Original Research Article

Performance of different maize varieties under Front Line Demonstrations in District Kupwara.

Abstract

Maize is one of the important cereals next to wheat and rice in the world and in India as well.It is grown in temperate , tropical and subtropical regions of the world. In Kashmir valley maize is cultivated on area of 1.0 lac hactares which comprises of 26% of total maize area in the UT of J&K. Maize is grown in all the districts of Kashmir Valley with second highest area of 19.50 thousand hactares in Kupwara after Baramulla district, however the productivity of maize in Kupwara is very low as compared to the national average because of the poor seed replacement rate. To improve seed replacement rate and adoption rate of maize technologies front line demonstration on different high yielding area specific varieties were carried out in Kupwara. In the present investigation 120 Front line Demonstrations on maize varieties were conducted by KVK –Kupwara at farmers field in District Kupwara to demonstrate the impact of high yielding varieties of maize viz , Shalimar Maize Composite-,3 Shalimar Composite-4 , Shalimar KG-2, Shalimar QPMH-1 and LQMH-1 with recommended Package of Practices and compared with local check during the kharif seasons of 2020 and 2021 The improved high yielding varieties Shalimar Maize Composite-,3 Shalimar omposite-4 , Shalimar KG-2, Shalimar QPMH-1 and LQMH-1 recorded yield of 48, 58 45 68 and 85 qs/ha respectively as compared to local variety with yield of 20 q /ha. The technology gap of SMC-3, SMC-4 , Kg-2 Shalimar QPMH-1 and LQMH-1 was recorded as 3,2,5,2 and 5 respectively and extension gap was recorded as 36,46,33,56 and 73.

Introduction

Maize (*Zea mays* L), being a C4 plant, has yield potential far higher than any other cereals and that's why sometime referred to as the 'miracle crop' or 'queen of cereals' and that's why sometimes referred to as the miracle crop or queen of cereal's Maize is one of the major cereals crops with wide adaptability under diverse agro climatic conditions around the world. It is the third most important crop of India after rice and wheat that occupied 8.67 mha area with an average productivity of 25.7 q/ha compared to world average of 49.40 q/ha. Maize is one of the important major cereal crop grown in *Kharif* season in the district kupwara and an area of 17000 ha with the average productivity of 18.5 q/ha which is far below average national productivity (25.7 q/ha). The potential expected from improved technologies due to erratic rainfall, rain-fed farming, small land holdings, adoption of local cultivar, low and imbalance use of fertilizer, no use of plant protection measures and weed management practices. Yield of maize crop can be enhanced at least 26.70% with adoption of improved technologies such as improved cultivar, recommended dose of fertilizer and control of pests (Dhaka *et al.* 2010),fertilizer and plant protection are most critical inputs for increasing yield (Mishra *et al.* 2009). Realizing the situation front line demonstrations on maize production technology were planned and conducted to show the production potential, economic benefit of improved technologies under real farmer's conditions.

In the present study performance of improved technologies of maize against local check was evaluated through front-line demonstrations conducted at farmer's field during *Kharif* season of 2014 and 2015.

Materials and Methods

In the present investigation 120 Front line Demonstrations on maize varieties were conducted by KVK –Kupwara at farmers field in District Kupwara to demonstrate the impact of high yielding varieties of maize viz , Shalimar Maize Composite-,3 Shalimar composite-4 , Shalimar KG-2, Shalimar QPMH-1 and LQMH-1 with recommended Package of Practices and compared with local check during the kharif seasons of 2020 and 2021. The soils of the study area are mostly sandy loam to clay loam in texture with low nitrogen, medium phosphorus and high in available potassium. Crop was sown after receiving sufficient rainfall, between second week of May to last week of May with crop geometry of 60 × 20 cm and seed rate of 20 kg/ha. The total amount of phosphorus and potassium was applied as basal dose along with half dose of nitrogen and remaining dose of nitrogen was top dressed in two equal splits at 30 and 60 days after sowing. Hand weeding was done once at 20-30 days after sowing. The total number of hundred twenty farmers were associated under this programme. The demonstrations of improved technologies was taken in an area of 0.2 ha of each farmer. In each demonstration one control plot was kept where farmers practices were carried out. Adoption of improved technology by the farmers and guidance was ensured through regular visits by the KVK scientists to the demonstrations field. Field days and group meetings were organized at the site of demonstration to provide the opportunities for other farmers to see the benefit of demonstrated technologies. The feedback from the farmers were utilized for further improvement in research and extension programme (Dalei *et al.* 2014). The crop was harvested between first and second week of October. Data was collected from the FLD's farmers and analyzed with statistical tools to compare the performance of farmer's field. All the crop management practices as per the package of practices for *Kharif* crops by SKUAST-Kashmir were followed for raising the crop. The data on production and economic data was recorded and analysed for all FLDs and local practices.

