

# Productivity of Sweet corn as Influenced by Planting Geometry and Fertilizer Levels

## ABSTRACT

**Aim:** Field experiment was conducted to study the productivity of sweet corn as influenced by planting geometry and fertilizer levels

**Study design:** Split plot design with three replications and nine treatment combinations

**Place and Duration of Study:** Plot number '125' 'E' block, Main Agricultural Research Station, University of Agricultural Sciences, Dharwad, Karnataka (India) during 2015-16 and 2016-17

**Methodology:** Treatments includes three planting geometry and three fertilizer levels were applied as per protocol

**Results:** Individual yield parameters such as fresh cob weight with husk, without husk, cob girth and number of grains per row were significantly higher in wider planting geometry with higher fertilizer levels but with respect to fresh cob yield with husk and fresh fodder yield was recorded higher significantly in planting geometry of 60 cm x 15 cm along with higher fertilizer level (125:60:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>) which was on par with planting geometry of 45 cm x 20 cm along with higher fertilizer level (125:60:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>).

**Conclusion:** Planting geometry of 60 cm x 15 cm along with higher fertilizer level (125:60:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>) was found superior with respect to fresh cob yield with husk and fresh fodder yield, which was on par with planting geometry of 45 cm x 20 cm along with higher fertilizer level (125:60:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>).

*Keywords; Yield, Yield parameters, Planting geometry, Fertilizer levels,*

## 1. INTRODUCTION

Specialty corns (*viz.*, sweet corn, pop corn, baby corn and high oil corn) assume tremendous market potential not only in India but also in the international market. Among them, sweet corn is gaining importance in the star/big hotels, shopping malls and departmental stores *etc.* It is used for preparation of special soups, sweets, jams, cream pastes and other delicious eatables in urban areas. So now a day's sweet corn industry is expanding because of increasing domestic consumption, export development and import replacement. Since, 3 to 4 crops can be harvested in a year and fresh fodder is highly succulent, palatable and digestible for dairy animals. Hence it is becoming increasingly popular in India and other Asian countries. Increasing demand, premium price and global spread of sweet corn make it attractive options for the farmers.

Plant densities or geometries are very important parameters in crop production. The optimum plant density paves the way for better-use of time, light, temperature, precipitation and other resources. Plant density is of particular importance in sweet corn, because it does not have tillering capacity to adjust to variation in plant stand. In order to achieve higher cob yields, maintenance of optimum plant density is the most important factor. Few of the studies were confirmed positive response for the optimum plant population along with nutrients in order to achieve the higher productivity of sweet corn [1]. Maize has high production potential especially under irrigated condition when compared to any other cereal crop. The productivity of sweet corn is largely depends on its nutrient requirement and management practices particularly that of nitrogen, phosphorus and potassium.

## 2.0 MATERIALS AND METHODS

The field experiment was conducted at University of Agricultural Sciences, Dharwad of Northern Transition Zone of Karnataka, during *khari* 2015-16 and 2016-17 to study the productivity of sweet corn as influenced by planting geometries and fertilizers levels. Soil have pH (7.24), electrical conductivity (0.25 dS m<sup>-1</sup>), organic carbon (0.63 %), available N (237.9 kg ha<sup>-1</sup>): P<sub>2</sub>O<sub>5</sub> (32.14 kg ha<sup>-1</sup>): K<sub>2</sub>O (410.5 kg

48 ha<sup>-1</sup>) and micronutrients *viz.*, Zn and Fe (0.58 and 4.47 ppm, respectively). The field experiment was laid  
 49 out in split plot design with three replications. There were 9 treatment combinations involving three main  
 50 plots., Planting geometry: P<sub>1</sub> - 60 cm x 15 cm (1,11,111, plants ha<sup>-1</sup>), P<sub>2</sub> - 45 cm x 20 cm (1,11,111, plants  
 51 ha<sup>-1</sup>) and P<sub>3</sub> - 60 cm x 20 cm (83,333, plants ha<sup>-1</sup>) and sub plots: Fertilizer levels: F<sub>1</sub> - 75:40:25  
 52 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>, F<sub>2</sub> -100:50:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup> and F<sub>3</sub> - 125:60:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>.  
 53 Recommended dose of different fertilizer were applied, 50 % of N applied at basal, 25 % at 30 DAS and  
 54 remaining 25 % applied at 45 DAS. Full dose of P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O applied at the time of sowing. The test  
 55 crop was sweet corn (Hybrid sugar 75) yield and yield attributes were recorded as per treatments  
 56 accordingly.

