# Variation In Finger Girth Of Banana (*Musa Acuminata* L.) With Doses Of Potassium Fertilizers Under Different Plant Geometries

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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*. $D_1$ (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) and $D_4$ (1.5 m x 2.1 m), three sub- treatment of potassium levels, *viz*. $K_1$ (100 g $K_2$ O/plant), $K_2$ (200 g $K_2O$/plant), $K_3$ (300 g $K_2O$/plant) and thus comprising twelve treatment combinations.
The greatest girth of fruit (11.91cm) was recorded in density $D_4$ ()1.5 m x 2.1 m) at the least girth of fruit (11.26cm) was given by $D_1$ 1.5 m x 1.2 m (5,555 plants/ha), which was at par (11.28cm) $D_2$ 1.5 m x 1.5 m (4,444 plants/ha) The potassium level $K_3$ (300 g $K_2O$/plant) had given greatest girth of fruit (11.63cm), which was at par (1159cm) with $K_2$ (200 g $K_2O$/plant), while the least girth of fruit was noted in k, least girth of fruit was noted in k, (100 g $K_2O$/plant) (11.23cm) The interaction effect of plant densities and potassium levels in pooled shows that the greatest girth of fruit (12.14 cm) was noted in $D_4K_3$ (1.5 m x 2.1 m at 300 g $K_2O$/plant), (1.5 m x 2.1 m at 200 g $K_2O$/plant).

**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:**

Girth of finger was measured by using vernier caliper and mean diameter of fingers was recorded and expressed in centimeters.

**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:**

**Girth of Fingers of Banana:**

The data on finger girth (cm) as influenced by the plant densities and different levels of potassium is presented in Table 01 and depicted in Fig 01.

The data on effect of plant densities and levels of potassium on finger girth (cm) during 2011-12, 2012-13 and in pooled is statistically significant.

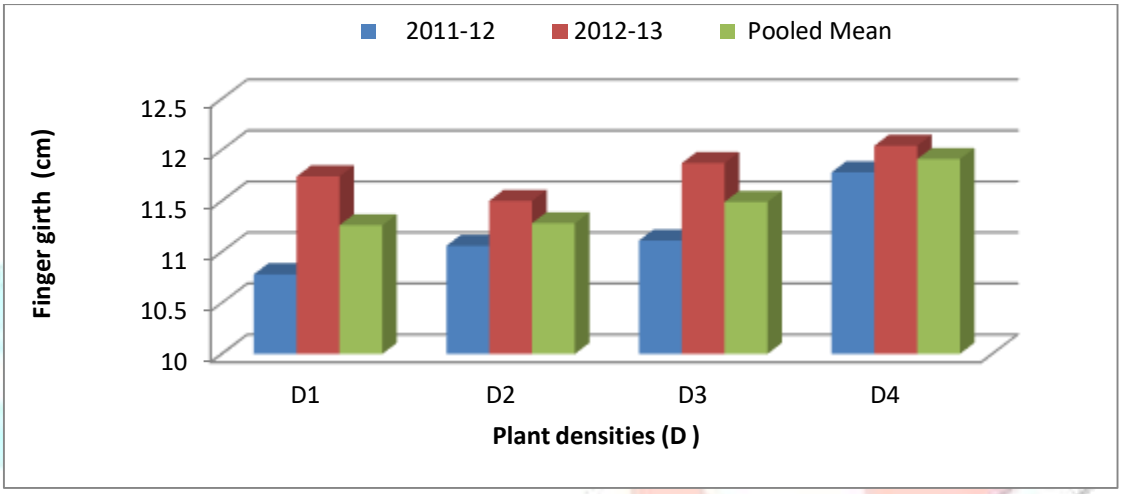
During 2011-12, the plant density $D_4$(1.5m x 2.1m spacing *i.e.* 3,174 plants/ha) gave the significantly highest finger girth (11.78 cm) and the minimum finger girth (10.78cm) was recorded by $D_1$ (1.5m 1.2m). The potassium level $K_3$ (300 g $K_2O$/plant) gave the significantly highest finger girth (11.42cm) and the least finger girth (10.96cm) was gave by $K_1$(100 g $K_2O$/plant). The interaction effect of plant densities and potassium levels showed that the greater finger girth (12.00cm) was found $D_4K_3$ (1.5m x 2.1 m with 300 g $K_2O$/plant), which was equally at par with $D_4K_2$ (1.5m x 2.1m spacing *i.e.* 3,174 plants/ha with 100 g $K_2O$/plant) and $D_4K_2$ (1.5m x 2.1m spacing *i.e.* 3,174 plants/ha with 200 g $K_2O$/plant) (11.67cm). The minimum finger girth (10.17cm) was found in $D_1K_1$ (1.5m x 1.2m spacing *i.e.* 5,555 plants/ha with 100 g $K_2O$/plant).

