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Effect of Improved Production Technologies on Growth and Yield of Hybrid Maize

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Abstract: ***An experimental trial was conducted at central farm, Agricultural College and Research Institute, Killikulam during Feb 2014 to June 2014 to study the improved production technology (IPT) on growth and yield of hybrid maize. The improved production technologies were compared with farmer practice. The results revealed that adoption of improved production technologies for maize influenced the growth attributes viz., plant height, stem girth, leaf area index, dry matter production and yield attributes viz., cob length, number of rows per cob, number of grains per row and number of grains per cob. There was a remarkable improvement in grain yield with an overall increase of 52 per cent over farmers practice due to adoption of improved production techniques in maize. Higher stover yield was also recorded due to adoption of IPT in maize.***

Key words: Maize, Growth, Yield attributes, Grain yield, Improved Production Technology (IPT)

Introduction:

Maize (*Zea mays* L.) is one of the important staple food crop of the world and ranks next only to wheat and rice in India, both in area and production. It accounts for approximately 9 per cent of total food grain production in the country. Maize is called as "king of crops" and "queen of cereals" because of its productive potential compared to any other cereal crop. Area and demand of maize is gaining momentum due to its diversified use. Among the cereal crops in India, Maize with annual production of around 22.5 million tonnes from 8.67 million hectares ranks third in production and contributes to 2.4% of world production with almost 5% share in world harvested area (Gracy *et al*., 2013). In Tamil Nadu, Maize occupied an area of 2.44 lakh ha with a production of 11.4 lakh tonnes and production of 4.6 t ha^{-1} (Singh, 2008). By 2020, the requirement of maize for various sectors will be around 100 million tones, of which poultry

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sector needs 31 million tones. Hence, it is a challenging task for us to increase the maize production from the present level (Paramasivan *et al*., 2012). In recent years, maize emerged as leading crop in Salem, Erode, Karur, Pudukottai, Dindigul and Perambalur Districts of Tamil Nadu, since it fetches higher price in the poultry industry. Maize, being a C_4 plant is an efficient converter of absorbed nutrients into food. Maize is a rich source of protein, vitamin and minerals.

However, the productivity of maize is low than its actual potential due to adoption of improper varieties and farmers inadequate knowledge on production practices (Naveen Saviour *et al*., 2013). Adoption of improved and sustainable maize technologies holds the key to ensure both sustainability and increased maize production. Maize and maize based cropping systems are becoming important food and nutritional security in Tamil Nadu (Malarvizhi *et al*., 2009). The productivity of maize could be substantially increased by adopting improved production technologies viz., use of hybrid varieties optimum spacing, balanced fertilization use of herbicide and micronutrients. There is ample opportunity for maximizing maize yields to meet the ever increasing feed grain demand for the growing livestock industry in the state. Keeping these facts in mind, the present trial was undertaken to popularize the improved production technologies on hybrid maize.

Materials and Methods:

Tambiraparani basin is one of the biggest basins to extend irrigation facility to covering Tirunelveli and Thoothukudi Districts of Tamil Nadu. Field experiment was conducted during summer (February to June 2014) at Central Farm, Agricultural College and Research Institute, Killikulam with a view to popularize the improved production technologies for maize in Tamirabarani basin. The soil type ranged from sandy loam to sandy clay loam having 0.5% organic carbon, low in available N (160 kg ha^{-1}), medium in available P (19.25 kg ha^{-1}) and K (256 kg ha^{-1}). Well decomposed farm yard manure at the rate of 12.5 t ha^{-1} was applied uniformly over the field before last ploughing. The experient was carried out with the hybrid maize variety Dekcalm *viz*., DKC 9120, DKC 9126, DKC 9133 and DKC 9142 adopting a seed

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rate of 20 kg ha^{-1}. The improved production technologies consisted of use of hybrid seeds, wider spacing (25 x 60 cm), fertilizer application at recommended levels (250:75:75 NPK kg ha^{-1}), *Azosprillium* (2 kg ha^{-1}) and use of pre-emergence herbicide (Atrazine @ 500 g ha^{-1}). Ridges and furrows were formed and the seeds were sown on the side of the ridges. Zn SO_4 @ 37.5 kg ha^{-1} was applied uniformly as basal dose to all the plots. Nitogen was applied in three splits as basal, 25 and 45 DAS, respectively. The entire dose of phosphorus was applied basally. The potassium was applied in two equal split doses as basal and 45 DAS. It was comparable with farmers practice. The experiment was conducted with due core adopting all improved practices recommended for maize. The biometric observation and grain yield were recorded and compared with conventional practice.

