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Influence of Pearlmillet (*Pennisetum glaucum* (L.) R. Br.) Crop Geometry on Disease Severity under Dryland Conditions

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ABSTRACT

The field experiment was conducted at research farm of the department of Agronomy College of agriculture, Bijapur, University of Agricultural Sciences, Dharwad during the year Kharif 2013-2014 to know the Influence of pearlmillet crop geometry on disease severity under dryland conditions. The experiment was laid out with eight treatments replicated three times in randomized block design. The closer spacing treatments like 60 cm x 10 cm (1140.44 percent disease index of blast) and 75 cm x 8 cm (694.40 percent disease index of blast) recorded higher blast severity and 60 cm x 10 cm (311.08 percent disease index of rust) and 75 cm x 8 cm (414.40 percent disease index of rust) lower rust severity and on the contrary wider row spacing treatments 120 cm x 10 cm (1140.72 percent disease index of rust) and 135 cm x 10 cm (1036.84 percent disease index of rust) recorded higher rust severity and 120 cm x 10 cm (406.56 percent disease index of blast) and 135 cm x 10 cm (350.56 percent disease index of blast) lower blast severity.

Key words: *Crop geometry, Dryland, Pearlmillet, Disease severity.*

INTRODUCTION

Pearl millet (*Pennisetum glaucum* (L.) R. Br.) belongs to family Poaceae (section Paniceae), is one of the most important among the millets or nutritious coarse grain cereals, the crop is grown as a nutrient rich food source for humans as well as a fodder crop for livestock and feed for poultry.

Pearl millet is the most drought and heat tolerant among cereals or millets and it has the highest water use efficiency under drought stress, also this plant species has unique tolerance to high temperature and moisture stress even at flowering, seed setting and grain filling stages.

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Yield of a crop depends on the final plant density. Pearlmillet production is seriously hampered by some biotic and abiotic factors, thereby reducing its yield. Pearlmillet is attacked by a large number of diseases caused by fungal, bacterial, viral and nematode pathogens. However, diseases that are considered economically important are only a few and include downy mildew, blast, rust, ergot and smut. Among these, downy mildew is the most destructive and widespread in India and in countries of Africa.

Downy mildew infects the foliage and the panicles of the crop and causes severe losses. Blast and rust are foliar diseases and they affect quality of fodder and grain[10].Northern Dry Zone (zone-3) of Karnataka is a biggest zone having an area of 50.8 lakh.ha, out of this 35.5 lakh.ha is under cultivation. This area receives an annual rainfall of 594.3 mm in 30 rainy days. The rainfall is not sufficient for profitable crop production due to uneven distribution of rainfall. The problems such as erratic rainfall, undulating topography, poor adoption of soil and moisture conservation practices by the farmers, hence crop management practices play an important role in overcoming the drought situations. Keeping this in view a present investigation on influence of pearlmillet crop geometry on disease severity under dryland conditions was conducted.

MATERIAL AND METHODS

The experiment was conducted at the farm of College of Agriculture, Bijapur in the Northern Dry Zone of Karnataka (Zone 3) and is situated at 16^0 49' North latitude, 75^0 43' and East longitude and at an altitude of 593.8 m above the mean sea level. The experiment consisted of eight treatments Viz., T_1: 60 cm x 10 cm, $T_{2:}$ 75 cm x 8 cm T_3: 90 cm x 7 cm, T4:90 cm x 10 cm, T_5: 120 cm x 5 cm, T_6:120 cm x 10 cm T_7:135 cm x 5 cm T_8:135 cm x 10 cm. The experiment was laid out in RBD with three replications. The soil of the experimental sight was medium deep black soils. The severity of blast (*Pyricularia setariae)* and rust (*Puccinia substriata var.indica)* were recorded in different treatments at 8-10 days interval from the date of their appearance by following the scale given by Mayee and Dater[6]. Further these observations were converted to percent disease index using the formula of Wheeler[9]. Using the percent disease index values obtained at different intervals for each treatment, the area under disease progress curve (AUDPC) was calculated using the formula of Shaner and Finney[8].

