

Foxtail millet as an alternative to Groundnut under rainfed conditions

Sahaja Deva^{*1}, R. Prasanna Lakshmi² and M.K. Jyosthna³

^{1,3}*Krishi Vigyan Kendra., Kalikiri, India Annamayya (District), India*

²*Department of Entomology, DAATTC, Chittoor, India*

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ABSTRACT

Demonstrations were conducted at farmers fields at Guttapalem (Kalikiri mandal) and Murevandlapalli (Vayalpadu mandal) during *Kharif* 2020-21 and 2021-22 in 4.0 ha area during each year to study the performance of improved variety of Foxtail millet (SiA 3156) as an alternative to traditional crop groundnut under rainfed conditions. Under demonstrations treatment comprised of Foxtail millet variety SiA 3156 which matures in 85-90 days with an average yield potential of 20-25 q/ha and compared with groundnut variety Kadiri 6. Foxtail millet performed well under rainfed situations where crop failure of groundnut was occurred. Pooled data of two years proved that Net returns and B:C ratio of foxtail millet were significantly higher than Groundnut variety Kadiri 6. Foxtail millet var SiA 3156 recorded 15750 Rs./ha net returns and B:C ratio of 2.1. Whereas, Groundnut var Kadiri 6 recorded net returns and B:C ratio of 1150 Rs./ha and 1.0, respectively.

Key words: Foxtail millet, Groundnut, Yield, Economics

Introduction

Groundnut is one of the major oilseed crops of India accounting for 25% of total oilseed production in the country. It occupies an area of 5.30 million ha with a production of 5.50 million tonnes and productivity of 1040 kg/ha (<http://www.indiastat.com>). In Andhra Pradesh Groundnut was grown in an area of 7.48 lakh ha with production of 4.62 lakh tonnes production and productivity of 618 kg/ha (<http://www.indiastat.com>). In Chittoor dt Groundnut is one of the major Oilseeds crop. It ranks first in area and production of Oilseeds. The crop is cultivated in 123268 ha during *Kharif*, 2020-21 and 2124 ha during *Rabi*, 2020-21 in Chittoor dt.(O/o JDA, Chittoor). Groundnut is cultivated in diverse agro-climatic environments characterized by soils of varying water holding capacity under rainfed as well as irri-

gated conditions (Priya *et al.*, 2016). In western mandals of Chittoor dt, 85% area of groundnut is under rainfed conditions. Under water stress conditions huge losses are occurring due to very low yields in groundnut. Sometimes crop failure may also occur during extreme water stress conditions. To mitigate the problems, an improved variety of Foxtail millet SiA 3156 was introduced in western mandals of Chittoor dt. Foxtail millet can grow even with 300-350 mm rainfall and can also tolerate water stress conditions and gives better yields. When there is groundnut crop failure foxtail millet can provide income to farmers. Foxtail millet can be grown as sole crop or as inter crop with Groundnut. The KVK, Kalikiri demonstrated the performance of foxtail millet variety SiA 3156 during 2019-20 and 2020-21 under rainfed conditions.

(¹SMS (Crop Production), ²Scientist, ³Programme Coordinator)

Materials and Methods

Front Line Demonstrations on Foxtail millet variety SiA 3156 were conducted in red sandy loam soils in western mandals of chittoor dt during *Kharif* season in farmers fields at Guttapalem (Kalikiri M) during 2020-21 and Murevandlapalli (Vayalpadu M) during 2021-22 in an area of 4.0 ha with 10 farmers during each year. An improved variety of Foxtail millet var SiA 3156 (T1) was compared with Kadiri 6 (T2), a local variety grown by farmers in terms of yield attributes and yield. Farmers have applied 20 q FYM/acre, urea @ 25 kg/ac, SSP @ 100 kg/ac and MOP @ 35 kg/ac. For foxtail millet no management practices were followed.

Five plants were selected in each field and data was recorded on plant height, Number of pods/plant, 100 pod and seed weight for Groundnut and Plant height, Number of productive tillers/plant, Panicle length, Panicle weight and Test weight for Foxtail millet. Yield of foxtail millet and Groundnut were recorded from 10 farmers fields during each year in an area of 0.4 ha per farmer. Data recorded was statistically analyzed.

Economics was calculated as shown below:

Cost of cultivation (Rs. ha⁻¹)

Cost of cultivation (ha⁻¹) was calculated considering the prevailing charges of agricultural operations and market price of inputs involved.

