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Management of disease complex inducing grain discolouration in rice crop in northern Telangana zone of the state

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Abstract
Rice (*Oryza sativa* L.) is predominantly grown as a staple crop in the Nizamabad district of Telangana state. The average productivity of the district varies from 5 - 6 t ha^{-1} and it is a major source of earning to majority of farmers. Grain discoloration disease of rice is becoming a serious threat to rice production in the district particularly in *Kharif* season which caused yield losses. The influence of disease incidence and severity on grain yield and quality of the rice (*Oryza sativa* L.) was investigated by conducting Front –line demonstration on management of Grain discoloration in Rice (var. RNR-15048) crop during three continuous years i.e., 2017-18, 2018-19 and 2019-20 through recommended technology given by PJTSAU at farmers fields in 10 locations each year (one location is equivalent to one farmer field) by Krishi Vigyan Kendra, Rudrur, Nizamabad. Observations were recorded using Standard Evaluation Scale (SES) from 10 randomly selected hills from each location. Results revealed that, eight fungal species such as *Sarocladium oryzae*, *Bipolaris oryzae* (*Cochliobolus miyabeanus*), *Pyricularia grisea* (*Magnaporthe grisea*) *Curvularia lunata, Phoma* sp., *Microdochium* sp., *Nigrospora* sp., and *Fusarium* sp. were the predominant fungal species detected. By adopting the technology, lowest per cent disease incidence i.e., 8.4, 6.8, 8.6 with higher yield returns (q/ha) 66.25, 62.65, 67 with quality grains with an average increase in yield per cent of 8.16, 3.98, 19.11 was noticed in demo plots during 2017-19, 2018-19, 2019-20 respectively. Benefit-cost analysis of demo plots were significantly higher 2.17, 2.96, 2.54 compared to check plots i.e., 1.96, 2.80, 1.83 during 2017-18, 2018-19, 2019-20 respectively.

Keywords: Rice, grain discolouration, demonstration, yield loss, cost-benefit ratio

Introduction
Rice is a staple food that provides more than one fifth of the calories in the world for human consumption. It was also explained the rice consumption is highest in Asia, where average per capita consumption is higher than 80 kg/person/year Rice ranks second amongst the staple food grain crops in the country and it has a major source of earnings. In Telangana, average production in an area of 9.50 lakh hectares in the *Kharif* season and 6.5 lakh hectares in the *Rabi* season [1]. Nizamabad District is situated in the Northern part of the Telangana state with geographical location 18°54' - 18.90"N, 77°52' - 78.52"E. Paddy is being grown predominantly under the ayacut of Nizamsagar, Pocharam, Sriramsagar, Ramadugu and Kowlasnala Projects. Among reasons of low yield of rice, diseases pose a major threat to its production [2, 3]. Among the several diseases infecting rice, grain discoloration, caused by a complex of fungal species such as *Sarocladium oryzae*, *Bipolaris oryzae* (*Cochliobolus miyabeanus*), *Pyricularia grisea* (*Magnaporthe grisea*) *Curvularia lunata, Phoma* sp., *Microdochium* sp., *Nigrospora* sp., and *Fusarium* sp. is an important constraint for lowland and upland rice production and becoming serious under changing climatic conditions. The pathogens found associated with discolored grains has also been reported by [4, 5, 6].

The disease has the potential to reduce the yield of rice as much as 75% in severely affected regions due to reduction in grain weight, floret sterility, inhibition of seed germination, reduction of stands, as well as the year-to-year transmission because of the seed borne nature of the pathogen [7]. The pathogen causing grain discolouration have direct influence on both quality and quantity of seeds. Infected seeds are not preferred for quality seeds posing a serious problem in seed certification and marketing [8]. Different fungicides for the management of grain discolouration of rice in the field [9]. Although grain discolouration diseases has been a minor problem in the past. But in recent years it is becoming a serious problem if no attention is given to the disease.

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Hence, looking to the severity of disease, its economic importance and need of the rice growers, in the present paper front-line demonstrations were conducted to evaluate some commercially available fungicides for the effective management of the problem.