$$A = \sum_{i=1}^{k} \left\{\frac{xi + xi\text{-}1}{2}\right\} \{Ti - T1\}$$

Where, A= area under disease progress curve; Xi= Disease severity at the end of interval i

k=Number of successive evaluation of disease severity; Ti – T1 = Constant time interval

RESULTS AND DISCUSSION

Severity (Percent Disease Index) of blast and rust in different treatments

The data from the table indicated that the blast disease was appeared first in treatment, 60 cm x 10 cm on 18.07.2013 and it was appeared one week late that is on 25.07.2013 in the remaining treatments, on the contrary rust was first observed on 08.08.2013 in treatments, 90 cm x 7.0 cm ,90cm x 10 cm, 120cm x 5.0cm, 120cm x 10cm,135cm x 5.0 cm and 135cm x 10 cm and it was appeared on 15.08.2013 in 60 cm x 10 cm and 75 cm x 8.0 cm. Blast severity was 3.70 percent in the first observation in treatment 60 cm x 10 cm and was increased at different intervals and reached maximum of 37.03 percent on 30.08.2013. Next highest blast severity of 24.80 percent was recorded in 75 cm x 8.0 cm Lowest blast severity of 11.90 percent was recorded in 135 cm x 10 cm on 30.08.2013 on the contrary initial rust severity of 8.40 percent was recorded in 120 cm x 10 cm and was increased at different intervals and reached maximum of 40.74 percent on 30.08.2013.Next highest rust severity of 37.03 percent was recorded in 135 cm x 10 cm and it was followed by 120 cm x 5.0 cm and 135 cm x 5.0 cm which have recorded 33.33 percent rust severity. Lowest rust severity of 11.11 percent was recorded in 60 cm x 10 cm on 30.08.2013.

Area under disease progress curve (AUDPC)

The AUDPC values calculated for both blast and rust diseases in different treatments exhibited wide variation among themselves. For blast disease maximum AUDPC value of 1140.00 was recorded in 60 cm x 10 cm followed by 75 cm x 8.0 cm (694.40), 90 cm x 7.0 cm (414.40), 90 cm x 10 cm and 120 cm x 5.0 cm (406.56) and 135 cm x 10 cm (350.56) and least AUDPC value of 333.20 was recorded in 135 cm x 5.0 cm. Regarding rust disease maximum AUDPC value of 1140.72 was recorded in 120 cm x 5.0 cm followed by 135 cm x 10 cm (1036.84), 90 cm x 10 cm and 120 cm x 10 cm (933.24), 90 cm x 7.0 cm (829.64), 90 cm x 10 cm (742.00) and 75 cm x 8.0 cm (414.40) and least AUDPC value of 311.08 was recorded in 60 cm x 10 cm. In general closer spacing treatments (60 cm x 10 cm and 75 cm x 8.0 cm) recorded higher blast severity and lower rust severity and on the contrary wider row spacing treatments (120 cm x 10 cm and 135 cm x 10 cm) recorded higher rust severity and lower blast severity. These results are in conformity with the reports of Ghewande *et al*[4]. Their results indicated that the severities of LLS (late leaf spot) and rust diseases in groundnut were significantly higher in higher plant densities than in lower plant densities; this is primarily because higher plant densities influence the micro-climate in favor of LLS and rust disease development. Chevaugeon[2] and Ferrell *et al*[3]., reported that severity of LLS in groundnut increased as the in-row spacing decreased. Ghewande *et al*[4]., also observed that LLS and rust severities were significantly more in closer spacing (higher plant densities) than in wider spacing (low plant densities). The blast severity in finger millet increases with increase in plant population and disease severity was reduced when sorghum was grown as an intercrop. The increase in plant population increases the relative humidity within the crop canopy (>90%) which inturn increases the blast severity[1]. In general rust disease severity in many crops increases when the temperatures are in the range of 25-30^{0}cand relative humidity in between 75 to 90 percent[5,7].