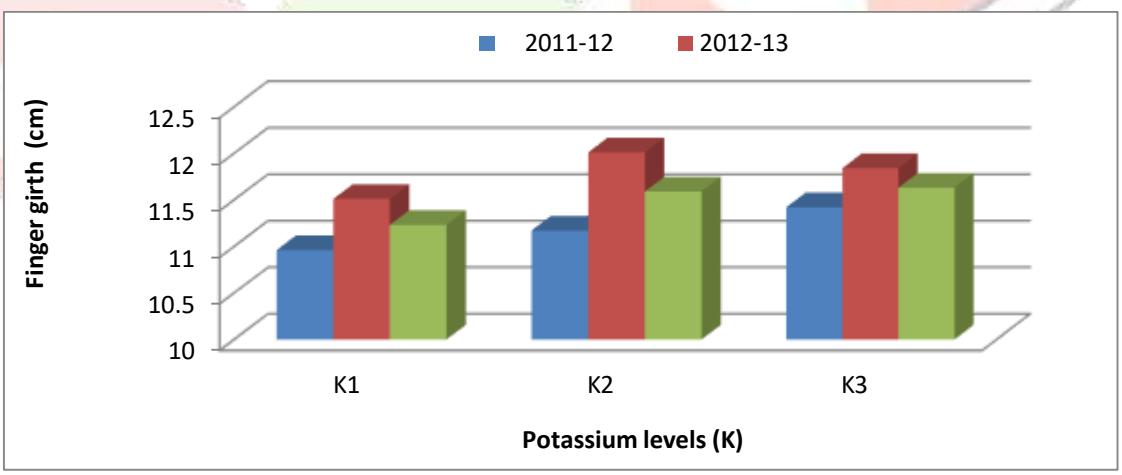
During 2012-13, the highest finger girth (12.04cm)was observed in $D_4$(1.5m x 2.1m spacing *i.e.* 3,174 plants/ha), which was at par

Table 01. Effect of plant densities and different levels of potassium on Finger girth (cm) of banana cv. Ardhapuri

| Treatments | | Finger girth (cm) | | |
|---|---|---|---|---|
| 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 | 10.78 | 11.74 | 11.26 |
| $D_2$( 1.5 x 1.5 ) | 4,444 | 11.06 | 11.50 | 11.28 |
| $D_3$( 1.5 x 1.8) | 3,703 | 11.11 | 11.87 | 11.49 |
| $D_4$ (1.5 x 2.1) | 3,174 | 11.78 | 12.04 | 11.91 |
| S.E.(m) ± | | 0.051 | 0.047 | 0.05 |
| C.D. at 5% | | 0.176 | 0.162 | 0.15 |
| Sub-treatment (Potassium levels) (K) | | | | |
| $K_1$ (100 g $K_2O$/plant) | | 10.96 | 11.51 | 11.23 |
| $K_2$ (200 g $K_2O$/plant) | | 11.17 | 12.01 | 11.59 |
| $K_3$ (300 g $K_2O$/plant) | | 11.42 | 11.84 | 11.63 |
| S.E.(m) ± | | 0.063 | 0.058 | 0.060 |
| C.D. at 5% | | 0.188 | 0.172 | 0.173 |
| Interaction (D x K) | | | | |
| $D_1$ $K_1$ | | 10.17 | 11.17 | 10.67 |
| $D_1$ $K_2$ | | 11.00 | 12.07 | 11.53 |
| $D_1$ $K_3$ | | 11.17 | 12.00 | 11.58 |
| $D_2$ $K_1$ | | 11.00 | 11.43 | 11.22 |
| $D_2$ $K_2$ | | 11.00 | 11.74 | 11.37 |

