"A Study Of Levels Of Potassium And Plant Geometry On Percent Of Sigatoka Disease (*Musa Acuminata* L.) Cv. Ardhapuri"

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ABSTRACT

The present investigation was carried out at Banana Research Station, Nanded. "Studies on plant geometry and levels of potassium on growth, yield and quality of banana (Musa acuminata L.)", for two trial years. In the present experiment, there were four main treatments of plant density, viz. D1 (1.5 m x 1.2 m), D2 (1.5 m x 1.5 m), D3 (1.5 m x 1.8 m) and D4 (1.5 m x 2.1 m), three sub- treatment of potassium levels, viz. K1 (100 g K2 O/plant), K2 (200 g K2O/plant), K3 (300 g K2O/plant) and thus comprising twelve treatment combinations.

The lowest percent incidence of sigatoka (10.14%) was recorded in D41.5 m x 2.1 m (3,174 plants/ha) while the highest percent incidence of sigatoka was recorded (18.86%) in D1 1.5 m x 1.2 m (5,555 plants/ha). The effect of potassium levels on percent incidence of sigatoka was found to be non significant. The interaction effect of plant densities and potassium level on percent incidence of sigatoka was found to be non significant.

INTRODUCTION

Banana belongs (Musa spp.) to family Musaceae and it is the most important fruit crops of the world as well as India. It is pleasing flavoured, nutritious, cheap and known as "poor man's apple". The banana crop determines the socio-economic status of the farmer's and called as Kalpataru (Plant of heaven) due to its socio-economic and multiple uses. The number of banana cultivars are variable, there are about 250-300 cultivated cultivars in India. Ardhapuri (Musa sp.)

Advantages of high density planting(plant geometry) includes precocity in bearing, high yield, high average yield, high returns per unit area, early returns, easy management, reduction in labour cost, low reduction cost, mechanization of fruit crop, production and facilitates more efficient use of radiation, fertilizers, fungicides, herbicides, pesticides, insecticides etc.

To ensure high yield of superior quality bananas, adequate application of nutrients is of paramount importance, Potassium regulates many vital functions like carbon assimilation, translocation of proteins and sugars, water balance in plants, maintain turgor pressure in the cell, root development, improving the quality of fruits by maintaining desirable sugar: acid ratio, ripening of fruits and many other processes. The banana requires more potassium for its growth, production and quality compared to nitrogen and phosphorus Croucher and Mitchell (1940). Considering these facts the research topic entitled "Studies on plant geometry and levels of potassium on growth, yield and quality of banana (*Musa acuminata* L.)" is related to the present studies.

MATERIALS AND METHODS

Percent of sigatoka incidence:

Scale of 0-6 for scoring the Sigatoka leaf spot index.

0 = No symptoms

1 = Less than 1% of lamina with symptoms

2 = 1 to 5% of lamina with symptoms

3 = 6 to 15% of lamina with symptoms

4 = 16 to 33% of lamina with symptoms

5 = 35 to 50% of lamina with symptoms

6 = 51 to 100% of lamina with symptoms

$$\text{Infection index (PDI)} = \frac{\text{Summation nb} \times 100}{(N-1)\,t}$$

Where,

n = Number of leaves in each grade

b = Grade

N = Number of grades used in the scale

T = Total number of leaves scored

Details of Experiment:

a) Name of crop : Banana
b) Botanical Name : *Musa* spp.
c) Family : Musaceae
d) Number of main treatments : 04
e) Number of sub treatments : 03
f) Number of treatment combinations: 12
g) Number of replications : 03
h) Experimental design : Split plot design
i) Variety : Ardhapuri
j) Season : 2011-12 and 2012-13
k) Fertilizers : As per mentioned later

Treat. Symbol.		Treatment details
Plant density (D)		
D_1	:	1.5 m x 1.2 m
D_2	:	1.5 m x 1.5 m
D_3	:	1.5 m x 1.8 m
D_4	:	1.5 m x 2.1 m
Potassium levels (K)		
K_1	:	100 g K_2O/plant (1/2 dose of RDF)
K_2	:	200 g K_2O /plant (RDF)
K_3	:	300 g K_2O /plant (1.5 dose of RDF)
Treatment		Treatment Details
T1	:	D1K1 (1.5m x 1.2m with 100g K2O/plant)
T2	:	D1K2(1.5m x 1.2m with 200g K2O/plant)
T3	:	D1K3(1.5m x 1.2m with 300g K2O/plant)
T4	:	D2K1(1.5m x 1.5m with 100g K2O/plant)
T5	:	D2K2(1.5m x 1.5m with 200g K2O/plant)
T6	:	D2K3(1.5m x 1.5m with 300g K2O/plant)
T7	:	D3K1(1.5m x 1.8m with 100g K2O/plant)
T8	:	D3K2(1.5m x 1.8m with 200g K2O/plant)
T9	:	D3K3(1.5m x 1.8m with 300g K2O/plant)
T10	:	D4K1(1.5m x 2.1m with 100g K2O/plant)
T11	:	D4K2(1.5m x 2.1m with 200g K2O/plant)
T12	:	D4K3(1.5m x 2.1m with 300g K2O/plant)