Table 1: Blast and rust severity of pearlmillet as influenced by crop geometry

Per cent Disease index																
Treatments	18.07.2013		25.07.2013		01.08.2013		08.08.2013		15.082013		22.08.2013		30.08.2013		AUDPC	
Spacing(cm)	B	R	B	R	B	R	B	R	B	R	B	R	B	R	B	R
T1-60 x 10	3.70	0.00	7.4	0.00	11.11	0.00	14.80	0.00	18.50	5.40	24.50	7.40	37.03	11.11	1140.44	311.08
T2-75 x 8	0.00	0.00	1.85	0.00	7.40	0.00	11.11	0.00	14.80	7.40	18.90	11.11	24.80	14.80	694.40	414.40
T3-90 x 7	0.00	0.00	1.70	0.00	4.70	0.00	8.10	1.70	11.11	8.70	12.40	22.22	14.80	29.63	414.40	829.64
T4-90 x 10	0.00	0.00	1.85	0.00	5.40	0.00	7.40	1.85	11.11	7.70	14.50	21.11	17.03	26.50	476.84	742.00
T5-120 x 5	0.00	0.00	1.85	0.00	3.70	0.00	3.70	5.70	7.40	10.25	12.22	14.81	14.52	33.33	406.56	1140.72
T6-120 x 10	0.00	0.00	2.70	0.00	4.40	0.00	5.70	8.40	7.40	18.52	11.11	26.22	14.52	40.74	406.56	933.24
T7-135 x 5	0.00	0.00	1.40	0.00	2.70	0.00	3.70	3.70	7.40	7.70	9.80	18.51	12.52	33.33	333.20	933.24
T8-135 x 10	0.00	0.00	1.85	0.00	3.70	0.00	3.70	3.70	5.70	7.40	7.70	22.22	11.90	37.03	350.56	1036.84

B-Blast R-Rust AUDPC- Area under Disease Progress Curve

REFERENCES

1. Adipala, E., Okobai, C.A., Ssekabembe, C.K. and Ogenga Latigo, M.W., Foliar disease and yield of finger millet [*Eleusine coracana* (L)] under monocropping and intercropping systems. *Discovery and Innovation.* **6:** 301-305 (1994).
2. Chevaugeon, J., Recherche sur la cercosporiose de larachide an moyenne casamance. *Annals de 1'institut national de la recherche agronomique. Ser. C.*, **3:** 489-510 (1952).
3. Farrel, J.A.K., Baily, B.E. and Mills, W.R., The effects of time of planting, spacing and fungicide on cercospora leaf spots of groundnuts in Malawi. Rhod. Zambia, Malawi *J. Agric. Res.*, **5:** 241-247 (1967).
4. Ghewande, M.P., Shukla, A.K. and Pandey, R.N., Management of foliar diseases of groundnut through agronomic practices. *Indian Bot. Rev.*, **5:** 179-181 (1986).
5. Gururaj Sunkad, Epidemiology and management of rust of groundnut caused by *Puccinia arachidis* Speg. In northern Karnataka. *Ph. D. Thesis*, Univ. Agric. Sci., Dharwad, (India). (2004).
6. Mayee, C.D. and Datar, V.V., "*Phytopathometry*". Technical Bulletin-I, Marathawada Agricultural University, Parbhani, India, pp146. (1986).
7. Patel, V.A. and Vaishnav, M.U., Effect of weather parameters in relation to occurrence and developments of groundnut rust. *J. Oilseeds Res.*, **6:** 379-383 (1989).
8. Shaner, G. and Finney, R.E., New sources of slow leaf rusting resistance in wheat *Phytopath.*, **70:** 1183-1186 (1980).
9. Wheeler, B.E.J., *An Introduction to Plant Disease*, John Wiley and sons. Ltd. London., p.301 (1969).
10. Zarafi, A.B. and Emechebe, A.M., Effect of intra row spacing on the incidence and severity of pearlmillet downy mildew and grain yield. *Archives of Phytopath. and Pl. Prot.*, **39(1):** 9-14 (2006).