## 57 **2.1 Observation on sweet corn**

### 58 **2.1.1 Fresh cob weight with husk**

59 The total weight of sweet corn cobs from five tagged plants was taken along with the husk and  
 60 the average weight of cob was recorded in grams per cob (g cob<sup>-1</sup>).

### 61 **2.2.2 Fresh cob weight without husk**

62 The weight of dehusked sweet corn from each plant was recorded in grams per cob (g cob<sup>-1</sup>).

### 63 **2.1.3 Number of cobs per hectare**

64 The total number of sweet corn cobs per hectare was calculated with a help of number of cobs  
 65 per plant and plant population at the time of cob harvesting.

### 66 **2.1.4 Cob length**

67 The length of the cob was measured from base to the tip of the cob and expressed in centimetres  
 68 (cm).

### 69 **2.1.5 Cob girth**

70 The circumference measured at the centre of cob was taken as the girth of the cob and  
 71 expressed in centimetres (cm).

### 72 **2.1.6 Number of grains per row**

73 The number of grains per row of five cobs were measured manually and the average was worked  
 74 out to get the number of grains per row.

### 75 **2.1.7 Fresh cob yield with husk**

76 The weight of fresh sweet corn cobs with husk from each net plot was weighed and expressed in  
 77 kg and it was converted in to quintal per hectare (q ha<sup>-1</sup>).

### 78 **2.1.8 Fresh fodder yield**

79 After harvesting the fresh cobs, the plants were cut immediately from each net plot and the weight  
 80 was recorded in kg and it was converted in to quintal per hectare (q ha<sup>-1</sup>).

### 81 **2.1.9 Harvest index**

82 The ratio of economic yield (fresh cob yield) to the biological yield (fresh cob yield and fodder  
 83 yield) was worked out as harvest index [2] and expressed in percentage

$$84 \text{ Harvest Index (\%)} = \frac{\text{Economic yield (q ha}^{-1}\text{)}}{\text{Biological yield (q ha}^{-1}\text{)}} \times 100$$

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Biological yield (q ha<sup>-1</sup>)

### 86 87 3. RESULTS AND DISCUSSION

#### 88 3.1 Effect of planting geometry and fertilizer levels on yield parameters

89 The pooled results indicated that, significantly higher fresh cob weight with husk (364.99 g cob<sup>-1</sup>),  
90 without husk (310.46 g cob<sup>-1</sup>), cob girth (15.56 cm), number of grains per row (40.67) was noticed in wider  
91 planting geometry of 60 cm x 20 cm and it was on par with 60 cm x 15 cm and both were significantly  
92 superior over planting geometry of 45 cm x 20 cm. Similar trend was also observed during individual  
93 years of 2015 and 2016. Among the fertilizer levels, significantly higher fresh cob weight with husk  
94 (371.11 g cob<sup>-1</sup>), without husk (318.63), cob length (19.35), cob girth (16.22 cm), number of grains per  
95 row (43.06) was observed with higher fertilizer level (125:60:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>) which was at par with  
96 recommended fertilizer level (100:50:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>) and both were significantly superior over  
97 lower fertilizer level. The similar trend was observed during individual years. With respect to interaction  
98 effects, the combination of P<sub>3</sub>F<sub>3</sub> (60 cm x 20 cm along with 125:60:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>) was registered  
99 significantly higher yield attributes and which was on par with treatment combinations of P<sub>1</sub>F<sub>3</sub>, P<sub>2</sub>F<sub>3</sub>, P<sub>1</sub>F<sub>2</sub>  
100 and P<sub>2</sub>F<sub>2</sub>. Whereas, significantly lower yield attributes was observed with treatment combination of P<sub>2</sub>F<sub>1</sub>.  
101 However, wider planting geometry of 60 cm x 20 cm produced higher yield parameters of individual plants  
102 which was mainly due to better resource availability and reduced inter and intra plant competition in the  
103 community.