Materials and Methods
Plant Materials and Growth Conditions
Krishi Vigyan Kendra, Rudrur, Nizamabad district of Telangana state has conducted Front –Line demonstration on management of Grain discoloration in Rice (var. RNR-15048) crop during 2017-18, 2018-19 and 2019-20 at farmers fields in 10 locations each year.(one location is equivalent to one farmer field) to study the Grain discoloration disease management in *Kharif* Rice (var. RNR-15048) crop. The crop was transplanted in the field at plant to plant distance 10 cm and row to row distance 20 cm using 2-3 seedlings hill[-1] in the month of 1st Fortnight of August due to its early duration i.e., 125 days and photo sensitivity nature.

The crop was fertilized with urea, Di-Ammonium phosphate (DAP), muriate of potash (MOP) at the rate of 120, 60, 40 kg ha^{-1} respectively. The entire amount of DAP, MOP, were broadcast into the soil at final land preparation. The whole amount of urea was applied as top dressing at three equal splits at 20, 35 and 55 days after transplanting. All intercultural operations were performed in time as per requirement of the crop.

Disease Incidence and Severity
Ten random hills from each farmer field (each location) were selected and tagged for observation from Panicle initiation stage to till maturity stage. Due to frequent rains in *Kharif* season, high relative humidity and cloudy weather prevailing particularly from booting to maturity which inturn influence the grain discolouration in Rice (var. RNR-15048) crop the following treatments or technology (recommended by PJTSAU) was imposed to restrict the pathogen complex. The first spray was taken with Dicofol 5 ml/l + Propiconazole 1 ml/l at the time of panicle initiation (PI) stage. While, the second spray was taken after 15 days of panicle emergence with Spiromesifen 1 ml/l + Propiconazole 1 ml/l. The

observations for incidence of grain discolouration were recorded as per SES scale [10] and for grain yield (kg/net plot) at maturity stage.

There after implementing the technology in farmers fields different parameters has been investigated viz., per cent pest incidence in both Demo plots and check plots, Yield, Total cost of cultivation, Gross & net returns of individual farmer with a sample size of 30 farmers from three years (10 farmers each year).

Results and Discussion
In the present investigation, Front-line demonstrations was conducted with recommended technology (Demo) i.e., first spray with Dicofol 5 ml/l + Propiconazole 10 ml/l at the time of panicle initiation (PI) stage. While, the second spray was taken after 15 days of panicle emergence with Spiromesifen 1 ml/l + Propiconazole 1 ml/l in comparision with farmer practice (Check) in 30 different locations during three continuous years 2017-18-, 2018-19, 2019-20. Disease incidence and severity at farmers fields were recorded during booting to crop maturity stage. Rice panicles with discolored grains were collected from random 10 hills in each location and eight fungal species such as *Sarocladium oryzae*, *Bipolaris oryzae* (*Cochliobolus miyabeanus*), *Pyricularia grisea* (*Magnaporthe grisea*) *Curvularia lunata, Phoma* sp., *Microdochium* sp., *Nigrospora* sp., and *Fusarium* sp. were the predominant fungal species detected among the all fungi on almost all the samples. The pathogen was initially identified morphologically as described in the Technical bulletin on seed-borne diseases and seed health testing of rice [11, 12]. These findings in association with different fungal species of discoloured paddy was reported by [4, 5, 6, 13].

Among the various fungicides tested by the farmers in their fields, the given technology (Demo) significantly reduced the incidence of grain discolouration and increased the grain yield over check plot (farmers practice). The economic analysis of the demo over check was given in the Table.1. The decrease of disease incidence of grain discoloration over farmers practice during three continuous years (2017-19) was given in the Fig.1

Table 1: Economic analysis of Demo over Check in Grain discolouration in Rice (Var.15048)

| Economic Parameters	2017-18		2018-19		2019-20	
	Demo	Check	Demo	Check	Demo	Check
Yield (Q/ha)	66.25	61.25	62.65	60.25	67	56.25
Gross Cost of cultivation(ha [-1])	50000	55000	40250	40875	50250	58250
Gross returns (ha [-1])	108000	106000	119035	114475	127300	106875
Net returns(ha [-1])	58000	51000	78785	73600	77050	48625
Benefit: Cost (B:C) ratio	2.17	1.96	2.96	2.80	2.54	1.83
% increase in Yield in Demo over Check	8.16		3.98		19.11	
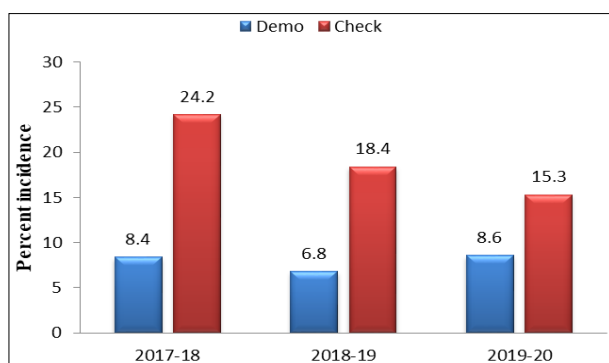
Fig 1: Per cent disease incidence

