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Survey on the Sheath Blight disease of Rice in Telangana State, India

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A B S T R A C T

A survey was conducted during *Kharif* 2016-2017 to assess the incidence of sheath blight disease in nine districts of Telangana state. The per cent disease incidence (PDI) ranged from 20 to 80 per cent. Maximum PDI (80) was recorded at Miryalaguda block, while minimum (20) was observed at Buddipally, Rudrur, Vangapally and Wyra villages. The maximum severity (9scale) was observed at Huzurnagar and Miryalaguda blocks. The disease was observed from panicle initiation to grain hardening stage.

Introduction

Rice is cultivated successfully in a wide range of climatic and edaphic conditions. Its production and productivity is affected by number of biotic and abiotic factors which causes yield losses of 20-70 percent (Naidu, 1992).

Among all the biotic constraints, fungal diseases are most predominant across the world where ever rice is grown. Sheath blight is one of the major fungal diseases in Telangana that affects rice production and contributes to severe yield reduction that continues to threaten the socio economic status of rice-farmers in the state. The disease was reported in all the districts of Telangana State from moderate to severe (30 to 50%) from 1995 to 2014 (Laha *et al.*, (2016). Disease was spread widely in terms of both occurrence and intensity over the past twelve years. Moreover, it has become more prevalent on most of the improved varieties *viz.*, BPT 5204, JGL1798, JGL 384, Swarna, MTU1010, MTU1061 and MTU1075 currently grown in the state (Prakasam *et al.*, 2013).

Keeping in view the importance of the crop and losses caused by this disease, a roving survey was carried out during *kharif* 2016 in nine major rice growing districts of Telangana.

Materials and Methods

A roving survey was conducted in 30 major rice growing villages which represented all the nine districts of Telangana state *viz.* Adilabad, Nizamabd, Karimnagar, Warangal, Medak, Rangareddy, Nalgonda, Mahboobnagar and Khammam. Survey was carried out from October to November 2016. From each village randomly 3-5 rice fields were selected when the crop was at tillering to maturity stage. Three plots in each field having an area of one square meter were selected at random. Data was also collected on stage of the crop, disease severity and incidence in these areas.

Disease Incidence (DI) was recorded by using the following formula

$$\text{Disease incidence} = \frac{\text{Number of Infected Tillers}}{\text{Total number of tillers}} \times 100$$

Fifty samples were brought to the laboratory and washed under running tap water to remove dirt particles. Infected leaf bits were cut into pieces of 5 cm, surface sterilized with one per cent sodium hypochlorite solution for 30 seconds and were washed in three changes of sterile distilled water and blotted dry. Small samples of plant tissue (0.5 cm of length) were then cut from the lesions and transferred to an isolation medium *i.e.,* 2 per cent water agar and incubated at 27±2 °C for 24-48 h. After 48 hours the hyphal bits from culture plate were transferred to the fresh Petri plates containing PDA and incubated at 24-28^{0}c. The mycelial growth in plates was recorded for every 24 hours. Thirty isolates were isolated from 50 samples by single hyphal tip isolation technique. All the isolates were identified as *Rhizoctonia solani* based on the right angle branching by microscopic observation. Koch's postulates was proved for all isolates at field conditions during *kharif* -2016 by using typha bit inoculation method. Isolates were assigned with code numbers like TS-Rs-01, where, 'TS' denotes Telangana State, Rs Represents the *Rhizoctonia solani* and 01 refers to sample number.