| | | | |
|---|---|---|---|
| $D_2$ $K_3$ | 11.17 | 11.33 | 11.25 |
| $D_3$ $K_1$ | 11.00 | 11.60 | 11.30 |
| $D_3$ $K_2$ | 11.00 | 12.23 | 11.62 |
| $D_3$ $K_3$ | 11.33 | 11.77 | 11.55 |
| $D_4$ $K_1$ | 11.67 | 11.83 | 11.75 |
| $D_4$ $K_2$ | 11.67 | 12.00 | 11.83 |
| $D_4$ $K_3$ | 12.00 | 12.27 | 12.14 |
| S.E.(m) ± | 0.125 | 0.115 | 0.120 |
| C.D. at 5% | 0.376 | 0.345 | 0.347 |



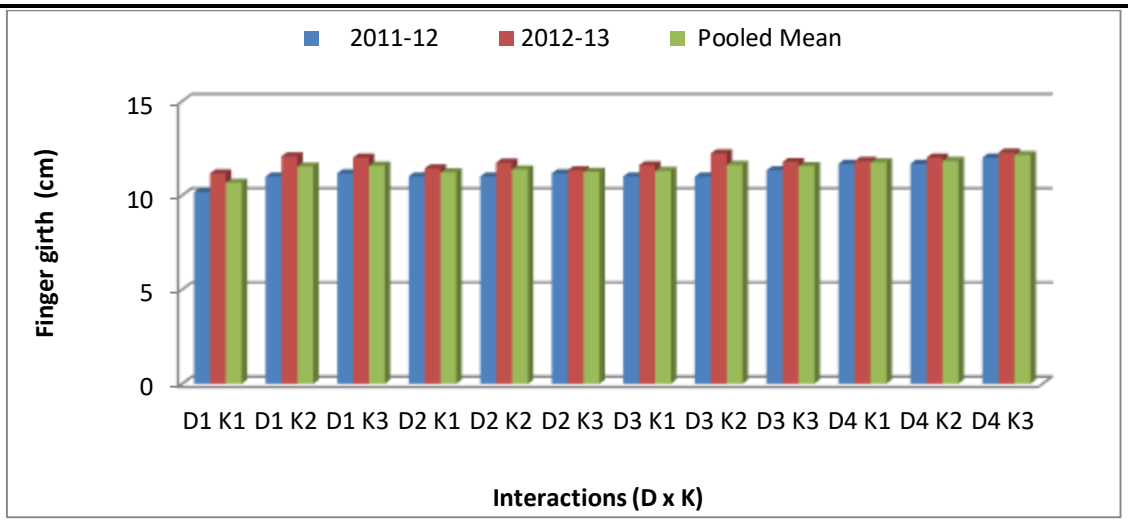



**Fig. 01. Effect of plant densities and different levels of potassium on finger girth (cm) of banana cv. Ardhapuri**

(11.87cm) with $D_3$ (1.5m x 1.8m spacing *i.e.* 3,703 plants/ha), while the least finger girth (11.50cm) recorded by $D_2$ (1.5m x 1.5m spacing *i.e.* 4,444 plants/ha).The potassium level $K_2$ (200 g $K_2O$/plant) gave the highest finger girth (12.01cm) which was at par (11.84cm) with $K_3$ (300 g $K_2O$/plant), while the least finger girth (11.51 cm) was recorded by $K_1$ (100 g $K_2O$/plant). The interaction effect of plant densities and potassium levels gave the highest finger girth (12.27cm), which was at par (12.23cm) with $D_3K_2$ (1.5m x 1.8m spacing *i.e.* 3,703 plants/ha at 200 g $K_2O$/plant), respectively and equally at par with $D_1K_3$ (1.5m x 1.2m spacing *i.e.* 5,555 plants/ha at 300 g $K_2O$/plant) $D_4K_2$(1.5m x 2.1m spacing *i.e.* 3,174 plants/ha at 200 g $K_2O$/plant) (12.00cm). The minimum finger girth (11.17cm) was recorded by $D_1K_1$(1.5m x 1.2m spacing *i.e.* 5,555 plants/ha with 100 g $K_2O$/plant), which was at par with $D_2K_3$(1.5m x 1.5m spacing *i.e.* 4,444 plants/ha with 300 g $K_2O$/plant) (11.33cm) and $D_2K_1$(1.5m x 1.5m spacing *i.e.* 4,444 plants/ha with 100 g $K_2O$/plant) (11.43), respectively.

