Effect of Spacing and Size of Planting Material on Elephant Foot Yam Grown as Intercrop in Coconut Garden

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Abstract
Field experiment was conducted at AICRP on Palms at Shaheed Gundadhoor College of Agriculture and Research Station, Kumhrawand, Jagdalpur (Bastar), IGKV, Raipur, Chhattisgarh to standardize the spacing and size of planting material of elephant foot yam grown as intercrop in coconut plantation. Among the five different spacing (40 x 40 cm, 50 x 50 cm, 60 x 60 cm, 70 x 70 cm and 80 x 80 cm) and two corm sizes (300 and 500 g), the plants under closest spacing (40 x 40 cm) had maximum pseudostem length but pseudostem girth and canopy were maximum in plants spacing (80 x 80 cm). Greater growth and yield were associated with 500 g size of planting material. From yield maximization point of view, 40 x 40 cm spacing with 500 g planting material size was the best for elephant foot yam grown as intercrop under coconut garden. Greater nut yield/palm/year of 8.71 was observed from intercropped block as compared to nut yield of 5.58 from the monocrop.

Key words: Coconut, corm size, elephant foot yam, intercrop, spacing, yield.

Introduction
Elephant foot yam (Amorphophallus campanulatus Blume,) has now become a very popular crop in certain area of tropical and subtropical regions. It needs a well distributed rainfall with warm weather throughout its growing season. The corm has high carbohydrate content (about 18% starch) and rich in vitamin A, minerals and protein. As ayurvedic medicine, it is used against piles, jaundice, diabetes, dyspepsia and appetites. The production potential of this crop is very much dependent on good management practices and both planting material size and spacing being the important factors affecting the corm yield (Sethi et al. 2002). In the recent past, economy of coconut farming was affected due to fluctuation in the price of coconut, copra and coconut oil. Adoption of coconut based multiple cropping system emerges as a viable way for improving the income of coconut farmers. Growing of elephant foot yam as an intercrop increases the profitability without affecting the performance of coconut (Singh et al., 1997). The relation between planting material size and corm yield has been reported by Ravi et al., (2011). The present investigation was undertaken to study the effect of spacing and size of planting material on the yield of elephant foot yam grown as intercrop in coconut garden and to evaluate the effect of intercrop on the yield of coconut.

Materials and Methods
The field experiment was conducted during the period of Kharif season of 2009-10 in a 20 year old plantation of AICRP on Palms at Shaheed Gundadhoor College of Agriculture and Research Station, Kumhrawand, Jagdalpur (Bastar), Chhattisgarh. Soil of the experimental site is silty-loam to clay-loam, rich in silicon, prone to excessive cementing nature with low contents of organic matter, zinc, nitrogen, phosphorus, potash and boron and pH ranging from 5.5 to 6.1. The experiment was laid out in
Elephant foot yam as intercrop in coconut garden

a split plot design with three replications assigning spacing to the main plots and size of planting material (corm) to the sub plots. The treatment included five spacings (40 x 40 cm, 50 x 50 cm, 60 x 60 cm, 70 x 70 cm and 80 x 80 cm) with two corm sizes (300 and 500 g). There were ten treatments with all possible combinations. Four rows of coconut consisting of six palms in each row, i.e. 24 palms, covering an area of 1350 m² was taken for conducting the experiment. The seed corms were treated by dipping in concentrated solution of 20 kg fresh cow dung with 100 liters of water for 30 minutes. Corms were planted in the middle of March during both the years. All the cultural practices and plant protection measures were done as per need of crop. Fertilizers were applied @ 100:80:100 kg NPK/ha as urea, P₂O₅ and K₂O. Entire phosphorus with FYM @ 20 t/ha was given as basal application. Nitrogen and potassium were applied in two splits 30 days after planting (DAP) and 60 DAP followed by earthing up and irrigation. Scheduled agronomical management practices with fertilizer dose @ 400:200:750 g NPK/Palm/year as urea, P₂O₅ and K₂O was followed in coconut under both intercropped and monocropped plots. The observation on different growth parameters were recorded from five randomly selected plants per plot. Yield was taken on net plot basis at harvest. The yield per ha was calculated on the basis of yield per plot considering 75% area occupied by intercrop. The data collected from different characters were processed and were analyzed by the method of analysis of variance given by Gomez and Gomez (1984).

Results and Discussion

Spacing and corm size had significant effect on almost all vegetative and yield parameters but their interactions had significant effect on girth of pseudostem, canopy and yield of elephant foot yam (Table 1-2). The plants under closest spacing (40 cm x 40 cm) had maximum pseudostem length but pseudostem girth and canopy spread were maximum in plant widest spacing. The plant raised from bigger corm size (500 g) had maximum length, girth of pseudostem and canopy spread.

