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Impact of Front Line Demonstrations on Zero tillage Maize in Srikakulam District of Andhra Pradesh

P VenkataRao [1], G Chittibabu [2], G Harika [3]
[1]Scientist (ToT), Acharya N G Ranga Agricultural University,
DAATTC, Srikakulam Dist. Amadalavalasa, Andhra Pradesh – 532 185.

Abstract:- Rice fallow maize has been adopted in major area of the Srikakulam district during Rabi with conventional method of maize cultivation, sown behind the plough after 2-3 ploughings which is highly laborious and costly . The crop is subjected to terminal moisture stress and requires more number of irrigations which is a constraint in the district and resulted less yields and low price. To combat, this new concept of zero tillage maize emerged during 2012-13.The front line demonstrations were conducted in various locations of Srikakulam district of Andhra Pradesh during 2017 to 2020. Total 37 farmers from different villages for demonstration of zero tillage maize for three consecutive years were selected. The demonstrations were laid out on farmers' field as per package of practices recommended by Acharya N. G. Ranga Agricultural University. The farmers' practice was considered as control plot in demonstration. The results revealed that rise in yield of maize of 8092 Kgs/ha, 7530 Kgs/ha and 7514 Kgs/ha was recorded in the consequent years in the demonstration plots over the control by 9.35%, 5.6% and 2.03% respectively. The cost of cultivation has also reduced on Preparatory cultivation and irrigation Up to Rs.4500/ha resulting in Benefit Cost ratio of 1:2.63 when compared to the farmers practice1:2.49 on an average. The Zero tillage maize proved to be an effective technology for the improvement of farmer's income with reduced cost of cultivation on land preparation, utilizes the residual moisture minimizing the number of irrigations and preventing the crop from terminal moisture stress in rice fallows when compared to the farmer's practice of field preparation after rice cultivation. The impact of the FLDs on zero tillage maize evidenced in increased crop coverage area during rabi under Zero Tillage Maize was from 1500 ha during 2016-17 to 5500 ha during 2020-21(Source: Dept. of Agriculture, Srikakulam).

Keywords:- *Impact, FLD, Zero Tillage Maize, Rice fallows.*

I. INTRODUCTION

Maize is the third most important crop after rice and wheat in the world having the highest genetic yield potential among cereals and hence referred as the "queen of cereal". Its importance lies in the fact that it is not only used for human consumption and animal feed but at the same time it is also widely used for corn starch industry, corn oil production, baby corns etc.

In India, maize is grown in an area of 8.17 m. ha with a production around 19.33 m. tons and productivity 2414 kg/ha(Dandu Snigdha, Deepakkumar Bose, Jahanara. (2021)) Maize production in India is dominated by Andhra Pradesh , Telangana and Karnataka states. In Andhra Pradesh it is grown in an area of lakh ha with a productivity of 6523 Kg/ha which has the highest productivity due to majority of the area being covered under single cross hybrids followed by Karnataka state.

In conventional method of maize cultivation, the crop is sown behind the plough after 2-3 ploughing, which is highly laborious and high cost. As this crop requires more number of irrigations (500-600 mm) which also became a constraint in the district and the crop is subjected to terminal moisture stress results in low yields. Hence, Rice fallow maize has been adopted in major areas of the district. By adoption of Zero tillage maize technology, the crop can be sown 20-25 days earlier than the conventional method and escape from the terminal moisture stress(.Jeengar KL, Panwar P, Pareek OP, 2006). The concept of this technology is that the soil disturbance is reduced to sowing operations and management of weeds can be achieved by chemical means. It maintains crop residues on the soil surface and protects the ground from wind and water erosion.Zero tillage maize crop be taken up to reduce the cost on tillage and also this technology minimizes the number of irrigations.

Even though farmers adopted this technology, it is still to be promoted in clusters. Hence to popularize the Zero tillage maize cultivation to minimize the irrigations, enhance the yields in selected cluster villages, to utilize residual moisture and save cost on preparatory cultivation, front line demonstrations (FLDs) were conducted on Zero tillage Maize cultivation in Srikakulam District of Andhra Pradesh" by the District Agricultural Advisory and Technology Transfer Centre of Srikakulam, an extension unit of Acharya N.G Ranga Agricultural University.

II. MATERIALS AND METHODS

The FLD was conducted to popularize this technology and also to increase the yield levels in rice fallow Zero tillage Maize in clusters. The study was conducted consequently for four years at farmer fields growing in rice fallows during *Rabi* 2017-18 to 2020-21 on Zero Tillage Maize Cultivation in Rice Fallows as demo in different locations of Srikakulam district against Farmer's practice as a local check to compare the results obtained from the technology and the per cent increase or decrease in the yields was calculated along with Benefit Cost ratio. Two treatments were used for this trial.

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T_1: Demo: Zero tillage Maize
T_2: Farmers practice: Sowing of Maize after tillage

III. RESULTS AND DISCUSSION

During *Rabi* 2017-18, 2018-19,2019-20 and 2020-21 the study was conducted on the management of zero tillage maize in rice fallows with an aim to utilize the residual moisture, escape the terminal moisture stress, reduce time and cost of cultivation on preparatory cultivation and increase the yields of maize.

Table: 1 Result of FLD on Zero Tillage Maize Cultivation in Rice Fallows during 2017-18.

