Indian Journal of Plant Sciences ISSN: 2319–3824(Online)
An Open Access, Online International Journal Available at http://www.cibtech.org/jps.htm
2014 Vol.3 (1) January-March, pp.115-117/Patro and Madhuri

Research Article

EPIDEMIOLOGICAL STUDIES ON BLAST DISEASE OF FINGER MILLET (ELEUSINE CORACANA (L) GAERTN.) INCITED BY *PYRICULARIA GRISEA* (CKE) SACC

***T.S.S.K. Patro[1] and J.Madhuri[2]**
Agricultural Research Station, Acharya N G Ranga Agricultural University, Vizianagaram – 535 001, Andhra Pradesh, India
**Author for Correspondence*

ABSTRACT
Under favourable environmental conditions the losses caused by *Pyricularia grisea* are severe due to leaf, neck and finger blast in finger millet. The highest incidence of neck blast of 72.67 and 67.00 per cent was noticed in the susceptible genotypes VR-708 and KM-252 respectively in June 16th sown crop, where minimum temperature of 26.1^{o} C, maximum temperature of 32.36^{o} C, relative humidity of 89.9 per cent and a very high amount of rainfall prevailed. Highest finger blast severity of 58.32 and 51.37 per cent in genotypes VR-708 and KM-252 respectively in June 16th sown crop. Similarly highest incidence of leaf blast (grade-4) was recorded in June 16th sown VR-708. The variety PR-202 performed better in all four dates of sowing and recorded the highest grain yield of 3685 kg/ha in August 2nd sown crop. The investigations revealed that increased leaf, neck and finger blast was due to increased temperature, significantly high amount of rainfall and high relative humidity and vice versa for low blast disease development.

Keywords: *Finger Millet, Blast, Pyricularia Grisea, Epidemiology, Disease Severity.*

INTRODUCTION
Finger millet (*Eleusine coracana* (L.) Gaertn.) Variously called as chodi, bird's foot, Nagli, Mandua, Ragi in different regions is one of the important millet crops of India. It is an indispensable to Indian Agriculture as a source of grain and straw in a vast dry land area. This "nutritious millet" is rich source of protein, iron and calcium. The fodder is fed to cattle; the malted grain is used as food for infants. The protein of finger millet has been reported to possess a fairly high biological value, which is needed for the maintenance of nitrogen equilibrium of the body. In India, it has been grown over an area of 2.15 million hectares with an average production of 2.68 million tons (Anon., 2006). Finger millet is known to be effected by several disease viz., blast, banded blight, smut, rust, foot rot and viral disease. Under favourable environmental conditions yield reduction up to 100 per cent was recorded at Rampur, Nepal (Batsa and Tamang, 1983). Neck and finger blast severity varies within the season and also from one season to other. Among the various diseases that affect finger millet, blast disease affects adversely the crop from economic point of view, whenever it occurs. In fact the impact of the disease on growth and yield of the crop is so high that Mc Rae (1922) who reported this disease for the first time from India also gave an estimate of loss due to the impact of the disease. According to his opinion the loss could be over 50%. According to the official report of the Department of Agriculture, Uganda the loss to be around 10 per cent (Anon., 1959). Ramappa, *et al*., (2002) recorded up to 50 per cent neck blast and 70 per cent finger blast during Kharif 2000 in Mandya and Mysore districts. Vishwanath *et al*., 1986 recorded 30 per cent of yield losses in finger millet due to blast incidence. Blast disease considered as "number one" in form of loss in Andhra Pradesh, Haryana, Madhya Pradesh, Maharashtra and Mysore. The ultimate loss in grain yield is due to the cumulative effect of reduction in grain number and weight as well as enhanced spikelet sterility. The adverse effect of the disease on finger millet could be in many ways. It starts from nursery where seed germination is reduced, seedlings are killed affecting the seed stand, may cause

extensive damage to foliage affecting adversely the transplantable seedlings. In main field the disease affects the plant growth, tillering etcetera.

Further the knowledge of the effect of the interaction of host variety with weather, pathogenic strain and of course in any situation is an essential component in Integrated Disease Management strategy. These factors are more relevant with a polycyclic, airborne pathogen like *Pyricularia* sp. In this investigation, an attempt was made to know the epidemiological factors (maximum and minimum temperature, rainfall, relative humidity) responsible for high and low neck and finger blast disease development in the cropping period and to get higher yields with limited disease management practices.

MATERIALS AND METHODS

To understand the development of leaf, neck and finger blast in finger millet caused by *Pyricularia grisea*, field experiment was conducted during *Kharif* 2005 and 2006 at experimental farm of Agricultural Research Station, Vizianagaram, and Andhra Pradesh, India. The recommended agronomical practices with 40 N: 20 P: 20 K in kg/ha were adopted for better crop growth in both the years and other standard packages of practices were followed at the time of crop growth period (Anon., 1995). Occurrence of leaf blast was recorded by visual observation following 0-5 scale (Table 1) at the time of crop vegetative stage. Neck blast and finger blast are recorded at dough stage of the crop. Neck blast incidence was calculated by counting the number of infected peduncles in a selected population of hundred plants and calculated as per cent incidence. Finger blast severity was recorded in each ear heads in a known crop area and how much area of each fingers were infected was converted as per cent severity. Regular epidemiological factors like minimum temperature, maximum temperature, rainfall, relative humidity first and second were recorded starting from sowing to harvesting of the crop. Finally weather data were correlated with leaf, neck and finger blast development in finger millet genotypes.

