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EFFICACY OF VARIOUS FUNGICIDES IN CONTROLLING BROWN LEAF SPOT AND ENHANCING RICE YIELD

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Rice is very important crop in Pakistan. It is largely affected by brown leaf spot of rice in all localities. Its major impact is on grain yield. In order to assess its impact on yield and evaluate various fungicides on number of grains, 1000 grain weight, grain yield (t/h) and cost benefit ratio and their percent increase/decrease over control were recorded. A farmer field with natural disease occurrence was selected at Garhi Awan district Hafizabad, Punjab. The design applied was RCBD (Randomized Complete Block Design) . There were 6 treatments (Difenoconazole 25 EC @ 308ml/h, Azoxystrobin + Difenoconazole 325 SC @ 500ml/h, Trifloxystrobin + Tebuconazole 75WG @ 160gm/h, Thiophanate Methyl 70WP @ 750gm/h, Bismerthiazol 20WP @ 300gm/h and control) and each treatment was replicated 3 times. The fungicide combination of Azoxystrobin and Difenoconazole was found to be the most effective in yield parameters while in terms of cost benefit ratio. Thiophanate Methyl was found to be the most effective followed by the combination of Azoxystrobin + Difenoconazole.
Keywords: Brown leaf spot, fungicides, rice, yield, Difenoconazole and Azoxystrobin

INTRODUCTION

Rice (*Oryza sativa* L.) is the most important cereal crop of Pakistan which is extensively cultivated in Punjab, Sindh, some parts of Balochistan and Khyber Pakhtoon Khwa provinces. It occupies an area of 280 thousand hectares with production of 921 thousand tons (FAOSTAT, 2013). It is seriously affected by many factors over its whole cycle. In addition to other factors, the diseases are considered as major barriers for higher productivity of rice. These become more severe under stress conditions and cause seed discoloration, reduced seedling vigor and the yield losses by affecting both productivity and grain quality as well (Santos *et al*., 2009). Rice yield of Pakistan is lower as compared to advance rice growing countries of the world. Reasons of low yield are attributed to various factors but disease like brown leaf spot caused by *Bipolaris oryzae* has significant importance in decreasing the yield and quality of rice (Iqbal *et al*., 2015).

It occurs every year on most of the cultivated rice varieties (Gupta *et al.,* 2013). It has also been observed that rice cultivation under aerobic conditions resulted in 27.5% yield reduction due to brown leaf spot disease (Patel *et al.,* 2010). Brown leaf spot can be managed by improving soil fertility and application of balanced fertilizers. The foliar application of fungicides against brown leaf spot has been very effective in controlling the disease.

In the last decades, a number of systemic fungicides with different modes of action and targets have been applied to reduce the losses caused by the diseases (Pasquer *et al*., 2005). As rice being an important cash crop in Pakistan and infected by brown leaf spot which causes severe losses to the crop by reducing both quality and quantity of the grains. Therefore, it is a dire need to screen out most effective fungicides for managing this disease out of the fungicides available in the market. The present study was, therefore, designed to evaluate comparative efficacy of various fungicides in controlling brown leaf spot and enhancing the grain quality and yield of rice.

MATERIALS AND METHODS

For evaluation of different fungicides against brown leaf spot of rice, a farmer field with natural disease occurrence was selected at Garhi Awan district Hafizabad, Punjab. The variety sown was PS-2 with date of sowing 25th July 2015. It was provided with urea 85.21 Kg/hectare in two installments. The design applied was RCBD. There were 6 treatments (Difenoconazole 25 EC @ 308ml/h, Azoxystrobin + Difenoconazole 325 SC @ 500ml/h, Trifloxystrobin + Tebuconazole 75WG @ 160gm/h, Thiophanate Methyl 70WP @ 750gm/h, Bismerthiazol 20WP @ 300gm/h and control) and each treatment was replicated 3 times. Fungicides were sprayed two times with 15 days interval on appearance of symptoms. The yield and yield contributing parameters viz. number of grains per panicle, number of filled and unfilled grains per panicle, grain yield (t/h), 1000 grain weight and their percent increase/decrease over control were recorded. The cost benefit ratio was also calculated. The recorded data were subjected to analysis of variance (ANOVA) and LSD test at 5% level of significance for

comparing the difference among treatment means (Steel *et al.*, 1997).