#### 104 3.2 Effect of planting geometry and fertilizer levels on yield

105 In the present study, the pooled data of two years revealed that, planting geometries of 60 cm x  
106 15 cm and 45 cm x 20 cm were found superior and were recorded significantly higher fresh cob yield with  
107 husk (315.9 and 313.2 q ha<sup>-1</sup>, respectively) and fresh fodder yield (595.5 and 586.3 q ha<sup>-1</sup>, respectively).  
108 The increase in the fresh cob yield with husk was to the tune of 6.6 and 5.7 per cent higher, respectively  
109 and 8.6 and 6.8 per cent higher of fresh fodder yield, respectively as compared to planting geometry of 60  
110 cm x 20 cm (296.1 and 548.1 q ha<sup>-1</sup>, respectively). Higher yield was due to significantly higher plant  
111 density. These results are in close conformity with the findings of [3, 4 and 5] who also found that  
112 increase in plant population increased fresh cob yield. Higher fresh cob yield with husk was produced at  
113 planting geometry of 60 cm x 15 cm and 45 cm x 20 cm, though values of yield attributing characters  
114 were better in planting geometry of 60 cm x 20 cm, these improvement were not sufficient to compensate  
115 the increased plant number per unit area obtained from 60 cm x 15 cm and 45 cm x 20 cm. The similar  
116 results were reported by [6]. With respect to fertilizer levels; Significantly higher fresh cob yield with husk  
117 and fodder yield was recorded with higher fertilizer level (125:60:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>) and which was  
118 on par with the recommended fertilizer level (100:50:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>) and both fertilizer levels  
119 found superior over lower fertilizer level (75:40:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>). Similar results were observed by  
120 [7]. Singh and Yadav (2007). The native available soil nitrogen was low (237.9 kg ha<sup>-1</sup>) and hence the  
121 application of higher nitrogenous fertilizer resulted in higher nutrient availability. The optimum availability  
122 of nutrients has favored the growth and development of better root system, which helped in better uptake  
123 of nutrients. Further, it improves the rate of photosynthesis, dry matter production and translocation to  
124 reproductive parts as indicated by higher values of yield components that resulted in higher fresh cob  
125 yield with husk of sweet corn. Higher yield was observed during 2016-17 as compared to 2015-16. It  
126 might be due to good amount of rainfall received during the cropping period which resulted in higher yield  
127 and yield attributes of sweet corn. Among the different treatment interactions, significantly higher fresh  
128 cob yield with husk (321.4 q ha<sup>-1</sup>) and fresh fodder yield (606.7 q ha<sup>-1</sup>) was recorded with planting  
129 geometry of 60 cm x 15 cm along with higher fertilizer level (125:60:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>) over wider  
130 planting geometry of 60 cm x 20 cm along with lower fertilizer level (75:40:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>). The  
131 increase in yield was due to synergetic effect between planting geometry and fertilizer levels were more  
132 effective than their individual effects. The improvement in nutrient availability with the application of higher  
133 fertilizer levels resulted in higher yield parameters and which contributed to increased fresh cob yield with  
134 husk of sweet corn.