Results and Discussion

The data indicated that among all the locations the per cent disease incidence ranged from 20 to 80 percent and grouped as very high (>50), high (31-50), moderate (20 to 30) and low (<20). Very high per cent disease incidence was noticed in Miryalaguda (80), followed by Huzarnagar (75), Jabitapur (65) and Warangal-rural (60), High per cent disease incidence was observed at Khanapur (50), Tikkannapally (45), Bhanswada (45), Adilabad (40), Rampur (40), Killawarangal (40), Nandi Kandi (40), and Mahabubnagar (40), moderate per cent incidence was recorded at Nasuallabad (30), Rampuram (30), Arapally RARS (30), Polasa RARS (30), Siddipet (30), Sadashivpet (30), Miryalguda (30), Palem (30), Rangareddy (30), Narsampet (30), Nagarkurnool (25), Suryapet (25), Buddipally (20), Rudrur (20), Vangapally (20), Wyra (20) and. None of the locations were found with low per cent disease incidence (<20). Among 30 locations, 17 per cent showed very high incidence (>50), 23 per cent location showed high per cent incidence (31-49) and 60 per cent location showed moderate per cent incidence (20-30).

Disease severity (DS) of sheath blight ranged from 3 to 9 score (SES scale). Very high severity (9scale) was recorded at Huzarnagar and Miryalaguda, high disease severity (7scale) observed at Tikkannapally, Rampur, Bhanswada, Jabitapur, Warangal–rural, Killawarangal, Arapally-RARS, Khanapur and Mahboobnagar. While moderate disease severity (5scale) observed at Adilabad, Nasullabad, Polasa–RARS, Polasa, Narsmpat, Nandikandi, Sadashivpet, Siddepat, Wyra, Suryapet, Miryalaguda and Nagerkurnool (Fig. 1, 2 and Table 1).

Table.1 Disease incidence and Severity of sheath blight from major rice growing areas of Telangana during *Kharif*- 2016]

Isolate code	Agro ecological Zone	District	Block / Village	Altitude/ Latitude	Stage of the crop	Diseased Plant Parts	Incidence (%)	Disease severity (%)	(0-9) SES Scale
Ts-Rs-1	NTZ*	Adilabad	Adilabad/ Adilabad	265msl/ 19°74.42 N	Grain hardening	Sheath & Leaf (S)	40	31-45	5
Ts-Rs-2	NTZ	Adilabad	Hazipur/ Tikkannapally	269msl/ $19^0$69.49N	Grain hardening	Sheath & Leaf (S)	45	46-65	7
Ts-Rs-3	NTZ	Adilabad	Manchiryal/ Buddipally	154msl/ $18^0$87.82 N	Grain hardening	Sheath	20	21-30	3
Ts-Rs-4	NTZ	Nizamabad	Rudrur/ Rudrur	395msl/ $18^0$978.56 N	Grain hardening	Sheath	20	21-30	3
Ts-Rs-5	NTZ	Nizamabad	Nizamabd/ Rampur	380msl/ $18^0$32.734 N	Milky stage	Sheath & Leaf (S)	40	46-65	7
Ts-Rs-6	NTZ	Nizamabad	Kamareddy/ Bhanswada	389msl/ $18^0$30.714 N	Grain hardening	Sheath & Leaf (S)	45	46-65	7
Ts-Rs-7	NTZ	Nizamabad	Nizamabd/ Nasullabad	441msl/ $18^0$44.751 N	Milky stage	Sheath (S)	30	31-45	5
Ts-Rs-8	NTZ	Karimnagar	Jagital/ Chalgal	260msl/ ·46.961N	Panicle initation	Sheath (S)	20	21-30	3
Ts-Rs-9	NTZ	Karimnagar	Jagital/ Ram puram	285msl/ $18^0$89.29N	Panicle initation	Sheath	30	21-30	3
Ts-Rs-10	NTZ	Karimnagar	Jagital/ Jabitapur	274msl/ :$18^0$48.412 N	Grain hardening	Sheath & Leaf (S)	65	46-65	7
Ts-Rs-11	NTZ	Karimnagar	Polasa – RARS/	252msl/ $18^0$83.831 N	Grain hardening	Sheath	30	31-45	5
Ts-Rs-12	NTZ	Karimnagar	Polasa/ Polasa	256msl/ $18^0$49.39N	Grain hardening	Sheath	25	31-45	5
Ts-Rs-13	CTZ*	Warangal	Warangal/ Warangal - rural	263msl/ $17^0$96.98N	Grain hardening	Sheath & Leaf	60	46-65	7
Ts-Rs-14	CTZ	Warangal	Warangal/ Killawarangal	253msl/ $17^0$23.52N	Milky stage	Sheath & Leaf (S)	40	46-65	7
Ts-Rs-15	CTZ	Warangal	Warangal/ Arapally-RARS	267msl/ $17^0$969.34 N	Grain hardening	Sheath & Leaf (S)	30	46-65	7
Ts-Rs-16	CTZ	Warangal	Narsmpat/	270msl/	Milky	Sheath	30	31-45	5