Conclusion
In the present paper it was concluded that, due to frequent rains in *Kharif* season, high relative humidity and cloudy weather prevailing particularly from booting to maturity Rice crop has been influenced by the complex of fungal pathogens which inturn caused grain discoloration in rice panicles. First spray with Dicofol 5 ml/l + Propiconazole 1 ml/l at the time of panicle initiation (PI) stage. While, the second spray was taken after 15 days of panicle emergence with Spiromesifen 1 ml/l + Propiconazole 1 ml/l which was recommended as an disease management technology module for effective management of grain discolouration disease and increasing the grain yield of paddy. Many farmers were lacking

knowledge in particular to the time of spraying i.e., stage at which the fungicide to be applied. As a result, disease incidence and its severity may not be reduced. In view of the above, Krishi Vigyan Kendra, Rudrur, Nizamabad conducted front-line demonstrations in the farmers fields with recommended technology which improved the grain yield, quality parameters by restricting the disease incidence and showed significant difference in their crop economics.

References

1. Anonymous. India - October crop review and winter crop prospects by informa economics survey - based crop reporting service. Agriwatch Crop-India. 2014; 25:10-16.
2. Ou SH. Rice diseases. 2nd edn. Commonwealth Mycological Institute, Kew, Surrey, England, 1985, 198p.
3. Groth DE, Rush MC, Hollier CA. Rice diseases and disorders in Louisiana. Louisiana Agricultural Experiment Station Bulletin, 1991, 828:37.
4. Ilyas MB, Javaid MS. Mycoflora of basmati 385 seeds collected from Gujranwala, Hafizabad, Sheikhupura and Sialkot Districts. Pakistan J Phytopathol. 1995; 7(1):50-52.
5. Khan TZ, Gill MA, Khan MG. Seed borne fungi of rice from Central Punjab and their control. Pakistan J Phytopathol. 2000; 12(1):12-14.
6. Javed MS, Wahid A, Idrees M, Gill MA, Saleem A. Seed mycoflora studies in rice. Pakistan J Phytopathol. 2002; 14(2):132-134.
7. Trung HM, Van NV, Vien NV, Lam DT, Lien M. Occurrence of rice grain rot disease in Vietnam. Int. Rice Res. Notes. 1993; 18(3):30.
8. Pham Van Du, Le Cam Loan, Nguyen DucCuong, Huynh Van Nghiep, Nguyen Danh Thach *et al*. Survey on seed borne fungi and its effects on grain quality of common rice cultivars in the Mekong Delta. Omonrice. 2001; 9:107-113.
9. Adhikari MKBB, Bhowmick MK. Bioefficacy of some commercially available chemicals against grain discoloration disease of rice in West Bengal. The Journal of Plant Protection Sciences. 2010; 2(1):103-104.
10. Anonymous. Standard Evaluation System for Rice (SES). Rice Science for a Better World - Rice Knowledge Bank. International Rice Research Institute, Philippines, 2002, 14.
11. Agarwal PC, Mortensen CN, Mathur B. Seed-Born diseases and seed health testing of rice. Technical bulletin No. 3, Phytopathlogical paper No. 30. CAB Int. Mycological Inst. (CMI) Kew, Surrey, UK, 1989, 58-59.
12. Ellis MB. Dematiaceous Hyphomycetes. Commonwealth Mycological Institute, Kew, Surry, England, 1980.
13. Habib A, Javed N, Sahi ST, Waheed M. Detection of seed-borne mycoflora of different coarse and fine rice varieties and their management through seed treatment. Pak. J Phytopatho. 2012; 24:133-136.