The combination of spacing and size of planting material (Table 2) at P₁S₂ (40 x 40 cm, 500 g i.e. closest spacing with bigger corm size) resulted in maximum pseudostem length and corm yield per plot. Maximum girth, canopy spread, diameter of corm and weight of corm were observed in plants under P₅S₂ (80 x 80 cm, 500 g) treatment. Increasing trends in both corm diameter and corm weight was observed with the increase in spacing and also with bigger (500 g) planting material but the corm yield was the maximum in plants were closest spacing.
Table 2. Effect of size of planting material on growth and yield parameters of elephant foot yam.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Pseudo stem length (cm)</th>
<th>Girth (cm)</th>
<th>Canopy spread (cm)</th>
<th>Diameter of corm (cm)</th>
<th>Weight of corm (Kg)</th>
<th>Corm yield (Kg/m²)</th>
<th>Corm yield (tha⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1S1</td>
<td>96.30</td>
<td>87.33</td>
<td>17.26</td>
<td>14.13</td>
<td>87.33</td>
<td>79.16</td>
<td>12.60</td>
</tr>
<tr>
<td>P1S2</td>
<td>111.16</td>
<td>101.00</td>
<td>16.53</td>
<td>16.13</td>
<td>95.23</td>
<td>93.33</td>
<td>13.70</td>
</tr>
<tr>
<td>P2S1</td>
<td>92.33</td>
<td>83.20</td>
<td>17.26</td>
<td>15.26</td>
<td>91.83</td>
<td>86.16</td>
<td>14.66</td>
</tr>
<tr>
<td>P2S2</td>
<td>104.40</td>
<td>99.80</td>
<td>17.40</td>
<td>17.53</td>
<td>104.50</td>
<td>96.16</td>
<td>14.86</td>
</tr>
<tr>
<td>P3S1</td>
<td>79.56</td>
<td>86.33</td>
<td>18.00</td>
<td>16.33</td>
<td>92.16</td>
<td>85.63</td>
<td>16.70</td>
</tr>
<tr>
<td>P3S2</td>
<td>104.13</td>
<td>96.83</td>
<td>19.26</td>
<td>17.33</td>
<td>105.56</td>
<td>102.16</td>
<td>17.06</td>
</tr>
<tr>
<td>P4S1</td>
<td>82.00</td>
<td>69.76</td>
<td>18.86</td>
<td>17.14</td>
<td>96.67</td>
<td>93.66</td>
<td>16.90</td>
</tr>
<tr>
<td>P4S2</td>
<td>100.66</td>
<td>91.00</td>
<td>20.33</td>
<td>18.26</td>
<td>110.83</td>
<td>102.33</td>
<td>19.46</td>
</tr>
<tr>
<td>P5S1</td>
<td>87.60</td>
<td>75.23</td>
<td>19.33</td>
<td>17.86</td>
<td>98.16</td>
<td>112.86</td>
<td>18.93</td>
</tr>
<tr>
<td>P5S2</td>
<td>98.33</td>
<td>85.80</td>
<td>21.86</td>
<td>19.33</td>
<td>109.16</td>
<td>112.86</td>
<td>18.26</td>
</tr>
<tr>
<td>CD (p=0.05)</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>1.32</td>
<td>6.34</td>
<td>1.21</td>
</tr>
</tbody>
</table>

At closer planting spacing (40 cm x 40 cm), the plant height was maximum as compared to widest planting spacing. Shift in terms of plant height, basal growth and canopy spread which might have resulted in reduction in basal girth, canopy spread and yield attributes under higher planting density. Greater corm size might be attributing to better crop growth in terms of plant height, basal growth and canopy spread which might have resulted in reduction in basal girth, canopy spread and yield attributes under higher planting density. The present study recommends the use of greater size corm as planting material. Greater growth and further in large size corm are vigorous in the early stages growing from monocrop and intercrop. Intercropping elephant foot yam under coconut with normal package of practices affect the nutrient yield of coconut. The pre-experimental (2008) nut yield from monocrop and intercrop plot was 60.65 and 58.84 nuts/palm/year respectively. The experiment (2009) nut yield from monocrop and intercrop plot was 66.23 and 67.23 nuts/palm/year respectively. An increase in nut yield of 5.58 (8.42%) and 8.71 (12.91%) per palm per year were observed in the yield of coconut. An increase in nut yield after the experimentation (2010) was 6.63 and 7.33 nuts/palm/year respectively from monocrop and intercrop plot. The yield of coconut might be attributed to better root ramification. Greater plant competition and mutual shading might have resulted in reduction in basal girth, canopy spread and yield attributes under greater plant density. The corm yield was recorded with the closest planting (40 cm x 40 cm) and greater corm size but maximum yield was associated with closer planting and larger corm size 500 g. The pseudostem girth, canopy spread, corm size and corm diameter increased with increase in plant spacing and size of seed corm, whereas pseudostem length decreased. Maximum corm yield was recorded with the closest plant spacing and greater corm size. This is in good agreement with the findings of Mohan Kumar et al. (1973) and Mandal and Sen (2004). Growth of the elephant foot yam increased with greater size plant material. From 50 x 50 cm spacing onwards, the further increase in plant material was proportionate with the size of the planting material.
over initial. The findings of present investigation are in agreement with Chowdhury and Deka (1997); Maheswarappa et al., (1998); Marimutha et al. (2001) and Nath (2002).

Conclusion

For yield maximization 40 x 40 cm spacing with 500 g planting material size was the best for elephant foot yam grown as intercrop under coconut garden. Greater nut yield/palm/year of 8.71 was observed from intercropped block as compared to nut yield of 5.58 from the monocrop.

References