			Narsampet	$17^0$45.67N	stage				
Ts-Rs-17	CTZ	Warangal	Narsampet/ Khanapur	243msl/ $17^0$928.92 N	Grain hardening	Sheath & Leaf (S)	50	46-65	7
Ts-Rs-18	CTZ	Warangal	Warangal/ Vangapally	258msl/ $17^0$567.89 N	Milky stage	sheath	20	21-30	3
Ts-Rs-19	CTZ	Medak	Sadashivpet/ Nandikandi	520msl/ $17^0$69.34	Grain hardening	Sheath	40	31-45	5
Ts-Rs-20	CTZ	Medak	Sadashivpet/ Sadashivpet	517msl/ $17^0$619.42 N	Grain hardening	Sheath	30	31-45	5
Ts-Rs-21	CTZ	Medak	Siddipet/ Siddipet	483msl/ $18^0$101.95 N	Grain hardening	Sheath	30	31-45	5
Ts-Rs-22	CTZ	Khammam	Wyra/ Wyra	129msl/ $17^0$24.275 N	Grain hardening	Sheath	20	31-45	5
Ts-Rs-23	STZ*	Nalgonda	Suryapet/ Suryapet	245msl/ $17^0$18.83N	Grain hardening	sheath	25	31-45	5
Ts-Rs-24	STZ	Nalgonda	Huzurnagar/ Huzrnagar	179msl/ $17^0$135.31 N	Grain hardening	Sheath & Leaf (S)	75	66-100	9
Ts-Rs-25	STZ	Nalgonda	Miryalaguda/ Miryalaguda	178msl/ 17^o137.16 N	Panicle initiation	Sheath & flag leaf (S)	80	66-100	9
Ts-Rs-26	STZ	Nalgonda	Miryalaguda/ Miryalaguda	127msl/ $16^0$875.31 N	Panicle initiation	Leaf	30	31-45	5
Ts-Rs-27	STZ	Mahbubnagar	Mahbubnagar / Mahbubnagar	478msl/ $16^0$543.81 N	Panicle initiation	Sheath & Leaf (S)	40	46-65	7
Ts-Rs-28	STZ	Mahbubnagar	Palem/ Palem	476msl/ $16^0$546.11 N	Grain hardening	Sheath	30	21-30	3
Ts-Rs-29	STZ	Mahbubnagar	Nagarkurnool / Nagarkurnool	456msl/ $16^0$49.3.94 N	Grain hardening	Sheath	25	31-45	5
Ts-Rs-30	STZ	Rangareddy	Rangareddy/ Rangareddy	597msl/ $17^0$389.43 msl	Panicle initiation	Sheath	30	21-30	3

NTZ- Northern Telangana zone; CTZ- Central Telangana zone; STZ- Southern Telangana zone
*S- Sclerotial bodies found

Fig.1 Disease incidence of sheath blight in rice growing areas of Telangana State during *Kharif* -2016