RESUITS

Percent of sigatoka incidence:

The data on percent incidence of sigatoka of banana fruit as influenced by the plant densities and different levels of potassium is presented in Table 01. and depicted in Fig 01 s.

The data during 2011-12, the lowest percent incidence of sigatoka (7.66% *i.e.* 16.03 %) was recorded in D_4 (1.5m x 2.1m spacing *i.e.* 3,174 plants/ha) while the highest percent incidence of sigatoka was recorded (19.23% *i.e.* 26.00 %) in D_1 (1.5m x 1.2m spacing *i.e.* 5,555 plants/ha). While the lowest percent incidence of sigatoka was recorded in K_3 *i.e.* 300 g K_2O per plant (12.92 % *i.e.*20.77%). The interaction effects of plant densities and potassium levels on percent incidence of sigatoka was found to be non-significant.

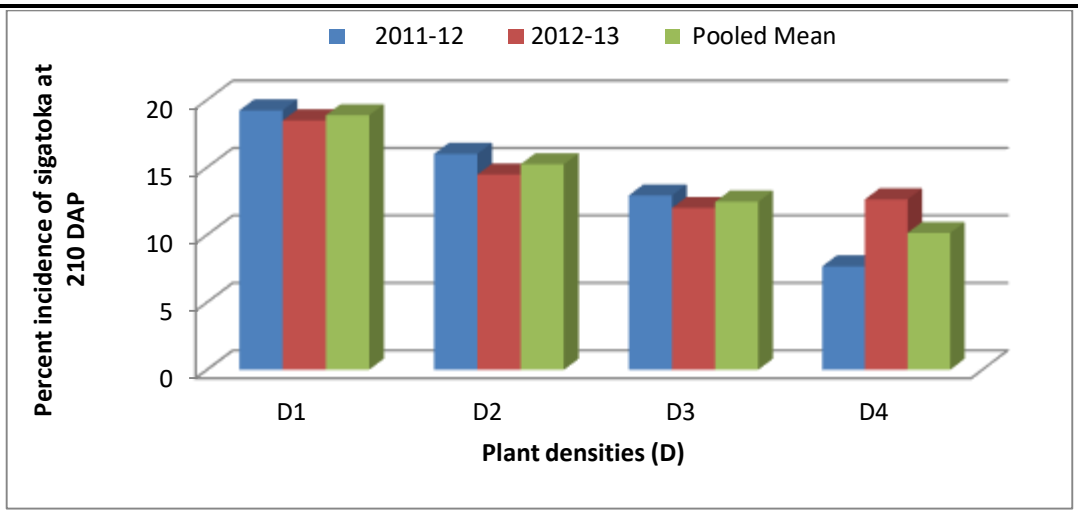
The data during 2012-13, the lowest percent incidence of sigatoka (11.99 % *i.e.* 20.23 %) was recorded in D_3 (1.5m x 1.8m spacing *i.e.* 3,703 plants/ha) while the highest percent incidence of sigatoka was recorded (18.48% *i.e.* 25.42 %) in D_1 (1.5m x 1.2m spacing *i.e.* 5,555 plants/ha). The lowest per cent of incidence of sigatoka was recorded in K_3 *i.e.* 300 g K_2O/plant (12.48% *i.e.* 20.62 %). The interaction effects of plant densities and potassium level on percent incidence of sigatoka was found to be non-significant.