S. No	Name of the Farmer	Location, Village, Mandal	Yield Kg/ha		% Increase / Decrease
			Demo	Control	
1	Sri. R. Surapanaidu	Sancham,Ranasthalam	8000	7562.5	5.79
2	Sri. T. Adinarayana	Lakshmipuram, Rajam	8125	7187.5	13.04
3	Sri. Ch. GanapathiRao	Santhavuruti, Ponduru	8150	7450	9.40
4	P ChandraRao	Kesavaraopeta,Etcherla	7924	7150	10.83
5	M AppalaNaidu	Modugulapeta, Santhakaviti	8260	7650	7.97
	Average		**8092**	**7400**	**9.35**
	B:C ratio		**1:2.48**	**1:2.15**	

Table: 2 Result of FLD on Zero Tillage Maize Cultivation in Rice Fallows during 2018-19.

Sl. No	Location, Village, Mandal	Parameter	Yield Kg/ha		Percentage increase in yield over check
	Cluster demonstration 25 acres S Rangarayapuram village of Santhakaviti		Demo	Control	
			7200-7860	7000-7250	
		Average	**7530**	**7125**	**5.6**
		BC Ratio	**1:2.25**	**1:2.13**	

Table: 3 Result of FLD on Zero Tillage Maize Cultivation in Rice Fallows during 2019-20.

Farmer Name	Village &Mandal	Yield (Kg/Ha)		% Increase or decrease
		Demo	Control	
Sri B.Atchuta Rao	N.T.Wada,Amadalavalasa	7250	7120	1.83
Sri G.GovindaRao	S.M Puram,Etcherla	7620	7450	2.28
Sri D.Ramakrishna Rao	Santhavuriti, G.Sigadam	7300	7000	4.29
Sri S.GovindaRao	Dallavalasa, Ponduru	7450	7270	2.48
Sri K.Sanyasi	Venkataraopeta,Ranastalam	7950	7850	1.27
Average		**7514**	**7338**	**2.03**
CB Ratio		**1:3.15**	**1:2.98**	

Table: 4 Result of FLD on Zero Tillage Maize Cultivation in Rice Fallows during 2020-2021

Farmer Name	Village & Mandal	Yield (Kg/Ha)		% Increase
		Demo	Control	
S. Apparao	Kotthakota, Sarbujili	7625	6750	12.96
L. Shankar Rao	Lavetipalem, Laveru	8750	7500	16.67
B.V.Ramanamurthy	Akkivalasa, Amadalavalasa	8000	7000	14.29
G. Appala naidu	Laidam, Ponduru	7750	7250	6.90
A.Surya narayana	Pallipeta, Ranasthalam	8250	7125	15.79
	Average	**8075**	**7125**	**13.33**
	Cost of cultivation (Rs)	**45800**	**46500**	
	B:C Ratio	**1: 3.1**	**1:2. 70**	

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The results (Table 1, 2 ,3& 4) from the FLDs organized by the DAATTC, Srikakulam indicate that the adoption of Zero tillage maize in rice fallows has reduced the cost of cultivation on Preparatory cultivation, two irrigations were saved along with prevention of crop from terminal moisture stress and increased yield up to 9.35%, 5.6% , 2.03%and 13.33% during 2017-18, 2018-19 , 2019-20 and 2020-21 respectively. This technology also saves time and crop comes to maturity in advance (5-8 days).

An average grain yield of 8092 Kg/ha, 7530 Kg/ha,7514 Kg/ha and 8075Kg/ha was recorded in the consequent years in the demonstration plots which are 9.35%, 5.6% , 2.03% and 13.33% higher than the local check yields respectively.

The pest and disease management practices were imposed timely in the farmer's fields which has reduced the indiscriminate use of more number of insecticides for the control of pests and diseases.

Table5: Average yield of zero tillage maize abstract from the FLDs :

Year	Demo Yield Kg/ha	Check Yield kg/ha	Per cent increase/decrease	B:C Ratio in Demo plot	B:C Ratio in Control plot
2017-18	8092	7400	9.35	2.48	2.15
2018-19	7530	7125	5.60	2.25	2.13
2019-20	7513	7338	2.03	3.15	2.98
2020-21	8075	7125	13.33	3.10	2.70
Average	**7802.5**	**7247**	**7.66**	**2.75**	**2.49**

The cost of cultivation has also reduced on Preparatory cultivation (Up to Rs.4500/ha) resulting in Benefit Cost ratio of 2.75 when compared to the farmers practice on an average. This was evidenced with the results of .Govardhana Rao V and VenkataRamana P(2017). These findings indicate that the farmers received higher income with reduced cost of cultivation and moisture conservation because of the adoption of Zero tillage maize.

IV. CONCLUSION

The Zero tillage maize proved to be an effective technology for the improvement of farmer's income with reduced cost of cultivation on land preparation, utilizes the residual moisture minimizing the number of irrigations and preventing the crop from terminal moisture stress in rice fallows when compared to the farmer's practice of field preparation after rice cultivation. Hence, this type of cost effective technology may be popularized by the extension system to mitigate the wide extension gap for reducing the cost of cultivation and improving the yields of maize in the district. Mainly farmers go land preparation after paddy cultivation which is a tedious practice which also tends crop to terminal moisture stress resulting in increased cost of cultivation and lower yields, hence a holistic approach may be adopted by the extension agency to increase the adoption of this technology.

On average reduction in cost of cultivation was Rs 4500/ha and advantage due to increase in yield Rs 9625 results in total additional benefit of Rs 14125/ha. If the farmers adopted the Zero tillage Maize for the total extent of 10,000 ha then the farming community will get the benefits of Rs 14.125 crores in the district**.**

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