

# THE MADRAS AGRICULTURAL JOURNAL

[PUBLISHED BY "THE MADRAS AGRICULTURAL STUDENTS' UNION" (M.A.S.U.)]

(Established 1911)

COIMBATORE-3, INDIA

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Vol. 58

November 1971

No. 11

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## Effect of Nitrogen on the Incidence of Ergot Disease of Pearl Millet caused by *Claviceps Microcephala*

by

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Ergot disease caused by *Claviceps microcephala* (Wallr.) Tul. is one of the most important diseases of pearl millet (*Pennisetum typhoides* (Burm.) Stapf.) which becomes very destructive in the crop heading during winter season. With the introduction of high yielding hybrid varieties of pearl millet in Tamil Nadu there was widespread ephiphytotic of this disease on hybrid cumbu and the ergot disease has assumed great importance. These hybrid varieties known as high fertility strains respond well only if heavy doses of nitrogenous fertilizer is applied to boost the yield of the high yielding varieties. Tanda and Kawatani (1964) reported that the ergot incidence on rye was influenced by the [fertilizer application. Attempt has not so far been made to elucidate the role of nitrogenous fertilizers on the incidence of ergot disease of pearl millet. Therefore with the object of assessing the effect of different levels of nitrogen on the disease incidence on different varieties of pearl millet, these investigations were initiated and the results of the trial conducted during 1969 are reported in this paper.

**Materials and Methods:** The experiment was conducted under field conditions at the Agricultural College and Research Institute, Coimbatore, Tamil Nadu

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during September, 1969 to January, '70 with six levels of nitrogen viz., 0, 40, 80, 120, 160 and 200 kg/hectare and six hybrid varieties viz., HB1, HB3, HB4, J.934-5, K1-559 and X3. The split plot design was adopted with four replications. N levels were kept as main plot treatments and varieties as sub plot treatments. Each replication consisted of 36 plots (treatments) which were further subdivided into 108 plots. The net plot size was 2.7 m×12 m. A common basal dressing of 50 kg per hectare in each of K<sub>2</sub>O as muriate of potash and P<sub>2</sub>O<sub>5</sub> as single super phosphate was given for all the treatments. N was applied as per schedule in the form of ammonium sulphate at two equal split applications, one at the time of planting and the other four weeks after germination. A spacing of 45 cm×15 cm was adopted and one plant per hole was maintained. Observations on the disease incidence were recorded at earhead stage prior to harvest under natural conditions of infection by counting the total number of earheads and the number of affected earheads showing ergot infection irrespective of the intensity in the earhead and the stage of the disease, honey dew or ergot stage.

**Results:** The disease incidence data under different levels of N and varieties are given in Table 1. Summary of results on the mean percentage of disease incidence are given in Table 2. It may be seen from the results that the disease incidence increased with the increase in the levels of N. However, there was no significant difference among the different levels of N.

TABLE 1. *Effect of Nitrogen on the incidence of Ergot disease in different varieties of Pearl millet*

Varieties	Nitrogen Levels kg/ha					
	0	40	80	120	160	200
HB1	431.96	490.20	544.45	478.50	523.35	487.51
HB3	394.34	504.13	508.00	491.94	540.43	547.45
HB4	361.95	404.79	411.41	435.40	407.05	402.74
J. 934-5	453.85	540.47	567.70	582.11	569.41	557.59
K1. 559	347.95	399.99	445.48	453.86	427.85	442.26
X3	343.68	399.04	437.11	459.92	474.88	439.61

All the six varieties tested were found to be susceptible to the disease. Among the varieties J. 934-5 was found to be highly susceptible followed by HB 3 and HB 1. HB 4 was found to be less susceptible followed by K1.559 and X3. The interaction between the N levels and varieties was found to be not significant.

**Discussion:** The recent trends in producing high yields using heavy doses of nitrogenous fertilizers, necessitate the study of the influence of N on the incidence of disease on the host plants. Tanda and Kawatani (1964)

TABLE 2. *The mean percentage of disease incidence (Transformed values)*

Nitrogen Levels kg/ha	Mean disease incidence	Varieties	Mean disease incidence
160	40.87	J. 934-5	45.43
80	40.47	HB. 3	41.47
120	40.31	HB. 1	41.05
200	39.96	X. 3	35.47
40	38.03	K1. 559	34.96
0	32.41	HB. 4	33.67
S.E. 1.93	C.D. (P=0.05) 5.81	S.E. 0.2188	C.D. 0.6064
<i>Conclusion:</i> 160, 80, 120, 200, 40, 0 J.934-5, HB3, HB1, X3, K1.559, HB4			

studied the influence of fertilizers upon resistance of rye to the ergotial fungus, *Claviceps purpurea* and found the resistance was increased as Potassium was increased and on the contrary decreased as N was increased. The present investigation indicates that the resistance of pearl millet spikelets to ergot disease reduced as N dose was increased. The application of N may alter the physiology of pearl millet spikelets in such a way that they become susceptible to the disease. Investigation on the role of other essential plant nutrients such as P and K will give more comprehensive picture about the role of the fertilizers on the incidence of ergot disease on pearl millet and studies are in progress.

In the present study among the six varieties tested, no variety was found to be resistant and all were found to exhibit their susceptible nature in varying grades. This is in accordance with the findings of Dwarakanath Reddy *et al* (1969) who were unable to screen a resistant variety of pearl millet to ergot disease under artificial conditions of inoculation.

**Summary:** The influence of different levels of N on the incidence of ergot disease of pearl millet on different varieties was studied under field conditions. In general, the application of N increased the susceptibility of pearl millet to ergot disease. Among six hybrid varieties of pearl millet tested, none of the variety exhibited the resistant reaction to ergot disease and all were found to be susceptible in varying degrees of intensity. The variety J. 934-5 was highly susceptible to the disease while HB 4 was found to be relatively less susceptible.

REFERENCES

Dwarakanath Reddy, K., C. V. Govindaswamy and P. Vidhyasekaran. 1969. Studies on Ergot disease of Cumbu (*P. typhoides*). *Madras agric. J.*, 56 : 367-77.  
 Tanda, S. and T. Kawatani. 1964. Fundamental studies on ergotial fungi (Part 2). Influence of fertilizers and sowing times of rye *Secale cereale* upon resistance to ergotial fungus and alkaloid content in ergot. *Tokyo agric. Sci.*, 9 : 178-86.