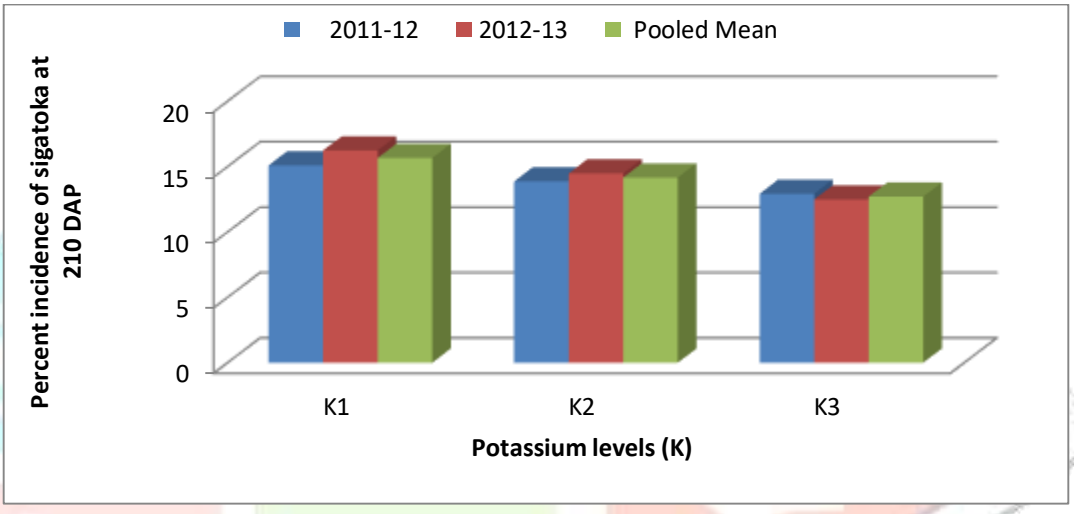
Table 01. Effect of plant densities and different levels of potassium on percent incidence of sigatoka on banana cv. Ardhapuri at 210 DAP

Treatments		Percent incidence of Sigatoka at 210 DAP		
Main treatments (Plant densities) (D)		2011-12	2012-13	Pooled Mean
Spacings (m^2)	No. of plants/ha			
D_1 (1.5 x 1.2)	5,555	19.23 (***26.00***)	18.48 (***25.42***)	18.86 (***25.71***)
D_2(1.5 x 1.5)	4,444	16.00 (***23.57***)	14.47 (***22.30***)	15.23 (***22.93***)
D_3(1.5 x 1.8)	3,703	12.92 (***21.05***)	11.99 (***20.23***)	12.46 (***20.64***)
D_4 (1.5 x 2.1)	3,174	7.66 (***16.03***)	12.63 (***20.80***)	10.14 (***18.41***)
S.E.(m) ±		0.210	0.296	0.314
C.D. at 5%		0.725	1.024	0.968
Sub-treatment (Potassium levels) (K)				
K_1 (100 g K_2O/plant)		15.08 (***22.61***)	16.23 (***23.68***)	15.66 (***23.14***)
K_2 (200 g K_2O/plant)		13.86 (***21.61***)	14.47 (***22.25***)	14.16 (***21.93***)
K_3 (300 g K_2O/plant)		12.92 (***20.77***)	12.48 (***20.62***)	12.70 (***20.70***)
S.E.(m) ±		0.174	0.228	0.248
C.D. at 5%		0.523	0.682	0.715
Interaction (D x K)				
D_1 K_1		20.77 (***27.11***)	20.50 (***26.91***)	20.63(***27.01***)
D_1 K_2		18.93 (***25.79***)	19.17 (***25.96***)	19.05 (***25.87***)
D_1 K_3		18.00 (***25.10***)	15.77 (***23.39***)	16.88(***24.25***)
D_2 K_1		17.00 (***24.35***)	16.67 (***24.08***)	16.83 (***24.21***)
D_2 K_2		16.00 (***23.58***)	14.93 (***22.73***)	15.47 (***23.15***)
D_2 K_3		15.00 (***22.78***)	11.80 (***20.09***)	13.40 (***21.44***)
D_3 K_1		14.00 (***21.97***)	13.50 (***21.54***)	13.75 (***21.76***)
D_3 K_2		12.67 (***20.84***)	11.97 (***20.23***)	12.32 (***20.54***)
D_3 K_3		12.10 (***20.35***)	10.50 (***18.90***)	11.30 (***19.62***)
D_4 K_1		8.57 (***17.00***)	14.27 (***22.19***)	11.42 (***19.59***)
D_4 K_2		7.83 (***16.25***)	11.80 (***20.09***)	9.82 (***18.17***)
D_4 K_3		6.57 (***14.84***)	11.83 (***20.12***)	9.20 (***17.48***)
S.E.(m) ±		0.349	0.455	0.497
C.D. at 5%		NS	NS	NS

Note : - **Bold** and *italic* figures in parenthesis Arc sin transformed values of sigatoka leaf spot disease of banana.