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136 **CONCLUSION**

137 Planting geometry of 60 cm x 15 cm along with higher fertilizer level (125:60:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg  
138 ha<sup>-1</sup>) was found superior with respect to fresh cob yield with husk and fresh fodder yield, which was on  
139 par with planting geometry of 45 cm x 20 cm along with higher fertilizer level (125:60:25 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg  
140 ha<sup>-1</sup>).  
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174 **Table 1: Fresh cob weight with husk, fresh cob weight without husk and cob length of sweet corn**  
 175 **as influenced by planting geometries and fertilizer levels**  
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Treatments	Fresh cob weight with husk (g cob <sup>-1</sup> )			Fresh cob weight without husk (g cob <sup>-1</sup> )			Cob length (cm)		
	2015-16	2016-17	Pooled	2015-16	2016-17	Pooled	2015-16	2016-17	Pooled
<b>Main plot - Planting geometry</b>									
P <sub>1</sub> : 60 cm x 15 cm (1,11,111)	354.69 ab	366.48 ab	360.58 ab	299.98 ab	309.23 ab	304.61 ab	18.27 a	18.72 a	18.50 a
P <sub>2</sub> : 45 cm x 20 cm (1,11,111)	350.37 b	362.90 b	356.63 b	293.63 b	305.97 b	299.80 b	17.83 a	18.30 a	18.06 a
P <sub>3</sub> : 60 cm x 20 cm (83,333)	359.61 a	370.37 a	364.99 a	302.97 a	317.94 a	310.46 a	18.46 a	18.59 a	18.52 a
<b>S.Em. ±</b>	1.33	1.41	1.33	1.70	2.35	1.95	0.23	0.42	0.24
<b>Sub-plot - Fertilizer levels</b>									
F <sub>1</sub> : 75:40:25 N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O kg ha <sup>-1</sup>	341.97 b	353.12 b	347.54 b	283.94 b	296.51 b	290.23 c	17.00 b	17.32 b	17.16 b
F <sub>2</sub> : 100:50:25 N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O kg ha <sup>-1</sup>	357.63 a	369.48 a	363.56 a	300.03 a	311.98 a	306.01 b	18.39 a	18.76 a	18.57 a
F <sub>3</sub> : 125:60:25 N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O kg ha <sup>-1</sup>	365.07 a	377.14 a	371.11 a	312.60 a	324.66 a	318.63 a	19.16 a	19.53 a	19.35 a
<b>S.Em. ±</b>	4.08	4.59	2.86	3.88	4.61	3.77	0.37	0.42	0.33
<b>Interaction</b>									
P <sub>1</sub> F <sub>1</sub>	341.23 bc	352.47 ab	346.85 cd	285.97 de	292.83 c	289.40 cd	17.27 ab	17.77 ab	17.52 bc
P <sub>1</sub> F <sub>2</sub>	358.23a-c	370.20 ab	364.22 ab	303.17 a-d	312.37 a-c	307.77 a-c	18.27 ab	18.73 ab	18.50 ab
P <sub>1</sub> F <sub>3</sub>	364.60 ab	376.77 a	370.68 ab	310.80 ab	322.50 ab	316.65 ab	19.27 a	19.47 a	19.30 ab
P <sub>2</sub> F <sub>1</sub>	335.27 c	347.03 b	341.15 d	279.00 e	291.83 c	285.42 d	16.37 b	16.77 b	16.57 c
P <sub>2</sub> F <sub>2</sub>	353.53 a-c	365.57 ab	359.55 a-c	292.57 b-e	308.20 a-c	300.38 b-d	18.03 ab	18.67 ab	18.35 a-c
P <sub>2</sub> F <sub>3</sub>	362.30 ab	376.10 a	369.20 ab	309.33 a-c	317.87 a-c	313.60 ab	19.09 a	19.47 a	19.28 ab
P <sub>3</sub> F <sub>1</sub>	349.40 a-c	359.87 ab	354.63 b-d	286.87 c-e	304.87 bc	295.87 b-d	17.37 ab	17.43 ab	17.40 bc
P <sub>3</sub> F <sub>2</sub>	361.13 ab	372.67 ab	366.90 ab	304.37a-d	315.37 a-c	309.87 a-c	18.87 a	18.87 ab	18.87 ab
P <sub>3</sub> F <sub>3</sub>	368.30 a	378.57 a	373.43 a	317.67 a	333.60 a	325.63 a	19.13 a	19.67 a	19.47 a
<b>S.Em. ±</b>	7.07	7.95	4.95	6.73	7.98	6.52	0.64	0.72	0.56