Gross returns (Rs. ha⁻¹)

Gross returns were obtained by converting the harvest into monetary terms at the prevailing market

rate during the course of studies.

$$\text{Gross return (ha}^{-1}\text{)} = (\text{Seed yield} \times \text{price})$$

Net returns (Rs.ha⁻¹)

Net returns were obtained by deducting cost of cultivation from gross return.

$$\text{Net returns (ha}^{-1}\text{)} = \text{Gross return (ha}^{-1}\text{)} - \text{Cost of cultivation (ha}^{-1}\text{)}$$

Cost: Benefit ratio

The benefit: cost ratio was calculated by dividing gross returns by cost of cultivation.

$$\text{Cost: benefit ratio} = \frac{\text{Gross returns (ha}^{-1}\text{)}}{\text{Cost of cultivation (ha}^{-1}\text{)}}$$

Advantages of Foxtail millet var SiA 3156 over Groundnut var Kadiri 6:

Foxtail millet can perform well even under water stress conditions whereas groundnut crop failure takes place. During severe drought farmers are getting negative net returns where foxtail millet can give net profit to farmers with less cost of cultivation.

Results and Discussion

Yield attributes: On an average no. of filled pods/plant in Kadiri 6 are 21.0. Fresh and dry 100 pod weight were 128.5 g and 81.6 g, respectively; fresh and dry 100 seed weight were 41 and 30.2 g, respectively. Whereas, number of productive tillers/plant in foxtail millet var SiA 3156 were 4.5. Panicle weight is 7.4 g and test weight is 3.0 g (Table 3). Panicle weight of SiA 3156 was higher in Foxtail

Table 1. Technological options

Technology Options	Crop	variety	Source of technology
T1	Groundnut	Kadiri 6	ARS, Kadiri
T2	Foxtail millet	SiA 3156	RARS, nandyal

Table 2. Salient features of Groundnut var Kadiri 6 and Foxtail millet var SiA 3156

Variety	Duration	Pod yield (q/ac)		Shelling %	100 seed weight (g)	SMK %	Oil content (%)	Special features
		<i>Kharif</i>	<i>Rabi</i>					
Groundnut var Kadiri 6	100-105	8-8.8	16-17	72	40-45	89	48	Popular among farmers for its quality attributes
Foxtail millet var SiA 3156	85-90	8-10	-	-	-	-	-	Highly responsive to nitrogenous fertilizers

Table 3. Yield attributes of Groundnut var Kadiri 6 and Foxtail millet var SiA 3156

Particulars	Groundnut var Kadiri 6			Foxtail millet var SiA 3156		
	2020-21	2021-22	Mean	2020-21	2021-22	Mean
Plant height (cm)	38.6	42	40.3	115	111	113
No. of filled pods/plant	18.0	24	21	-	-	-
No. of productive tillers/plant	-	-	-	4.0	5.0	4.5
Panicle length (cm)	-	-	-	19.6	21.2	20.4
Panicle weight (g)	-	-	-	6.6	8.2	7.4
Test weight (g)	-	-	-	3.0	3.0	3.0
Fresh 100 pod weight (g)	112	145	128.5	-	-	-
Fresh 100 seed weight (g)	32	50	41	-	-	-
Dry 100 pod weight (g)	69	94.2	81.6	-	-	-
Dry 100 seed weight (g)	21.7	38.7	30.2	-	-	-

Table 4. Yield and economics of Groundnut var Kadiri 6 and Foxtail millet var SiA 3156

Year	Yield (q ha ⁻¹)		Gross returns (Rs ha ⁻¹)		Net returns (Rs ha ⁻¹)		B: C ratio	
	Groundnut var Kadiri 6	Foxtail millet var SiA 3156	Groundnut var Kadiri 6	Foxtail millet var SiA 3156	Groundnut var Kadiri 6	Foxtail millet var SiA 3156	Groundnut var Kadiri 6	Foxtail millet var SiA 3156
2020-21	8.1	4.4	44550	22000	-5450	7000	0.89	1.5
2021-22	10.5	7.9	57750	39500	7750	24500	1.2	2.6
Mean	9.3	6.2	51150	30750	1150	15750	1.0	2.1

