



RESEARCH PAPER

Study on profitability of sunhemp seed production over blackgram in rice follows of Srikakulam district of north coastal AP

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Abstract : The crops like sun hemp, pulses, daincha, pillipesra are used as green manure or cover crops grown primarily for soil incorporation. The green manuring is the easiest and cheapest way to enrich the soil fertility besides adding huge amount of organic carbon to the soil and also which prevents soil erosion. Lack of green manure seed availability precede to paddy is major a constraint at farmer's level. In the farming system of rice fallow pulse yields are reduced due to climate constraints like low temperature and fog during *Rabi*, crop constraints like lack of YMV tolerant varieties, the yields are reducing so that farmers are unable reap the pulses in rice fallow situations in the present scenario. The study on productivity of seed production of sunhemp crop for seed and profitability was a lacuna in this zone. The present study of productivity of sunhemp (*Crotalaria juncea* L.) seed production was studied for seed yield in rice fallow situation during *Rabi*, 2020-21 and *Rabi*, 2021-22 under rainfed situation by Krishi Vigyan Kendra, Amadalavalasa. The Front Line Demonstrations (FLD) were conducted at farmers' fields in 10 locations randomly covering entire district during this period. Observations were recorded on days to maturity, seed yield, cost of cultivation, B:C ratio and net income. The results were revealed that significantly higher seed yield was observed in sunhemp when compared to black gram in rice fallow situation. The higher seed yield recorded in sun hemp (10.3 q/h) over black gram (5.7 q/h) and net income of sun hemp seed production (Rs.19,500/h) and black gram is (Rs.9,750) While the B:C ratio of sunhemp (1:2.34) and blackgram is (1:1.60) during two consequent years of *Rabi*, 2020-21 and 2021-22. The study revealed that growing of sun hemp in rice fallows is much remunerative in-terms of higher growth and yield components when compared to blackgram and add more green manure to soil and increased net income to the farmer. The farmers realized that, sunhemp seed production is best suitable after rice in *Rabi* season under rain fed condition in Srikakulam district of North Coastal Zone of Andhra Pradesh.

Key Words : Sunhemp, Black gram, Rice fallow situation, OFTs, Yield

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INTRODUCTION

Sunhemp, commonly known as Indian hemp, Madras hemp, Brown hemp is obtained from the plant (*Crotalaria*

juncea L.) an annual of family Fabaceae. It is widely cultivated for nara, green manure, fodder in all parts of India. The nara from its bark is of good quality and is used for the manufacture of various types of textiles. In

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Indian economy sunhemp used to play an important role both as raw materials for indigenous cottage industry and also as foreign exchange earner in the past. Recently the concept of agriculture as a holistic approach all over the world is concerned with ‘Sustainable agriculture’, ‘Organic farming’, ‘Integrated nutrient management. Accordingly in the present context, sunhemp holds a great promise for turn around as a fibre crop as well as green manure crop. The crop at 85-90 days age contributes around 50-60 kg N ha⁻¹ in the form of root nodules. The apical part of the plant, after harvest, can also be incorporated in the soil, which would substantially improve soil fertility. When it is used as green manure in situ it further adds 60 kg N ha⁻¹ to the soil. In addition, it also improves the soil physical, microbiological and physico-chemical properties (Bhattacharjee *et al.*, 2003). All these facts taken together, it appears that there is a necessity to have a fresh look on the future of sun hemp for its better fibre quality and as a green manure crop for sustainable agriculture, in particular. This is more so in the context of growing demand in the West for natural, bio-degradable, renewable and eco-friendly products against the menace of environmental hazards of synthetics.

Green manure crop should possess the characteristics such as multipurpose use, short duration, fast growing, high nutrient accumulation ability, tolerance to shade, flood, drought and adverse temperatures, wide ecological adaptability, efficiency in use of water, early onset of biological nitrogen fixation, high nitrogen accumulation rates, timely release of nutrients, photoperiod insensitivity, high seed production, high seed viability, ease in incorporation, ability to crossinoculate or responsive to inoculation, pest and disease resistance and high N sink in underground plant parts (Jagannatham *et al.*, 2008).