Results and Discussion:

Effect of IPT on growth attributes of maize

The growth attributes was found to be maximum under the improved production technologies viz., use of hybrid seeds, optimum spacing, use of pre-emergence herbicide and optimum fertilization (Table 1). All the maize hybrids tried under IPT in the experiment indicated higher growth parameters over farmers practice. The maximum growth attributes *viz*., plant height (165 cm), stem girth (6.1cm), leaf area index (4.92) and Dry matter production (7682 kg ha^{-1}) were recorded in hybrid maize DKC 126. The hybrid maize plants with improved production technologies have shown improved growth and development as compared to plants under farmers traditional practice. The above results of increased growth might be due to adoption of improved maize production technology. This is in accordance with the earlier findings of Dhaka *et al*., (2010). The increase in dry matter production might be attributed due to the improved foraging ability, optimum fertilization leads to higher nutrient availability with better assimilation which could have helped the plants to grow taller with more leaf area index. Similar results were also reported earlier by Verma and Joshi (1999) as plant height and LAI were directly correlated to DMP. The minimum plant height (120 cm), stem girth (4.0cm), leaf area index (2.15) and Dry matter production (5860 kg ha^{-1}) were recorded under farmers

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practice. The growth attributes in farmers practice was low due to non adoption of improved production technologies for maize. The present findings are in line with the findings of Naveen Savior *et al*.,(2013).

Effect of IPT on yield attributes and yield of maize

The results obtained from the field experiment indicated the superiority of improved maize production technologies viz., use of hybrid seeds, optimum spacing, use of pre-emergence herbicide and optimum fertilization (Table 2).

Among the maize hybrids, the maximum yield attributes viz., cob length (27 cm), Number of rows per cob (15), Number of grains per row (34) and Number of grains per cob (460) were recorded in DKC 126 which ultimately resulted in enhancing grain yield (2610 kg ha^{-1}) and stover yield (3485kg ha^{-1}). The corresponding grain yield was ranged between 1500 to 2610 kg ha^{-1} under improved package over farmers practice (1250 kg ha^{-1}). The percent increase in grain yield ranged between 16 and 52 over farmers practice. Similar yield enhancement due to adoption of improved maize production technology was earlier reported by Dhaka *et al*., (2010). The corresponding percent increase of stalk yield ranged from 13 to 68 over farmers practice due to adoption of improved cultivation practices. The lowest grain yield of 1250 kg ha^{-1} and stover yield of 1100 kg ha^{-1} was recorded under farmers practice. This might be due to the use of local variety, reduced spacing, avoidance of herbicides and use of reduced quantity of NPK fertilizers. This result is in agreement with findings of Naveen savior *et al*., (2013).

Conclusion:

The results of the present study indicated that performance of maize was superior due to adoption of improved production technologies to get maximum productivity and profitability over farmers practice.

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Table 1. Effect of Improved Production Technologies (IPT) on growth characters of maize

S.No.	Growth characters	Farmers practice	Improved Production Technologies			
		Local	DKC 9120	DKC 9126	DKC 9133	DKC 9142
1.	Plant height (cm)	120	155	165	159	150
2.	Stem girth (cm)	4.0	5.4	6.1	5.7	5.1
3.	Leaf area index	2.15	4.10	4.92	4.54	3.48
4.	Dry matter production (kg ha^{-1})	5860	6975	7632	7250	6790

Table 2. Effect of Improved Production Technologies (IPT) on yield characters and yield of maize

S.No.	Yield characters	Farmers practice	Improved Production Technologies			
		Local	DKC 9120	DKC 9126	DKC 9133	DKC 9142
1.	No. of cobs	1	2	2	2	2
2.	Cob length (cm)	17.5	23.4	27	24.4	21
3.	No. of rows/cob	9.0	12.4	14.8	13.2	12
4.	No.of grains/row	21	28	34	30	26
5.	No. of grains/cob	248	436	460	450	427
6.	Grain yield (kg/ha)	1250	1500	2610	2200	1600
7.	Stover yield (kg/ha)	1100	2350	3485	2630	1275

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