Table 1: Score chart for leaf blast (0-5 Scale)

Grade	Scale	Reaction
Nil	0	No symptoms on the leaves
Very Low	1	Small brown specks of pinhead size to slightly elongate, necrotic gray spots with a brown margin, less than 1% leaf area affected.
Low	2	A typical blast lesion elliptical, 5-10 mm long, 1-5% of leaf area affected.
Medium	3	A typical blast lesion elliptical, 1-2 cm long, 5-25% of leaf area affected.
High	4	25-50% of leaf area affected
Very High	5	More than 50% of leaf area affected with coalescence of the lesions

$$\text{Per cent neck blast} = \frac{\text{Number of ears showing infection on peduncle/neck}}{\text{Total numbers of ears in a unit area X 100}}$$

$$\text{Per cent finger blast} = \frac{\text{Number of infected fingers per unit area X 100}}{\text{Number of fingers in five plants X Total number of ears}}$$

RESULTS AND DISCUSSION

Data on the development of leaf, neck and finger blast of the four genotypes sown on four different dates is presented in Table 2. It revealed that the highest incidence of neck blast of 72.67 and 67.00 per cent was recorded in the susceptible genotypes VR 708 and KM 252 respectively in the crop sown on June 16th, which recorded minimum temperature of 26.10^{o}C and maximum 32.36^{o} C, relative humidity of 89.9 per cent and a very high amount of rainfall. Nil incidence of neck blast was recorded in July 16th and August 2nd sown KM 252, PR-202 and VR 847.

Finger blast development from the four genotypes (Table. 2) indicated that, highest severity of 58.32 % and 51.37% in genotypes VR 708 and KM 252 respectively was prevalent in the June 16th sown crop which recorded minimum temperature of 26.10°C, maximum temperature of 32.36°C and relative humidity of 89.9% and rainfall of 919.6 mm. Genotypes VR 708 and KM-252 showed highly susceptible response in all the four dates of sowings. Whereas lowest finger blast severity was recorded in other two genotypes VR-847 and PR-202 in both early and late sowings. The finger blast severity was decreased in other sowing dates, which recorded lower temperature lower relative humidity and less rainfall.

Further, highest leaf blast grade 4 was recorded in June 16th sown in KM-252 variety and nil incidence of leaf blast grade 0 was recorded in July 16th sown PR-202 variety.

The climatic conditions that prevailed from June 16th were more favorable for blast development with average minimum and maximum atmospheric temperatures around 26.10°C and 32.36°C respectively and a relative humidity of more than 80 per cent. Per cent neck blast incidence gradually decreased in subsequent sowings, which recorded temperature minimum of 25.8, 25.2, 24.5°C and maximum of 32.0, 31.5, 30.5°C and decreased relative humidity 88.1, 87.9, 87.0 during June 30, July 16th, August 2nd sowings respectively.

Thus the present investigation showed that early sowing results in more incidence of leaf, neck and finger blast and reduction in yield. Whereas, late sowing results in less incidence of blast disease and increased yields.

ACKNOWLEDGEMENT

The Authors are grateful to the Project Co-ordinator, All India Co-ordinated Small Millets Improvement Project, UAS, Bangalore for providing necessary funds for conducting the experiment.

REFERENCES

Anonymous (1959). *Annual report of the Department of Agriculture, Uganda* for the year ended 31st Dec 1958 75.

Anonymous (2006). Annual report for 2006-07. *All India Coordinated Small Millets Improvement Project, UAS, ICAR, Bangalore, India*.

Batsa BK and Tamang DB (1983). Preliminary report on the study of millet diseases in Nepal in Maize and Fingermillet, *10th Summer Crops Workshop 1982, 23-28 Jan 1983, Rampur, Chitwan, Nepal.*

Chaudhary RG and Vishwadharan G (1988). Epidemiology of rice blast and effect of date of sowing under upland conditions of Arunachal pradesh. *Indian Phytopathology* **41** 552-557.

Choi WJ, Park EW and Lec EJ (1987). Effect of temperature, relative humidity and leaf wetness period on the development of rice leaf blast. *Korian Journal of Plant Protection* **26** 221-228.

Pall BS (1987). Epidemiological studies on neck blast of finger millet (*Eleusine coracana* (L.) Gaertn.). *Narendra – Deva – Journal of Agricultural Research* **2(**2**)** 187-189.

Patel RP and Tripathi SK (1988). Epidemiology of blast of finger millet caused by Pyricularia grisea (Cke), Sacc. *Advances in Plant Sciences* **11** 73-75.

Ramappa HK, Ravishankar CR and Prakash P (2002). Estimation of yield loss and management of blast disease in finger millet (Ragi). *Proceedings of Asian Conference Mycology Plant Pathology. University of Mysore, Mysore* P. 195.

Bhist JS (1987). Blast tolerance and yield loss in finger millet. *Indian Journal of Agricultural Sciences* **57** 954-955.

Mc Rae W (1922). Report of the Imperial Mycologist. *Indian Agricultural Research Institute. Pusa Scientific Reports 1921-22 44-50.*

Sanne Gowda S and Pandurange Gowda KT. (1995). Epidemiology of blast disease of rice. *Indian Phytopathology* **38** 143-145.

Vishwanath S, Sanne Gowda S, Seetharam A and Shankare Gowda BT (1986). Reaction to blast disease of released and pre-released varieties of finger millet from different states. *Millet Newsletter* **5** 31.