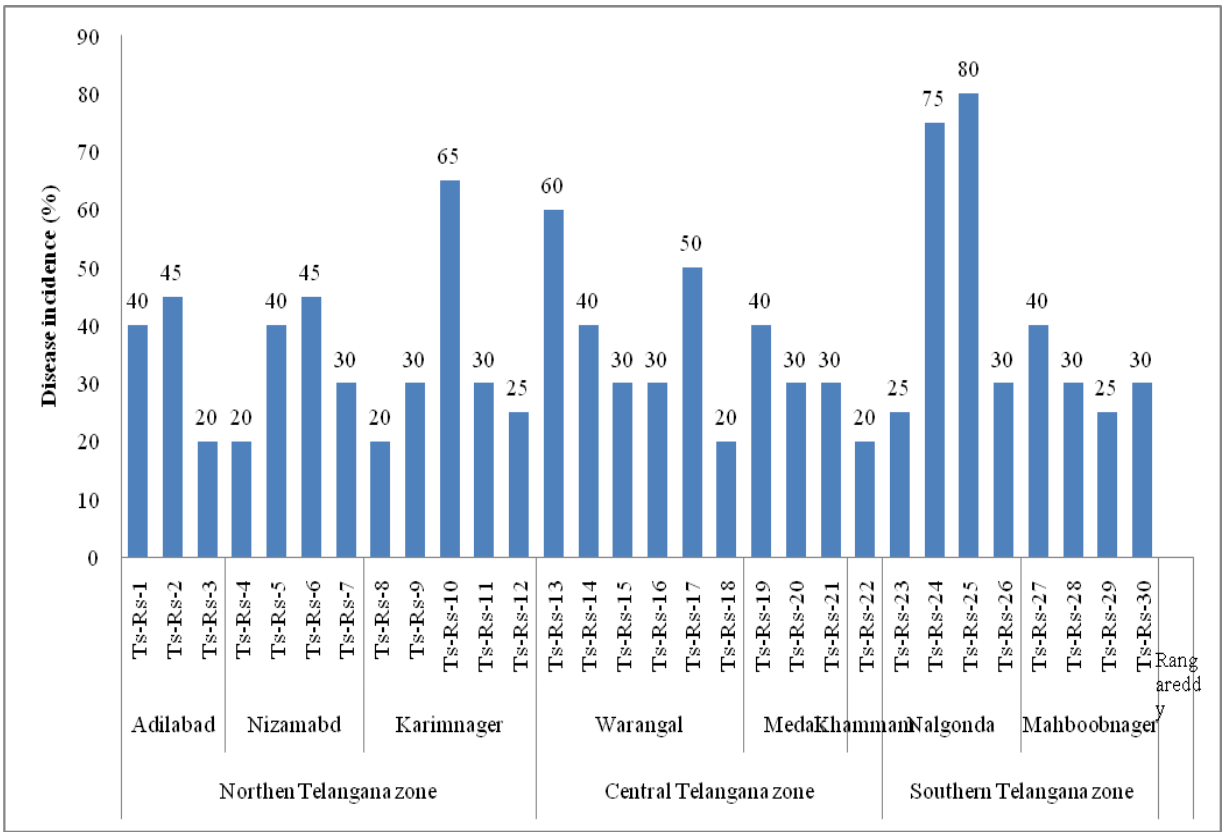
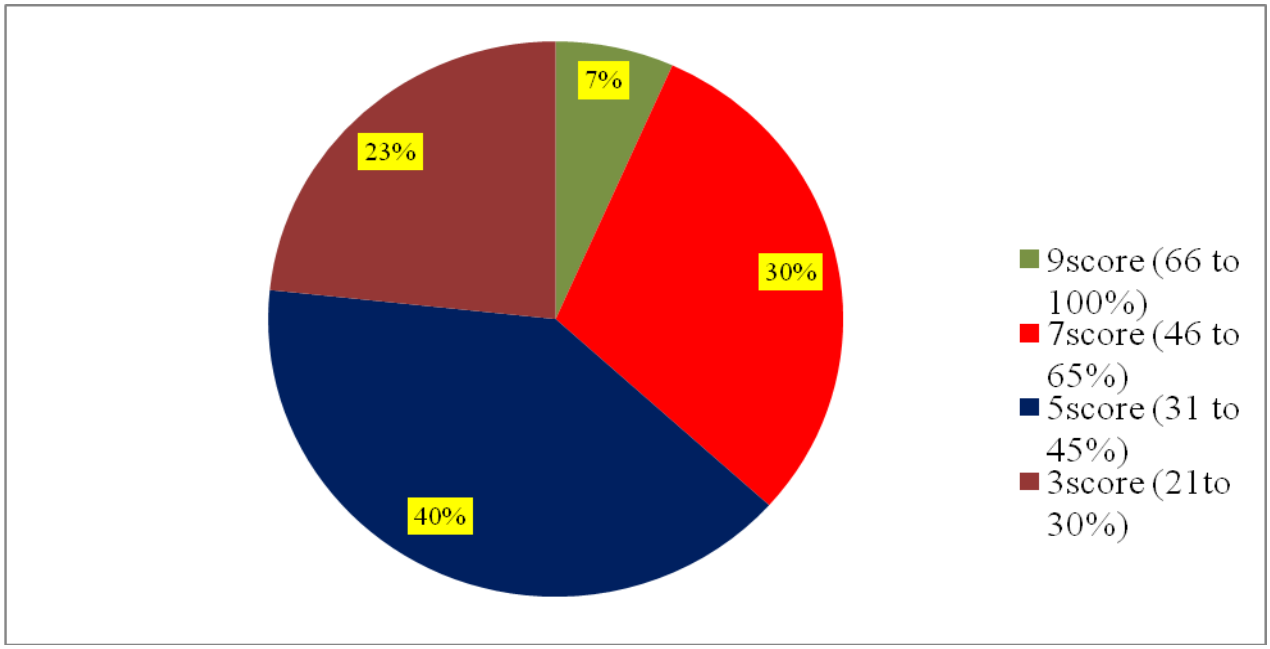