The extension gap, technology gap and technology index were calculated using the formula as suggested by Samui *et al*. (2000).

1. Extension gap (q/ha) = Demonstration yield (q/ha) – Yield of farmers practice (q/ha).
2. Technology gap (q/ha) = Potential yield (q/ha) – Demonstration yield (q/ha).

3. Technology index (%) = {Potential yield - Demonstration yield) / Potential yield} x 100
4. Knowledge level of the farmers about improved production practices of maize before frontline demonstration implementation and after implementation was measured and compared by applying paired t-test at 5 per cent level of significance.

Result and discussion

Table 1: Technology used for farmers practice and improved practice

S.No	Technology	Farmers Practice	Improved Practice
1	Variety	Local	SMC-4,SMC-3, SKG-2 Shalimar QPMH-1 and LQMH-1
2	Spacing	Broadcasting of seed	Line sowing with spacing of 45 cm between rows and 25 cm between plants in the row.
3	Seed rate	30-35 kg/ha	20 kg/ha
5	Line sowing	Sowing with broadcasting method	Sowing in rows.
6	Earthing up	Most of the farmers do not perform this operation due to either non availability of labour or lack of knowledge	Earthing up is done after about one month of sowing at knee height stage as it gives support to plant as well as save from lodging.
7	Other crop management & protection practices	Farmers are cultivating these crops without adoption of any improved technology	All the crop management practices as per the package of practices for *maize* crop issued by Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir were followed for raising the crop.

Performance of Front line demonstrations:

The data for yield was recorded for observing the performance of the varieties in front line demonstration.

Table 2. Performance of the varieties in front line demonstration

Variety	Yield (q/ha)		Potential Yield of demonstration (q/ha)	Percent increase over farmers practice	Extension Gap (q/ha)	Technology Gap (q/ha)	Technolo-gy Index (%)
	Farmers Practice (q/ha)	Demonstration (q/ha)					
Shalimar Composite-4	18.00	58.00	60.00	68.96	40.00	2.00	3.30
Shalimar Composite-3	16.00	47.00	55.00	65.95	31.00	8.00	14.54
Shalimar KG-2	13.00	45.00	50.00	71.11	32.00	5.00	10.00
Shalimar QPMH-1	25.00	68.00	70.00	172.00	43.00	2.00	2.85
LQMH-1	25.00	85.00	90.00	240.00	60.00	5.00	5.55

Yield:

It was observed from the frontline demonstrations that Shalimar composite-4, Shalimar composite-3 , Shalimar KG-2 , Shalimar QPMH-1 and LQMH-1 recorded a yield of 58.00,47.00, 45.00,68.00 and 85.00 quintals per hectare respectively as compared to 18.00,16.00,13.00 25.00 and 25.00 quitals of local maize cultivated by th farmers (Table 2). The per cent increase in yield of 68.96, 65.95, 71.11, 172.00 and 240 was observed for Shalimar composite-4, Shalimar composite-3 , Shalimar KG-2 , Shalimar QPMH-1 and LQMH-1 respectively over the farmers practice .The variation in the productivity was due to the low yield potential of local varieties cultivated by the farmers and by not following the scientific lines of cultivation. Similar, enhancement in productivity of different crops through front line demonstration has been documented by Tiwari *et al*. (2003), Sreelakshmi *et al*. (2012), Meena *et al*.(2014), Kumar *et al.* (2014) and Sharma *et al.* (2016) and the FLDs conducted in the present investigation also resulted in enhanced productivity which is in line with the results of these workers. The results indicated that performance of improved varieties was better than the local cultivars and farmers were motivated by HYVs and improved technologies demonstrated in the FLDs which will result in adoption of these improved technologies.

The per cent increase in yield of FLDs on Shalimar maize composite -4. Shalimar maize composite-3,Shalimar KG-2, Shalimar QPMH-1 and LQMH-1 with respect to farmers practice was recorded as 68.96,65.95,71.11,172.00 and 240 percent respectively.

