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## Profitability of zero tillage maize in rice fallows of north coastal Andhra Pradesh

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### Abstract

Maize is the most important cereal crop grown in north coastal Andhra Pradesh after rice. Conventional method of maize cultivation is practiced by the farmers after the harvest of the paddy, where soil is ploughed completely and used for maize sowings. Such traditional cultivation not only wastes the residual moisture of the field but also involves many operational costs of ploughing and irrigations. Thus to avoid such wastage and to make it economical KVK, Srikakulam has introduced zero tillage maize in rice fallows as part of NICRA project. Proper utilization of residual moisture along with getting remunerative prices for the farmers is the main aim of this project. Front line demonstrations (FLDs) were organized in 3 different villages in Rabi 2020-2021 and Rabi 2021-2022. Zero tillage maize made about 3.91 and 3.05% yield improvement over check with reduced cost of cultivation of Rs 3300 /ha resulting in overall raised net returns of Rs 7500/ha and Rs 10000/ha in both the years respectively. The credit of such result is due to rational resource management and good market price due to early harvest.

**Keywords:** Zero tillage maize, yield and yield attributes, FLDs, B:C ratio

### Introduction

Andhra Pradesh is predominantly an agricultural state. Two third of the state's population depends on agriculture. In the state Srikakulam is one such district which is suitable for both irrigated and rainfed crops due to incidence of good amount of rainfall and more extent of area that is covered by irrigation. Maize is an important cereal crop and is called as Queen of cereals globally consisting of high genetic yield potential. Maize is the most multifaceted crop which has great adaptability and can survive & grow in varied agro- climatic conditions. Maize is cultivated year round in almost most of the states of India and is the third most important crop after rice and wheat. It is said to account for nearly 10% of total food grain production (Tong *et al.*, 2003) [2]. Due to favourable climatic conditions, it can be grown in all seasons in AP. It is a preferred crop in rabi due to its less water requirement, less pest- disease attacks. Rice- maize system of cultivation is one of the predominant cropping system where it covers 3.5 million hectares in Asia (Ahrwar *et al.*, 2019) [1]. In present agro climatic conditions, most useful moisture conserving technology for maize is, zero tillage maize in rice fallows. Zero tillage is the present trending resource conserving technology that is being adopted in India. Zero tillage means sowing the crops in unprepared soil which has been previously used by another crop. This is also known as no till or direct sowing. This is actually an age old practice followed by farmers since ancient times. The difference in the modern concept is that implanting of the seed mechanically in the untilled soil covered by residues.

### Material and Methods

Front line demonstrations and method demonstrations were laid out in three villages namely Sirsuwada, VN Puram of Kottur mandal and Kothakota of Sarubujjili mandal in Srikakulam district of Andhra Pradesh in 2020-2021 and Rabi 2021-2022 by KVK Srikakulam, under the NICRA project. These demonstrations were laid in irrigated clay soils where farmers adopted normal maize cultivation whereas zero tillage maize is taken as improved technology. In this technology, after the harvest of kharif rice, one more crop could be taken up with no tillage for effective utilization of residual moisture by the second crop (maize). Zero tillage maize practice was demonstrated to minimize the cost of cultivation & for effective utilization of residual moisture, nutrients. The rice stubbles of 15-20 cm height were left in the field after the harvest. Sowings were started from November last week in order to capture the residual moisture from rice fields. Hybrid seed (8kg/ac) are taken and soaked in water for 12 hours

after which sowing is done. Sowing is done using a peg marker where farmers used a wooden contraption with spikes to make holes and then deposited the seeds into it. Pre

emergence herbicide Atrazine @800g/acre is sprayed to control grassy and broad leaf weeds.

**Table 1:** Comparison between demonstrated intervention and existing farmer's practice of maize cultivation

S.no	Intervention	Demo practice	Farmer's practise
1.	Soils	Clay loamy	Clay loamy
2.	Cropping system	Zero tillage maize in rice fallows	Maize cultivation
3.	Time of sowing	15 <sup>th</sup> to 30 <sup>th</sup> November	1 <sup>st</sup> to 15 <sup>th</sup> December
4.	Method of sowing	Line sowing using peg marker without ploughing.	Line sowing after thorough ploughing.
5.	Seed rate	8kg/acre	8-10 kgs/acre
6.	Plant protection	Need based application of chlorantraniliprole @60ml/ac or Emamectin benzoate @100gm/acre at vegetative stage.	Irrational use of pesticides
7.	Weed management	Atrazine@800g/acre as preemergence herbicide.	-

## Results and Discussion

The front line demonstrations were conducted in 3 different villages of Srikakulam district in 2020-2021 and Rabi 2021-2022 seasons. The improved practices resulted in giving better performance in average number of cobs in 25sq m by giving 165 & 180 cobs when compared to farmers practice which gave 150 & 172 cobs in Rabi 2021 and Rabi 2022 respectively. On an average the percent yield increase of demo plots over check was 3.91% and 3.05% in rabi 2021&2022 years.

In the past two years if we observe the yield of demo practice was 5562kg/ha in rabi 2021-22 & 7391kg/ha in rabi 2021-22

as against check which was only 5351kg/ha, 7172kg/ha in 2021 and 2022 respectively thus enhancing the net income per ha was Rs 72040 and Rs. 86447 respectively with a reduced cost of cultivation of Rs.3500/ha. This reduction in the costs was due to reduced number of irrigations and lessened sowing operations cost. Thus zero tillage maize earned good net income with an impressive B:C ratio of 2.83, 3.20 as compared to normal maize cultivation in rabi seasons of years 2021, 2022 respectively. Higher yield in zero tillage maize is a result of more number of productive cobs which is due to healthy crop growth and good plant population.

**Table 2:** Yield parameters of Frontline demonstrations on zero tillage maize conducted in Rabi 2020-2021 and Rabi 2021-2022

S.no	Year	Average no of cobs/ 25sq.mt		No. of kernel rows/cob		Yield(kg/ha)		% increase in yield over check
		Demo	Check	Demo	Check	Demo	Check	
1	Rabi 2020-21	165	150	17	15	5562	5351	3.91
2.	Rabi 2021-2022	180	172	16	14	7391	7172	3.05

**Table 3:** Economic analysis of zero tillage maize productivity vs Normal conventional maize cultivation during 2020-2021 and Rabi 2021-2022

Rabi 2021-2022					
Treatments	Seed yield	Cost of cultivation	Gross income	Net income	B:C ratio
Demo practise	7391	39200	125647	86447	3.20:1
Farmerspractise	7172	42500	121924	79424	2.86:1
Rabi 2020-21					
Demo practise	5562	39200	111240	72040	2.83:1
Farmers practise	5351	42500	107020	64520	2.51:1

**Table 4:** Benefit particulars frontline demonstrations on zero tillage maize conducted in Rabi 2020-2021 and Rabi 2021-2022

Particulars	Rabi 2020-21	Rabi 2021-2022
% increase in yield over check	3.91	3.05
Cost of cultivation reduced by	3300	3300
Net returns increased by	7520	7020
No. of irrigations reduced by	2	2
Crop duration reduced by	5-7 days	5-7 days
Overall economic impact over 20ha	Net returns increased by Rs 7500/-per ha	Net returns increased by Rs 10000/- per ha

## Conclusion

According to the results obtained above, farmers could profit around Rs 7500 to 10000 / ha through zero tillage maize over normal maize cultivation. This outcome can be attributed to costs saved through reduced tillage operations and labour savings by decreased irrigation operations in addition to the improved yield and its attributes.

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