Fig.2 Pie chart representing disease severity of per cent locations based on SES (0-9) scale



Disease severity scale: (Source: IRRI, 2002)

Scores	Description
0	No infection
1	Vertical spread of the lesions up to 20 per cent of plant height
3	Vertical spread of the lesions up to 21-30 per cent of plant height
5	Vertical spread of the lesions up to 31-45 per cent of plant height
7	Vertical spread of the lesions up to 46-65 per cent of plant height
9	Vertical spread of the lesions up to 66-100 per cent of plant height

Low disease severity (3 scale) observed at Buddipally, Rudrur, Chalgal, Rampuram, Vangapally, Palem and Rangareddy. Among the locations 7% (2) showed > 65% lesion height (9score), 30% (9 locations) showed 46-65% lesion height (7score), 40% (12 locations) showed 31-45% lesion height (5score) and 23% (7 locations) showed 21 to 30% lesion height (3 score). (Laha *et al.*, (2016) reported that sheath blight disease in all the districts of Telangana, however moderate to severe form of disease incidence (30-50%) was reported from 1995 to 2014 in three districts *viz.*, Nalgonda, Khammam and Karimnagar.

When district averages were considered, the disease incidence (%) was found highest in Nalgonda district with 52.5% followed by Warangal (43.3%), Adilabad (35%), Karimnagar (34%), Nizamabad (34%), Medak (33%), Mahboobnagar (31%) and Khammam 30%), while low in Rangareddy (20%). High incidence and severity in Nalgonda may be due to mono culturing of rice from last two decades and movement of propagules through canal water.

Besides, this district received continuous precipitation during the survey period. These results were in accordance with the findings of Pal *et al.*, (2015) where they observed highest per cent disease incidence of 30.19 at Bargarh district and recorded least per cent disease incidence of 21.98 in Jharsuguda district at West Bengal.

