestation (2,23%) .

8- Evaluation of ten isolates of *U. virens* indicated that the highest disease severity (3.83%) was recorded with isolate

no.8 followed by isolate no.9 (3,48%) . However the least severity was recorded with isolate no 1 (0,38). Likewise infected plants (%) run in parallel lines with those of severity i.e (2,68), (2,13 %) in respectively. A little bit difference was observed with 1000 grain weight since inoculation with isolate no. 3 induced the highest decrease i.e. (23,04%) followed by isolate no.2 (18,60%) and isolate no. 7 (5,65%).

9 – Effect isolates on seed germination, the obtained results indicated that isolate no. 6 induced the highest decrease in rice seed germination followed by isolate no.2 . On the other hand, isolate no.9 induced the least effect on rice cv. Giza 171 .

10 - The obtained results regarding the evaluation of rice cvs., indicated that long grain rice cvs. i.e. Giza 181, Giza 182 and Yasmin proved to have higher levels of infection with false smut i.e. (20,3%), (10,8 %) and (7,3%) respectively. Infected plants % run in the same trend i.e. (8,32 %. 3,35 % and 4,46%) respectively. The short grain rice cvs. show variable response to false smut, since Giza 171 exhibited (2.90%), Sakha 102, 104 (0.35) concerning 1000 grain weight. The rice cv. Sakha 104 was dramatically affected by the disease since it recorded a reduction (19.27%) followed by Giza 171 (14.2%) Giza 178 (0.55%) .

11- Three bacterial isolates were identified as a *Bacillus subtilis* they were tested for their antagonism to *U.virens* on culture media . they caused inhibition zone against the causal agent . In the addition three isolates of *Trichoderma* sp. were tested for their effect on the causal agent of false smut. They induce over growth on false smut fungus in Petri plate.

12- As regard to the growth of *U. virens in vitro*, seven sources of carbon were tested in Rechards medium. These sources were viz. (rafenose, galactose, maltose, fructose, sorbitol, glucose, starch). The highest dry weight (0.96 gm), was recorded with sorbitol and the reverse was recorded with starch (0.83gm), that gave the highest sporulation rate ($1.21x10^{7)}$/ml as compared to the control ($0.32x10^{7)}$ /ml.

13- Six nitrogen sources were tested on Rechards medium i.e. sodium nitrate, ammonium sulphate magnesium nitrate, potassium nitrate, peptone and urea. The obtained results indicated that the highest dry weight was recorded with sodium nitrate (0.35gm) followed by peptone (0.32gm) comparing with the control treatment. however the least weight was recorded with Urea (0.05gm).the highest sporulation was recorded with Potassium nitrate ($0.93x10^7$) /ml followed by magnesium nitrate($0.60x10^7$)/ml and the control .

14- The effect of false smut on seed germination in different rice cvs. was studied. The obtained results indicated that Sakha 104, Giza171, Giza178 showed reduction in germination estimated by (26.29%), (25.3%), (22.4%) in respectively.

15- The obtained results indicated that during the heading of spikes gave the highest severity on rice cvs. Giza 181, Giza 182 i.e. (9.43%), (4.25%) respectively. Giza 171 showed the least effect i.e. (0.30%). But inoculation after complete heading . Giza 181 stile occupied the highest rank (1.93%). The infected plants (%) run in the same line with those of severity , the highest Giza 181 (24.8%) and Giza 171 (23.82%). The least reduction was recorded with cv. Giza 182 after complete heading .

16- The fertilizers i.e. urea 46%, ammonium sulphate (20%) and balanced NPK were tested on two rice cvs. i.e. Giza 171 and Giza 181 with four levels to each : recommended level, plus two levels over and one level down . The obtained results indicated that the highest disease severity (i.e. 23.48%) was recorded with the higher level than recommended on cv. Giza 171 (5.30%) with urea .However the level below the recommended showed (0.0%) on the same cv. . Giza 181 gave (0.0%) severity at all the levels of urea. but in case of ammonium sulfate the lowest level showed (11.74%) severity

with cv. Giza 171 in contrast giza 181 did not influenced with any of the tested levels .

In case of NPK the recommended level (68.9 gm/m^2) showed the highest severity 17.72% , 76.38% with two cvs. Giza 171,181 respectively, comparing with the rest of levels. But the cv. Giza 181 showed the highest severity with the recommended level of NPK . The infected plants (%) run in the same trend of the disease severity .

17- As regard to the effect of certain bioagents , an experiment was designed containing four fungicides and six bioagent applied on two rice cvs. Giza 171, Giza 181 with two applications method . The first was artificial inoculation and applied control after three days and the reverse (second one) applied the control and artificial inoculation after three days. Severity of infection, efficacy of treatments, infected planted (%) and 1000 grain weight. these parameters of treatments were recorded either under field condition season (2007) or under wire greenhouse during season (2008) . the obtained results indicated that in season (2007), insignificance were observed between fungicides or bioagents except the control and (*T.virdi* , B1) in the first application (inoculation and control after three days), and gave highly efficacy. But when the reverse applied (protection and inoculation after three days, the results showed significant differences between treatments in disease severity .The efficacy was a least except B3 (bio.) and Sumi-8 (fungicide), but (B1) was not affected .Infected plants (%) were run in parallel with highly differences in significant with treatment one and treatment two. Concerning the second applied , the results in season (2008) in the first application (inoculation and protection after) showed significant differences between treatments and the reverse was found in another case as soon as the effect of fungicides, *Trichoderma* and (B1) showed significantly and the efficacy was excessed in cv.Giza171. According to the rice cv.Giza 181, the obtained results showed significant differences between treatments when infection was applied before

protection and the reverse was right, because no significant differences were observed between fungicides, *Trichoderma* and B2 and the efficacy, the infected plant (%) run in parallel way and 1000 grain weight were the same trend approximately. generally the cv. Giza 181.

* the differential in this results were coming to three causes:

1- The change in environmental condition.

2- The rice cultivar which was examined .

3-The biosubstrate may be cause helping to induce infection.

18- Four plant oils i.e. (Menthe, Mustard, Camphor, and Fennel) were tested to controlling false smut disease during season (2008) on rice cv. Giza 181 under wire greenhouse and field conditions by two application :

a- inoculation firstly and treatment after three days .

b- protection by oils and inoculation after three days.

Severity, protection efficacy, infected plants % and 1000 grain weight were recorded, the obtained results Under wire greenhouse condition indicated that

1- in the first case (inoculation and control), Mustard was the best in reducing infection and highly efficacy comparing with the other treatment, the same trend in case of infected plants, on the other hand, fennel oil was highly in 1000 grain weight but no significant differences were observed between each treatments comparing the control .

2- in the second case (protection firstly and inoculation after three days) the obtained results showed completely protection (zero infection and 100% efficacy) except the fennel oil and (96.19%) efficacy. But no significant differences were observed in infected plants (%). According 1000 grain weight,

Menthe and Mustard oils gave a highest 1000 grain weight respectively comparing with the treatment and control.

Under field condition, the obtained results indicated that .

1- In the first case (control),Mustard wase the most reducing to the infection (0.90%) and highly efficacy(81.90%) , and take the same trend in infected plants (%) comparing with the rest treatments ,but no true significant was observed in 1000 grain weight except the Camphor(19.69gm.) and control(19.46gm.) were the least.

2- According the second one all oil showed highly reducing in severity and best efficacy except the Fennel gave 100% efficacy and zero infection comparing the control .The same trend wase made in infected plants (%),but no significant differences were observed between treatments regarding to the 1000 grain weight comparing by the control which wase the less (19.46gm).