177 Means followed by the same letter (s) within a column are not significantly differed by DMRT (P = 0.05)

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196 **Table 2: Cob girth, number of grains per row and number of rows per cob of sweet corn as**  
 197 **influenced by planting geometries and fertilizer levels**  
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Treatments	Cob girth (cm)			Number of grains per row			Number of rows per cob		
	2015-16	2016-17	Pooled	2015-16	2016-17	Pooled	2015-16	2016-17	Pooled
<b>Main plot - Planting geometry</b>									
P <sub>1</sub> : 60 cm x 15 cm (1,11,111)	14.98 a	15.59 a	15.29 a	39.00 a	41.33 a	40.17 ab	16.22 a	16.44 a	16.33 a
P <sub>2</sub> : 45 cm x 20 cm (1,11,111)	14.39 b	15.20 b	14.80 b	37.78 a	38.89 a	38.33 b	15.78 a	16.43 a	16.11 a
P <sub>3</sub> : 60 cm x 20 cm (83,333)	15.19 a	15.92 a	15.56 a	39.78 a	41.56 a	40.67 a	16.67 a	16.44 a	16.56 a
<b>S.Em. ±</b>	0.28	0.32	0.24	0.80	0.83	0.50	0.63	0.29	0.31
<b>Sub-plot - Fertilizer levels</b>									
F <sub>1</sub> : 75:40:25 N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O kg ha <sup>-1</sup>	13.47 b	14.36 b	13.91 b	35.00 b	36.33 b	35.67 b	15.33 b	15.44 b	15.39 b
F <sub>2</sub> : 100:50:25 N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O kg ha <sup>-1</sup>	15.26 a	15.76 ab	15.51 a	39.33 ab	41.56 a	40.44 a	16.44 ab	16.56 ab	16.50 a
F <sub>3</sub> : 125:60:25 N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O kg ha <sup>-1</sup>	15.84 a	16.60 a	16.22 a	42.22 a	43.89 a	43.06 a	16.89 a	17.33 a	17.11 a
<b>S.Em. ±</b>	0.25	0.51	0.28	1.41	1.19	1.10	0.40	0.52	0.36
<b>Interaction</b>									
P <sub>1</sub> F <sub>1</sub>	13.31 d	14.31 a	13.81 cd	35.00 ab	37.67 b-d	36.33 bc	15.33 ab	15.67 a	15.50 ab
P <sub>1</sub> F <sub>2</sub>	15.21 ab	15.88 a	15.55 ab	39.67 ab	42.33 a-c	41.00 ab	16.67 ab	16.33 a	16.50 ab
P <sub>1</sub> F <sub>3</sub>	16.41a	16.58 a	16.50 a	42.33 ab	44.00 ab	43.17 a	16.67 ab	17.33 a	17.00 ab
P <sub>2</sub> F <sub>1</sub>	13.31 d	13.91a	13.61 d	34.00 b	34.67 d	34.33 c	14.67 b	15.33 a	15.00 b
P <sub>2</sub> F <sub>2</sub>	15.08 a-c	15.35 a	15.21 a-c	37.67 ab	39.33 a-d	38.50 a-c	16.00 ab	16.67 a	16.33 ab
P <sub>2</sub> F <sub>3</sub>	14.78 bc	16.35 a	15.56 ab	41.67 ab	42.67 a-c	42.17 ab	16.67 ab	17.33 a	17.00 ab
P <sub>3</sub> F <sub>1</sub>	13.78 cd	14.85 a	14.31 b-d	36.00 ab	36.67 cd	36.33 bc	16.00 ab	15.33 a	15.67 ab
P <sub>3</sub> F <sub>2</sub>	15.48 ab	16.05 a	15.76 ab	40.67 ab	43.05 a-c	41.83 ab	16.67 ab	16.67 a	16.67 ab
P <sub>3</sub> F <sub>3</sub>	16.31 a	16.88 a	16.60 a	42.67 a	45.00 a	43.83 a	17.33 a	17.33 a	17.33 a
<b>S.Em. ±</b>	0.42	0.88	0.48	2.44	2.06	1.90	0.68	0.89	0.61