In general correlation between stage of the crop and disease incidence and /or disease severity was not observed. However, only in Karimnagar district a positive correlation between the growth stage of crop and disease severity, where disease severity was about three score at early stage and it increased to seven while attaining crop maturity. These results are in accordance with findings of Upma Dutta *et al.*, (2012) who found that the disease was present in all the rice growing areas of Jammu and Kashmir. Maximum disease incidence of 46.6 and 85.6 percent was observed during stem elongation and maturity stages, respectively in Maal Shah in Jammu district.

Survey results indicated that disease incidence varied even at district/mandal level. Incidence ranged at Adilabad (20% to 45%), Nizamabad (20% to 45%), Karimnagar (20% to 65%), Warangal (30% to 60%), Medak (30% to 40%), Nalgonda (25% to 80%), Mahboobnagar (25% to 40%) districts. The variation in incidence might be due to differences in varietal status, time of sowing, transplanting, soil type, fertilizer dose and due to variations in weather conditions. Large scale cultivation of susceptible varieties as monocrop continuously on the same field might have increased the possibility of perpetuating the pathogen in the crop debris. *R. solani* being soil borne in nature, survives as sclerotia in field and thrives in weed hosts. Sclerotia remain viable in soil up to 270 days to a depth of 10 cm at the temperature level of

0-40°C (Kannaiyan and Prasad, 1981 and Sati and Sinha, 1999)

Servey on occurrence and spread of sheath blight of rice in major rice growing areas of Telangana state revealed that sheath blight is a major problem in all the districts. Among the districts surveyed, Nalgonda recorded 52.5% disease incidence. Very high disease severity (>65%) was observed at Huzarnagar and Miryalaguda. The survey was conducted during the vulnerable period from active tillering to panicle initiation stage of the crop, which is highly favourable to sheath blight development. The heavy incidence of sheath blight might be due to the favourable factors like high relative humidity, low temperature and water stagnation due to continuous rain on these locations during the period of survey.

References

Dutta, U., Kalha, C.S and Srivastava, J.N.2012. Status and distribution of sheath blight of rice in Jammu Sher-e-Kashmir University of Science and Technology (Jammu). *Oryza*. 49 (1): 70-71.

IRRI. 2002. Standard Evaluation System for Rice. International Rice Research Institute. Manila Philippines.

Kannaiyan, S and Prasad, N.N. 1981. Effect of organic amendments on seedling infection of rice caused by *Rhizoctonia solani*. *Plant and Soil*. 62: 131-133.

Laha, G. S., Sailaja, B., Prasad, M. S., Lakshmi, D. L., Krishnaveni, D., Singh, R., Prakasam, V., Yugander, A., Kannan, C., Valarmathi, P and Babu, V. R. 2016. Changes in rice disease scenario in India: An analysis from production oriented survey. *IIRR Bulletin*. pp: 34-35.

Naidu, V. D. 1992. Influence of sheath blight of rice on grain and straw yield in some popular local varieties. *Journal of Research Assam Agriculture University*. 10: 78-80.

Pal, R., Biswas, M. K., Mandal, D., Seni, A and Naik, B. S. 2015. Prevalence of sheath blight disease of rice in west central table land zone of Odisha. *International Journal of Bio-Resource, Environment and Agricultural Sciences.* 1(3): 103-107.

Prakasam, V., Ladhalakshmi, D., Laha, G.S., Krishnaveni, D., Sheshu Madhav, M, Jyothi Badri, Srinivas Prasad, M. and Viraktamath B.C. 2013. Sheath blight of rice and its management. *Technical Bullitin* No. 72, Directorate of Rice Research (ICAR), Rajendranagar.

Sati, P and Sinha, A.P.1999. Effect of soil texture and depth on the survival of *Rhizoctonia solani* on soil. *Indian Phytopathology*. 52: 385-388.

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