Extension gap:

Extension gap is the difference in the yield of the demonstration and farmers practices. The value of extension gap with respect to varieties of maize viz. Shalimar maize composite -4. Shalimar maize composite-3,Shalimar KG-2, Shalimar QPMH-1 and LQMH-1 was recorded as 40.00, 31.00,32.00,43.00 and 60.00 respectively which may be due to non-availability of high yielding improved varieties of maize seed and inputs and lack of knowledge among farmers. Hence, to exploit the potential of improved production and protection technologies efforts through FLDs ought to be increased among the farmers. It shows that the different extension agencies have to make hard efforts to technologically back the extension agencies for the speedy transfer of the recom-mended technology to the farmers fields. Further, the above extension gap emphasized the need to educate the farmers through various means for adoption of improved agricultural production technologies to reduce this extension gap. Increased use of latest production technologies with high yielding varieties will subsequently change the trends of extension gap which in turn would lead to higher productivity, farmers' income and prosperity.

Technology gap:

The technology gap shows the gap in the demonstration yield over potential yield and the observed values for different varieties of maize with respect to technology gap were 2.00, 8.00, 5.00,2.00 and 5.00. The observed technology gap may be due dissimilarity in the yield potential , soil fertility status, weather condition and management practices (Tiwari *et al*., 2014 and Sharma *et al.*, 2016). Hence variety-wise location specific recommendation with full package of practices and other pre-requisite appears to be necessary to minimize the technology gap for yield level under different situations. Such steps would boost up the production and bring more prosperity to the farming community.

Technology index:

Technology index of 3.30, 14.54, 10.00, 2.85 and 5.50 percent was observed for the varieties viz. Shalimar maize composite -4. Shalimar maize composite-3,Shalimar KG-2, Shalimar QPMH-1 and LQMH-1 respectively and showed the feasibility of the varieties alongwith scientific method of cultivation at the farmer's field. The lower the value of technology index more is the feasibility of the improved technology in the farmer's field as this indicated that technology is suitable for the particular region. The variation in yield from different FLDs can be accounted for varying climatic conditions, prevailing microclimatic and variation in yield potential of the varieties.

The findings of the present study about extension gap, technology gap and technology index (%) are in line with the findings of Dhaka *et al.* (2010), Meena *et al.* (2014) and Sharma *et al.* (2016).

Table 3. Economic analysis of improved technologies over traditional farmer's practices

Technology	**Cost of Cultivation (Rs.)**		**Gross returns (Rs.)**		**Net returns (Rs.)**		**BCR (Rs.)**	
	FP	**Demo**	**FP**	**Demo**	**FP**	**Demo**	**FP**	**Demo**
Shalimar composite -4	22583	33989	45341	85767	23758	51778	1.00	1.52
Shalimar composite -3	22487	31445	40232	81342	17745	49897	0.78	1.58
Shalimar KG-2	21871	32841	37119	78534	15248	45693	0.69	1.39
Shalimar QPMH-1	24745	35334	48974	95451	24229	60117	0.97	1.70
LQMH-1	23995	36544	47655	105441	23660	68897	0.98	1.88

Economics:

The economic analysis of improved technologies over traditional farmer's practices was calculated depending on the prevailing market prices of inputs and outputs (Table 3).The cost of production of maize with high yielding varieties under improved technologies varied from Rs. 33989, 31445, 32841, 35334 and 36544 for varieties :Shalimar maize composite -4. Shalimar maize composite-3,Shalimar KG-2, Shalimar QPMH-1 and LQMH-1 respectively and respectively in comparison to average cost of production of Rs. 22583,22487, 21871, 24745 and 23995 for local varieties of maize with farmers practices of cultivation. The additional cost incurred in the improved technologies was mainly due to more costs involved in the cost of improved seed and cultural practices involved in cultivation of the varieties .

Front Line Demonstrations on Shalimar maize composite -4. Shalimar maize composite-3,Shalimar KG-2, Shalimar QPMH-1 and LQMH-1 recorded higher net returns of Rs. 51778, 49897, 45693, 60117 and 68897 per ha respectively with the B:C ratio of 1.52,1.58,1.39,1.70 and 1.88 for Shalimar maize composite -4. Shalimar maize composite-3,Shalimar KG-2, Shalimar QPMH-1 and LQMH-1 respectively with improved cultural practices. These results are in line with the findings of Hiremath and Nagaraju (2009) and Sreelakshmi *et al*. (2012) and Kumar *et al.* (2015) who also reported higher net returns and B:C ratio in the FLDs compared to farmers' practices. The results from the present study clearly brought out the potential of high yielding varieties with improved production technologies in enhancing maize production and economic gains.

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