In the pooled data the lowest percent incidence of sigatoka (10.14% *i.e.* 18.41 %) was recorded in D_4 (1.5m x 2.1m spacing *i.e.* 3,174 plants/ha) while the highest percent incidence of sigatoka was recorded (18.86% *i.e.* 25.71 %) in D_1 (1.5m x 1.2m spacing *i.e.* 5,555 plants/ha). The lowest per cent incidence of sigatoka was recorded in K_3 *i.e.* 300 g K_2O/plant (12.70 % *i.e.* 20.70 %) and the highest per cent incidence of sigatoka was recorded in K_1 *i.e.* 100 g K_2O (15.66 *i.e.* 23.14 %). The interaction effects of plant densities and potassium level on percent incidence of sigatoka was found to be non significant.





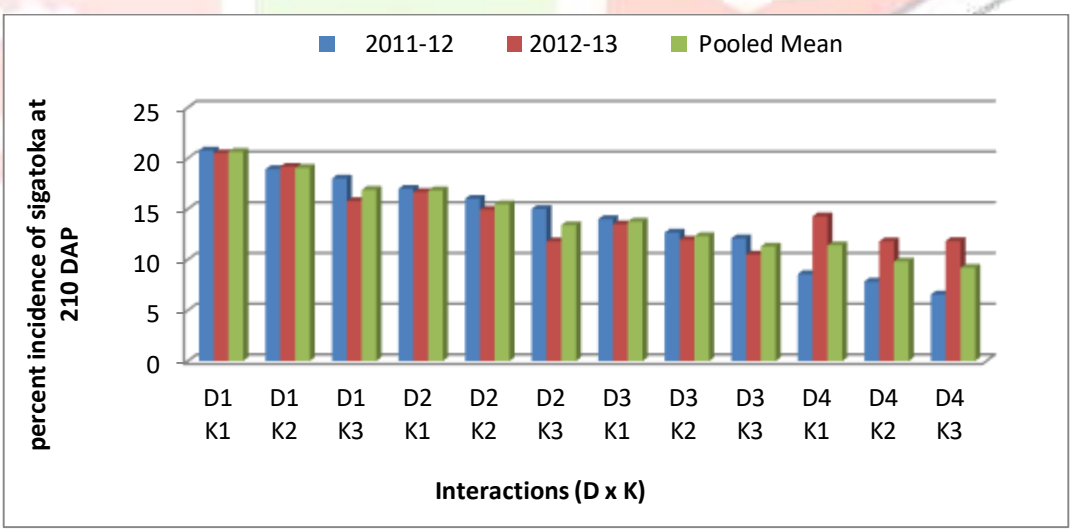


Fig. 01. Effect of plant densities and different levels of potassium on percent incidence of sigatoka on banana cv. Ardhapuri at 210 DAP

DISCUSSION

The data in Table 01. revealed that the lowest percent incidence of sigatoka (18.41%) was recorded in D_4(1.5 m x 2.1 m with 3,174 plants/ha) while the highest percent incidence of sigatoka was recorded (25.71%) in D_1 (1.5 m x 1.2 m with 5,555 plants/ha). The lowest percent incidence of sigatoka was recorded in K_3(20.70%), while the highest percent incidence of sigatoka was recorded in K_1(23.14%).The interaction effects of plant densities and potassium level on percent incidence of sigatoka was found to be non significant.

In this study the percent incidence of sigatoka in D_4(1.5 m x 2.1 m with 3,174 plants/ha) the influence of micro climate might be less due to wider spacing and due to prevalence of lower relative humidity in such condition would have reduce the incident. Micro climate with higher relative humidity could keep the leaves moist longer which in turn was found to increase disease incidence.

Similar findings were reported by Krishna Prasadji *et al,* (2000) and Servarajan *et al* (2001).

SUMMERY AND CONCLUSION

The lowest percent incidence of sigatoka (10.14%) was recorded in $D_4$1.5 m x 2.1 m (3,174 plants/ha) while the highest percent incidence of sigatoka was recorded (18.86%) in D_1 1.5 m x 1.2 m (5,555 plants/ha). The effect of potassium levels on percent incidence of sigatoka was found to be non significant. The interaction effect of plant densities and potassium level on percent incidence of sigatoka was found to be non significant.

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