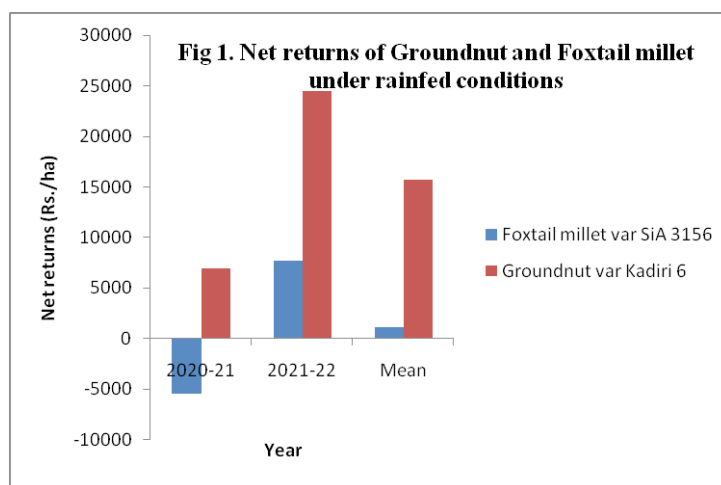
*Low yields during 2020-21 were due to heavy rains at the time of crop growth and harvesting

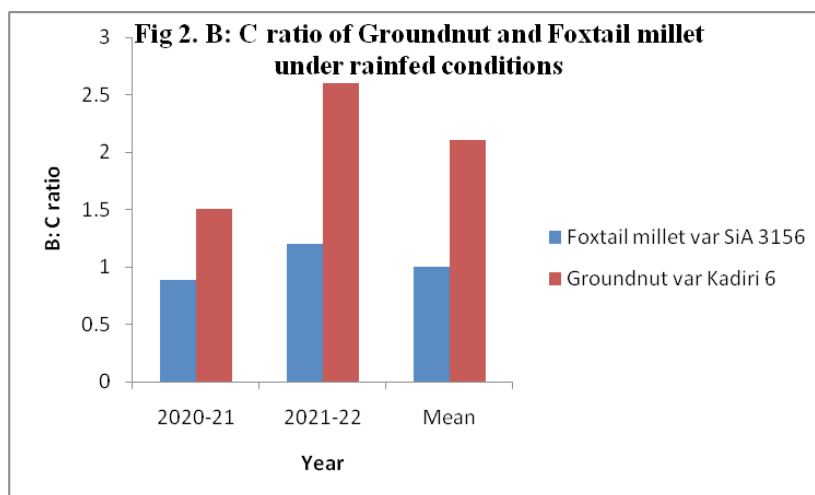
Table 5. Summary of t-test in comparing net returns and B: C ratio in treatment and farmers practice for twoyears pooled mean

Year	Treatments	N	Mean	Std.Deviation	t-value	p-value
Net returns	Foxtail millet var SiA 3156	10	15750	22.4	2.57*	0.004
	Groundnut var Kadiri 6	10	1150	9.62	2.57*	0.004
B: C ratio	Foxtail millet var SiA 3156	10	2.1	0.11	2.36*	0.003
	Groundnut var Kadiri 6	10	1.0	0.16	2.36*	0.003

**Significant at 1% level

*Significant at 5% level





millet var SiA 3156 (Sahaja *et al.*, 2019).

Yield and Economics

Perusal of the data presented in the Table 4, Fig. 1 and 2 revealed that average yield of foxtail millet was 6.2 q/ha and groundnut is 9.3 q/ha. Mean gross returns of Groundnut were 51150 Rs ha⁻¹. And foxtail millet was 30750 Rs ha⁻¹. Mean net returns of Groundnut and foxtail millet were 1150 and 15750 Rs ha⁻¹, respectively. Mean B: C ratio of foxtail millet and groundnut were 2.1 and 1.0, respectively. Even though yield and gross returns of foxtail millet were lower than groundnut net returns and B: C ratio were higher as the cost of cultivation is very less for foxtail millet compared to groundnut and statistically significant difference was observed in net returns and B: C ratio of foxtail millet and groundnut (Table 5).

Conclusion

Foxtail millet var SiA 3156 performed well during Kharif under rainfed conditions compared to groundnut local variety. Due to crop failure negative returns were obtained in groundnut due to its high cost of cultivation but farmers who have grown foxtail millet got net profit as the cost of cultivation

is very low. Net returns and B: C ratio were significantly higher in Foxtail millet. SO it has been concluded that foxtail millet is the best alternative for rainfed groundnut.

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References

- <http://indiastat.com>
 O/o Joint Director of Agriculture, Chittoor, Andhra Pradesh
 Priya, T., Subramanyam, D. and Sumathi, V. 2016. Performance of Groundnut (*Arachis hypogaea* L.) cultivars under different plant populations during early Kharif. *Indian Journal of Agricultural Research*. 50-51.
 Sahaja, D., Prasada Rao, G.M.V., Vinayalakshmi, P. and Varaprasad Rao, Ch. 2019. Assessment of improved varieties of foxtail millet in rainfed tracts of Prakasam district. *Journal of Pharmacognosy and Phytochemistry*. 8(3): 4678-4681.