The pooled data showed that the greatest finger girth (11.91cm) was recorded in density $D_4$ 1.5m x 2.1m spacing *i.e.* 3,174 plants/ha) and the least finger girth (11.26cm) was gave by $D_1$ (1.5m x 1.2m spacing *i.e.* 5,555 plants/ha), which was at par with $D_2$ (1.5m x 1.5m spacing *i.e.* 4,444 plants/ha) (11.28cm).The potassium level $K_3$ (300 g $K_2O$/plant) gave greatest finger girth (11.63cm), which was at par (11.59cm) with $K_2$ (200 g $K_2O$/plant), while the least finger girth was noted in K1 (100 g $K_2O$/plant) (11.23cm) The interaction effect of plant densities and potassium levels in pooled showed that the greatest finger girth (12.14 cm) was noted in $D_4K_3$ (1.5m x 2.1m spacing *i.e.* 3,174 plants/ha with 300 g $K_2O$/plant), which was at par with $D_4K_2$(1.5m x 2.1m spacing *i.e.* 3,174 plants/ha with 200 g $K_2O$/plant) (11.83cm). The minimum finger girth (10.67cm) was recorded in $D_1K_1$(1.5m x 1.2m spacing *i.e.* 5,555 plants/ha with 100 g $K_2O$/plant).

**Discussion:**

The data in Table 01 revealed that that the greatest finger girth (11.91cm) was recorded in density $D_4$ ()1.5 m x 2.1 m with 3,174 plants/ha) at the least finger girth (11.26cm) was gave by $D_1$ (1.5 m x 1.2 m with 5,555 plants/ha), which was at par (11.28cm) $D_2$ (1.5 m x 1.5 m with 4,444 plants/ha) The potassium level $K_3$ (300 g $K_2O$/plant) had gave greatest finger girth (11.63cm), which was at par (1159cm) with $K_2$ (200 g $K_2O$/plant), while the least finger girth was noted in $K_1$(100 g $K_2O$/plant) (11.23cm) The interaction effect of plant densities and potassium levels in pooled shows that the greatest finger girth (12.14 cm) was noted in $D_4K_3$ (1.5 m x 2.1 m with 3,174 plants/ha at 300 g $K_2O$/plant), (1.5 m x 2.1 m with 3,174 plants/ha at 200 g $K_2O$/plant). Similar findings were reported by Natesh *et al.* (1993).

**Summery and Conclusion:**

The greatest girth of fruit (11.91cm) was recorded in density $D_4$ ()1.5 m x 2.1 m) at the least girth of fruit (11.26cm) was given by $D_1$ 1.5 m x 1.2 m (5,555 plants/ha), which was at par (11.28cm) $D_2$ 1.5 m x 1.5 m (4,444 plants/ha) The potassium level $K_3$ (300 g $K_2O$/plant) had given greatest girth of fruit (11.63cm), which was at par (1159cm) with $K_2$ (200 g $K_2O$/plant), while the least girth of fruit was noted in k, least girth of fruit was noted in k, (100 g $K_2O$/plant) (11.23cm) The interaction effect of plant densities and potassium levels in pooled shows that the greatest girth of fruit (12.14 cm) was noted in $D_4K_3$ (1.5 m x 2.1 m at 300 g $K_2O$/plant), (1.5 m x 2.1 m at 200 g $K_2O$/plant).

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