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SHORT COMMUNICATION

EFFECT OF NITROGEN AND POTASSIUM ON SHEATH ROT INCIDENCE AND NUTRIENT CONTENT IN RICE

C. VIJAYABASKAR, G. RAMARAO* AND K.B. REDDY

Department of Plant Physiology, S.V. Agricultural College, Tirupati, Andhra Pradesh

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Field experiment was conducted during the late kharif, 2002 to study the effect of nitrogen and potassium on sheath rot incidence and nutrient content in rice. The results revealed that the disease incidence increased with increase in nitrogen level from 0 to 300 kg ha^{-1} while decreased with increase in potassium level from 0 to 140 kg ha^{-1}. The nitrogen and potassium content in leaf and stem increased with increased doses of nitrogen and potassium. The potassium content in leaf was higher in NLR30491 (2.15 percent) compared to NLR33633 (2.01 percent).

Key words : **Nitrogen, nutrient content, potassium, sheath rot disease**

Rice crop is constantly subjected to several fungal, bacterial and viral diseases. Among fungal diseases, sheath rot caused by *sarocladium oryzae* has assumed much importance in recent years by causing heavy yield loss in Andhra Pradesh (Muralidharan and Venkata Rao 1980, Laha and Venkataraman 2000.) Exeess nitrogen decreases the crop resistance to diseases (Akanda *et al.* 1984). Disease incidence increased with increase in nitrogen level but decreased with increased potassium application (Sekhar and Prasad 1989, Krishna *et al.* 2000). This requires further confirmation and understanding of effect of nitrogen and potassium on incidence of sheath rot and mineral content.

The field experiment was conducted at S.V. Agricultural College, Tirupati (Andhra Pradesh) during late kharif, 2002 on sandy clay loam soil. The experiment was laid out in a factorial randomized block design with three replications and twelve main plot treatments. The treatments consist of four levels of nitrogen (0, 100, 200, and 300 kg ha^{-1}). The varieties used in this study were NLR33633 and NLR30491. The crop was planted in 3 m X 5 m plots with a spacing of 20 X 10 cm. Different levels of nitrogen in the form of urea was applied in split doses; half the nitrogen as basal application and the rest at 30 days after planting (DAT). Phosphours in the form of single super phosphate @40 kg $P_2 O_5$ ha^{-1} and different levels of potassium (0, 70 and 140 kg ha^{-1}) in the form of murate of potash were applied as basal dose.

The symptoms developed due to sheath rot infections were carefully observed and recorded at regular intervals based on the visual symptoms by using the disease score (Table 1). Five plants from each plot were dug out at 10 days intervals and separated into leaf, stem and dried in hot air oven at 100 ºC for 5 min and then 80 ºC for 48 h. The dried samples of plant parts were ground in Willey

Table 1. Sheath rot intensity disease score grade in rice.

Grade	Disease
1	Small brown lesions on boot leaf sheath and panicle emergence normal.
2	Lesions enlarge or coalesce and cover about 5 percent of leaf sheath and panicle emergence normal.
3	Lesions cover about 6-15 percent of leaf sheath area and 75 percent of panicle exerted.
4	Lesions cover about 16-50 percent of the leaf sheath area and 50 percent of panicle exerted.
5	Lesions cover more than 50 percent of the leaf sheath and panicle emergence completely affected or only about 25 percent of panicle exerted.

* Corresponding author

grinding mill. Nitrogen in leaf was estimated by micro-kjeldahl method as described in AOAC (1960). The content of potassium in leaf was estimated by using triacid mixture extract (Piper1950).

The sheath rot intensity increased with increase in nitrogen level from 0 to 300 kg ha^{-1} and maximum disease intensity (4 score grade) was recorded at 300 kg N/ha (Table 2). Increased application of nitrogen might have increased the reducing and non reducing sugars resulting in increased susceptibility of the crop to the pathogens (Mohan and Subramanyam 1977). Increased application of potassium from 0 to 140 kg ha^{-1} reduced the sheath rot intensity and maximum reduction of disease intensity (2 score grade) was observed at 140 kg ha^{-1} irrespective of nitrogen levels. The disease intensity increased with increase in age of the crop and maximum was recorded at 100 DAT in both the cultivars. The disease intensity was higher in NLR33633 compared to NLR30491 irrespective of nitrogen application. The reduced disease incidence in potassium-applied plants might be due to the efect of potassium on the host by altering its physiology and biochemistry (Ramaswamy and Prasad 1974) and by increasing the anatomical resistance of host (Matsubayashi *et al.* 1963).

Significant difference was observed among treatments, between treatments and varieties with regard to nitrogen content in leaf (Table 3).Nitrogen content in leaf was higher at 50 DAT and later decreased gradually with increase in age of the crop. Similar decrease in nitrogen content of leaf was oserved in rice by Chandrasekhar (1997). Leaf nitrogen content increased with increase in nitrogen level from 0 to 300 kg ha^{-1}. Significantly higher leaf nitrogen content was recorded at 300 kg N ha^{-1}+ 140 kg K ha^{-1} (3.0%) at 50 DAT and which later decreased to 1.7% at 100 DAT. Similar increase in nitrogen concentration with increased nitrogen application was observed in rice by Bhavani (1997). The concentration of nitrogen in leaf was significantly higher in NLR30491 (2.63%) at 50 DAT and lower in NLR33633 at 100 DAT (1.43%). Interaction between treatments and varieties was significant.