RESULTS AND DISCUSSION

The analysis of the results shows that the fungicide combination of Azoxystrobin and Difenoconazole was found to be the most effective one in terms of 1000 grain weight (23.5 gm) followed by Thiophanate Methyl (23.16 gm). The Difenoconazole alone was the least effective fungicide against brown leaf spot. The percent increase in 1000 grain weight was also observed in Azoxystrobin + Difenoconazole (14.63) followed by Thiophanate Methyl (12.97). In case of number of grains per panicle, either the total number of grains or filled grains, the combination of Azoxystrobin + Difenoconazole was found the most effective one with maximum percent increase over control (50%) as compared to other fungicides.

The least number of unfilled grains was also observed in this combination (Mandal and Jha, 2008) followed by Trifloxystrobin + Tebuconazole (Mia *et al.*, 2001) as compared to control (Santos *et al.*, 2009). Again the grain yield (t/ha) was observed in Azoxystrobin + Difenoconazole combination (4.87) with percent increase over control 19.36 followed by Thiophanate Methyl (4.74) with percent increase 16.17. The least grain yield was observed in Difenoconazole (4.35) as compare to control. In terms of cost benefit ratio, Thiophanate Methyl was found to be the most effective followed by the combination of Azoxystrobin+ Difenoconazole while Trifloxystrobin+Tebuconazole as the least effective one.

These results show that brown leaf spot disease of rice can effectively be controlled by various fungicides. The same has been reported by Shabana *et al*. (2008) for fungicides and anti-oxidants against brown leaf spot. Similarly, the results of this study have also been supported by the findings of Savary *et al*. (2000) who reported that brown leaf spot caused yield loss up to 5% along with qualitative loss and can be managed by the use of fungicides. Various fungicides were also found effective for controlling diseases as reported by Moletti *et al*. (1996); Cortesi *et al*. (2003); Mandal *et al*. (2008) and Mia *et al*. (2001).

CONCLUSION

The rice is greatly affected by brown leaf spot of rice in Pakistan. Various fungicides available in market have potential to manage brown leaf spot at varying level. Among these fungicides, the fungicide combination of Azoxystrobin and Difenoconazole is the most effective against this disease. In alone these fungicides are not as effective as they are in combination. So through this combination the disease can effectively be controlled.

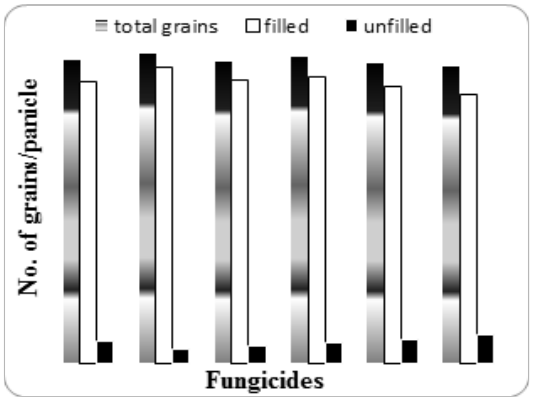

Figure 1: Effect of different Fungicides on No. of grains/ panicle

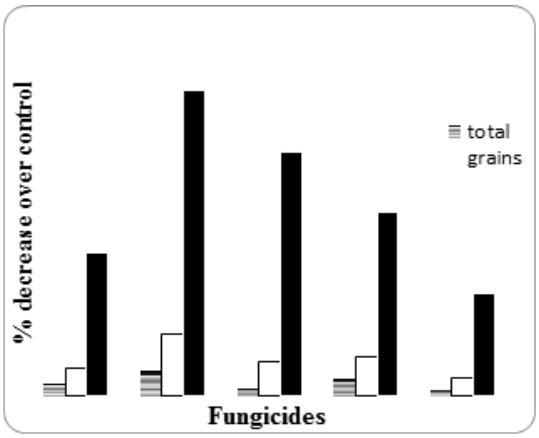

Figure 2: Different Fungicides and % decrease over control

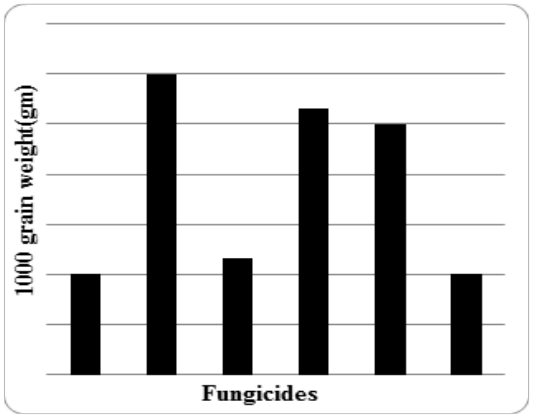

Figure 3: Different Fungicides and 1000 grain weight (gm)