The lack of availability of adequate quality seed at appropriate time at reasonable price for small and marginal farmers becomes a major constraint in sunhemp and black gram cultivation in rice fallows situation. Quality seed production of sunhemp has given meager importance

in spite of huge demand from farmers. Further, possibility of seed production under rice fallow situation paves way for identification of suitable crop with high water use efficiency and hence, this study was taken up in the farmers’ fields, with these main objectives

- To create awareness to farmers on green manure seed production *in-situ* in rice fallow situation.
- To evaluate suitable crop as sun hemp for seed production
- To analyse the economics of seed production of green manure crops in Srikakulam district at farmers level.

MATERIAL AND METHODS

KVK, Amadalavalasa, Srikakulam district of north coastal Andhra Pradesh was conducted Front line demonstrations in 10 locations of Srikakulam district. This demonstration were laid in rainfed situation and clay soil where farmers adopted summer black gram cultivation where as sunhemp seed production in rice fallow is taken as improved technology during *Rabi*, 2020-21 and *Rabi*, 2021-22.

Sunhemp and black gram seeds were broadcasted 7-10 days before the harvest of paddy crop in wet soil condition in the farmer’s fields. Need based plant protection measures were taken up during crop growth period. Observations were recorded on each crop on five randomly selected plants for yield and yield contributing characters *viz.*, days to maturity, cost of cultivation, gross income, net income and B:C ratio, seed yield (q/ha) and economics. Percentage yield increase in-between crops were calculated and comparative analysis of cost benefit ratio per hectare was arrived and presented in the tables. Simple analysis was done by using mean only.

RESULTS AND DISCUSSION

The results revealed that the sunhemp seed production in rice fallows resulted in giving better performance in average yield 10.3 q/h when compared

Table 1 : Cultivation details of Sunhemp and blackgram under rice fallows

Sr. No.	Parameter	Sunhemp	Blackgram
1.	Soil	Clay loamy	Clay loamy
2.	Cropping type	Rice fallows	Rice fallows
3.	Seed rate	8-10kg/acre	16-18
4.	Plant protection	Prophenofos @2ml/l	Hexaconazole @2ml/l Acphate@200gm/h

to black gram yield 5.7q/h in rice fallows situation *Rabi* 2021 and 2022. The cost analysis study revealed that there is an additional yield recorded in sunhemp compared to blackgram in rice fallow situation. The rise in yield of sunhemp in rice fallow situation might be due to the crop contributed high yielding and supported by profuse plant growth with more number of branches in rice fallow situation. Kathiresan *et al.*, 2003 also reported the similar results in daincha.

From the observations made in the study, it can be concluded that among the two crops grown in *Rabi*, sunhemp was the best in terms of yield (10.3q/ha), Biomass production (467.1, 1542.1, 8145.5 and 8455.4 kg/ha) during 30, 60, 90 DAS after sowing and harvest, respectively which is superiorly higher to blackgram (Table 2). The biomass production is in the scenario

noticed by Lakshmi *et al.* (1995).

Economics :

The cost analysis study revealed that there is an additional yield recorded in sunhemp compared to blackgram in rice fallow situation. Additional net income of Rs. 5030/ha received in sunhemp seed production with out additional cost of cultivation of Rs.1500 /ha. The net income was Rs.29200 with sunhemp and 22221 with blackgram during the two years (Table 3 and Fig. 2). It was mainly due to the low cost of harvesting charges due to sunhemp crop. It was observed that the cost-benefit ratio was higher in sunhemp crop seed production 1: 3.43 which is superiorly higher than in black gram 1:2.64 crop cultivation in rice fallow situation during *Rabi* season. Tripathi also observed the similar economic