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217 **Table 3: Fresh cob yield with husk, fresh fodder yield and harvest index of sweet corn as**  
 218 **influenced by planting geometries and fertilizer levels**  
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Treatments	Fresh cob yield with husk (q ha <sup>-1</sup> )			Fresh fodder yield (q ha <sup>-1</sup> )			Harvest index (%)		
	2015-16	2016-17	Pooled	2015-16	2016-17	Pooled	2015	2016	Pooled
<b>Main plot - Planting geometry</b>									
P <sub>1</sub> : 60 cm x 15 cm (1,11,111)	311.6 a	320.1 a	315.9 a	586.0 a	605.0 a	595.5 a	34.72 a	34.60 a	34.66 a
P <sub>2</sub> : 45 cm x 20 cm (1,11,111)	309.0 a	317.4 a	313.2 a	577.8 a	594.9 a	586.3 a	34.84 a	34.79 a	34.82 a
P <sub>3</sub> : 60 cm x 20 cm (83,333)	292.9 b	298.7 b	296.1 b	538.9 b	557.3 b	548.1 b	35.26 a	34.90 a	35.08 a
<b>S.Em. ±</b>	2.80	4.14	1.95	3.88	5.09	3.58	0.20	0.18	0.15
<b>Sub-plot - Fertilizer levels</b>									
F <sub>1</sub> : 75:40:25 N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O kg ha <sup>-1</sup>	298.5 b	304.61 b	301.5 b	555.0 b	572.9 b	563.9 b	34.98 a	34.71 a	34.85 a
F <sub>2</sub> : 100:50:25 N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O kg ha <sup>-1</sup>	305.0 ab	313.11 ab	309.0 ab	568.2 a	587.8 ab	578.0 a	34.94 a	34.75 a	34.85 a
F <sub>3</sub> : 125:60:25 N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O kg ha <sup>-1</sup>	310.5 a	318.68 a	314.6 a	579.5 a	596.5 a	588.0 a	34.90 a	34.83 a	34.86 a
<b>S.Em. ±</b>	2.88	3.54	3.95	4.05	5.34	3.54	0.19	0.20	0.16
<b>Interaction</b>									
P <sub>1</sub> F <sub>1</sub>	304.1 a-d	314.6 ab	309.3 a-c	572.1 bc	594.7 ab	583.4 bc	34.71 a	34.58 a	34.64 a
P <sub>1</sub> F <sub>2</sub>	312.1 ab	321.6 a	316.9 ab	586.8 ab	605.9 a	596.4 ab	34.72 a	34.67 a	34.70 a
P <sub>1</sub> F <sub>3</sub>	318.6 a	324.3 a	321.4 a	599.0 a	614.4 a	606.7 a	34.72 a	34.54 a	34.63 a
P <sub>2</sub> F <sub>1</sub>	302.8 a-d	310.1 ab	306.4 a-c	566.3 bc	582.9 a-c	574.6 cd	34.84 a	34.72 a	34.78 a
P <sub>2</sub> F <sub>2</sub>	309.7 a-c	317.5 ab	313.6 ab	579.2 ab	596.9 ab	588.0 a-c	34.84 a	34.72 a	34.78 a
P <sub>2</sub> F <sub>3</sub>	314.3 a	324.7 a	319.5 ab	587.8 ab	604.7 a	596.3 ab	34.84 a	34.94 a	34.89 a
P <sub>3</sub> F <sub>1</sub>	288.5 d	289.1 c	288.8 c	526.5 e	541.0 d	533.8 f	35.40 a	34.83 a	35.11 a
P <sub>3</sub> F <sub>2</sub>	293.2 cd	300.1 bc	296.7 bc	538.6 de	560.7 cd	549.6 ef	35.24 a	34.87 a	35.06 a
P <sub>3</sub> F <sub>3</sub>	298.6 b-d	306.9 a-c	302.8 a-c	551.6 cd	570.4 b-d	561.0 de	35.13 a	35.00 a	35.06 a
<b>S.Em. ±</b>	4.98	6.13	6.84	7.02	9.24	6.13	0.23	0.24	0.20

220 Means followed by the same letter (s) within a column are not significantly differed by DMRT (P = 0.05)

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