The potassium concentration in leaf increased up to 70DAT and later decreased gradually (Table 3). Significantly higher concentration of potassium in leaf (2.6%) was found in plants applied with potassium at 140 kg ha^{-1}. Similar increase in leaf potassium with increased application of potassium was observed in rice by

Table 2. Effect of nitrogen and potassium on sheath rot intensity score in rice.

Treatment	Days after planting									
	50		60		70		90		100	
	V1	V2	V1	V2	V1	V2	V1	V2	V1	V2
N0K0	2.6	2.3	2.9	2.7	3.1	3.0	3.63	3.6	3.8	3.7
N0K70	2.2	2.0	2.6	2.5	3.0	2.8	3.3	3.1	3.4	3.4
N0K140	2.0	1.7	2.3	2.2	2.5	2.5	3.1	2.8	3.2	3.1
N100K0	2.8	2.6	3.0	2.1	3.3	3.3	3.7	3.4	3.8	3.3
N100K70	2.5	2.1	3.0	2.9	3.2	3.2	3.5	3.2	3.7	3.5
N100K140	2.0	2.0	2.8	2.6	3.0	2.8	3.4	3.2	3.8	3.4
N200K0	2.8	2.6	3.2	3.1	3.4	2.4	3.8	3.6	4.0	3.9
N200K70	2.6	2.2	3.1	2.9	3.2	3.2	3.6	3.5	3.8	3.7
N200K140	2.1	1.9	3.0	2.4	2.9	2.6	3.2	3.1	3.5	3.3
N300K0	2.8	2.6	3.3	3.2	3.4	3.4	3.8	3.7	4.0	3.9
N300K70	2.5	2.4	3.1	3.0	3.1	2.6	3.6	3.5	3.8	3.7
N300K140	2.0	2.0	2.8	2.8	3.0	2.9	3.3	3.3	3.6	3.5

V1: NLR33633 V2: NLR30491

Table 3. Effect of nitrogen and potassium application on concentration of N and K in leaf in rice.

Treatment	Nitrogen content (%)									Potassium content (%)								
	50 DAT			70 DAT			100 DAT			50 DAT			70 DAT			100 DAT		
	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean
N0 K0	1.50	1.58	1.54	1.06	1.08	1.07	0.53	0.56	0.55	0.63	0.66	0.64	1.23	1.28	1.25	0.79	0.84	0.82
N0 K70	1.70	1.77	1.73	1.17	1.20	1.19	0.68	0.66	0.67	0.62	0.67	0.65	1.24	1.28	1.26	0.79	0.84	0.82
N0 K140	1.80	1.86	1.83	1.25	1.28	1.26	0.75	0.65	0.70	1.68	1.75	1.71	2.25	2.45	2.35	1.43	1.65	1.54
N100 K0	2.80	2.85	2.82	2.23	2.29	2.26	1.65	1.71	1.68	1.66	1.71	1.68	2.24	2.45	2.35	1.42	1.61	1.51
N100 K70	2.80	2.86	2.83	2.31	2.31	2.31	1.62	1.72	1.67	2.11	2.25	2.18	2.51	2.64	2.58	2.12	2.22	2.17
N100 K140	2.90	2.93	2.91	2.35	2.36	2.35	1.66	1.74	1.70	2.12	2.25	2.18	2.51	2.65	2.58	2.15	2.22	2.18
N200 K0	2.88	2.91	2.89	2.29	2.43	2.36	1.64	1.74	1.69	0.64	0.67	0.66	1.26	1.30	1.28	0.81	0.87	0.84
N200 K70	2.91	2.94	2.92	2.42	2.47	2.44	1.67	1.76	1.71	0.65	0.68	0.66	1.26	1.30	1.28	0.81	0.88	0.85
N200 K140	2.96	2.99	2.97	2.46	2.49	2.47	1.70	1.84	1.77	1.74	1.79	1.77	2.35	2.51	2.43	1.53	1.73	1.63
N300 K0	2.93	2.95	2.94	2.44	2.49	2.46	1.64	1.86	1.75	1.73	1.78	1.76	2.02	2.51	2.26	1.53	1.73	1.63
N300 K70	2.98	2.98	2.98	2.49	2.51	2.50	1.77	1.87	1.82	2.19	2.26	2.22	2.60	2.70	2.65	2.19	2.27	2.23
N300 K140	3.01	3.00	3.00	2.54	2.57	2.55	1.85	1.48	1.66	2.21	2.27	2.24	2.60	2.71	2.65	2.19	2.28	2.24
Mean	2.60	2.63		2.08	2.12		1.43	1.48		1.50	1.56		2.01	2.15		1.48	1.60	
CD at 5%																		
V			0.017			0.022			0.029			0.006			0.056			0.003
T			0.041			0.054			0.070			0.015			0.138			0.009
VXT			0.059			0.077			0.101			0.021			0.195			0.013

V1 : NLR 33633 V2 : NLR 30491

Chandrasekhar (1997). The concentration of potassium in leaf was significantly higher in NLR30491 at all stages compared to NLR33633. Interaction between treatments and varieties was significant at all stages. From the results it can be concluded that sheath rot intensity increased with increase in nitrogen level from 0 to 300 kg ha^{-1} while decreased with increase in potassium level from 0 to 140 kg ha^{-1}. The nitrogen and potassium content in leaf and stem increased with increase of nitrogen and potassium application. The variety NLR30491 recorded higher potassium content in leaf and stem than NLR33633.

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