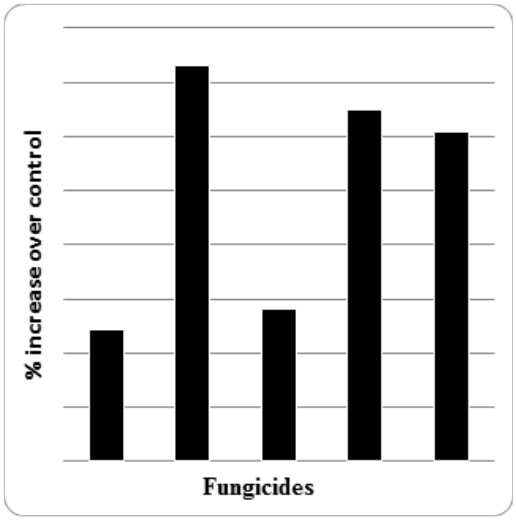

Figure 4: Different Fungicides and % increase over control

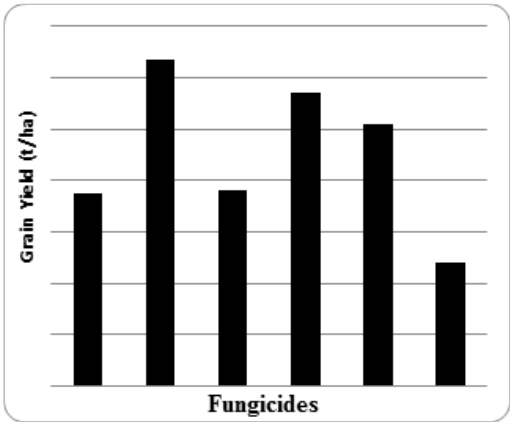

Figure 5: Different Fungicides and Grain Yield (t/ ha)

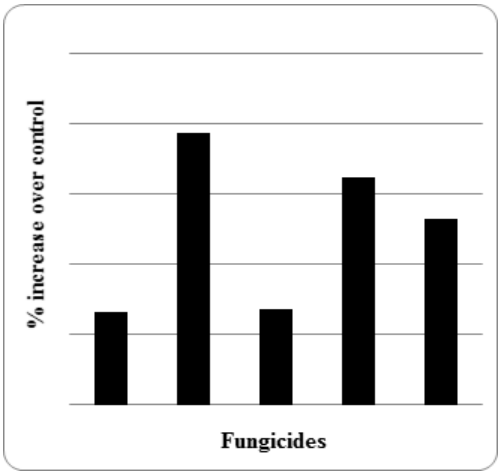

Figure 6: Different Fungicides and % increase over control

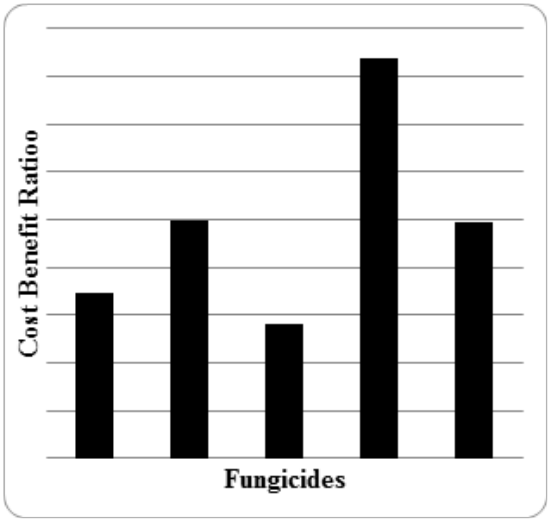

Figure 7: Different Fungicides and Cost Benefit Ratio

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