Table 2 : Mean yield and biomass production of sunhemp and blackgram cultivation in rice fallows of Srikakulam district for 2020-21 and 2021-22

Details	Sun hemp seed production					Black gram cultivation				
	Seed yield (q/h)	Biomass production (kg/ha)				Seed yield (q/h)	Biomass production (kg/ha)			
		30 DAS	60 DAS	90 DAS	harvest		30 DAS	60 DAS	90 DAS	harvest
Location 1	10.3	461	1584	7142	7689	5.67	175	410	861	987
Location 2	10.6	443	1465	8151	8571	6.3	184	412	857	1054
Location 3	11.2	467	1447	7895	8472	5.9	178	430	795	995
Location 4	9.4	452	1387	7984	8367	6.4	184	441	841	914
Location 5	11.4	449	1278	7894	8271	5.8	179	421	832	962
Location 6	9.7	471	1364	8451	7984	5.4	185	462	841	941
Location 7	10.9	469	1564	8645	8761	6.3	169	455	810	974
Location 8	10.4	480	1674	8674	8754	6.8	172	498	842	923
Location 8	11.8	512	1784	8634	8971	6.4	174	461	835	954
Location 10	11.2	467	1874	7985	8714	6.3	169	446	845	912
Average	10.34	467.1	1542.1	8145.5	8455.4	5.72	176.9	443.6	835.9	961.6
S.E.±	0.61	5.56	21.6	58.0	74.2	0.45	4.66	19.6	64.0	71.2
C.D. (P=0.05)	1.75	17.1	78.6	180.3	214.0	1.65	15.3	66.4	173.3	209.0
CV%	3.85	4.23	6.04	4.05	4.6	3.45	5.23	5.04	5.05	4.16

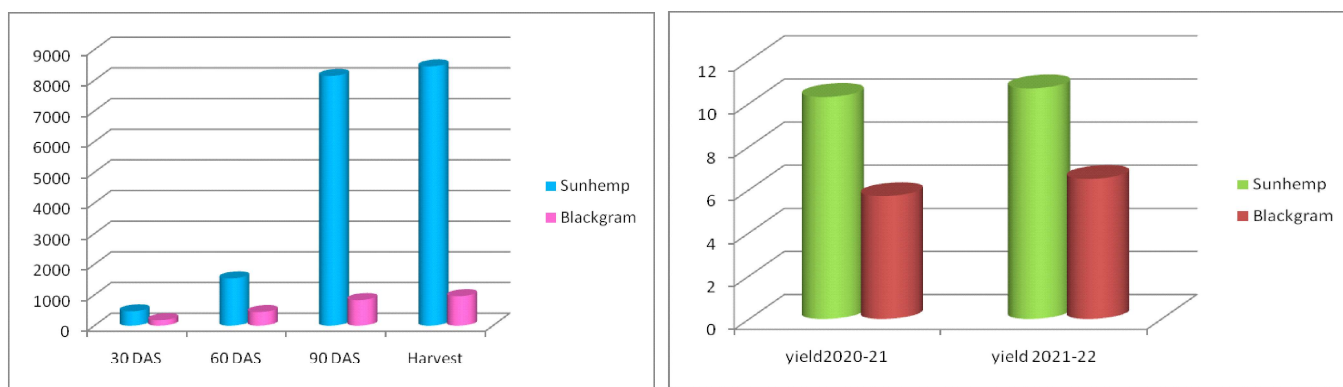


Fig. 1: Yield and biomass production of sunhemp and blackgram during two years

Table 3 : Mean economics of sunhemp seed production and blackgram cultivation in rice fallows of Srikakulam district for 2020-21 and 2021-22

Farmers details	Sun hemp seed production			Black gram cultivation		
	Cost of cultivation (Rs./ha)	Gross income (Rs./ha)	Net income (Rs./ha)	Cost of cultivation (Rs./ha)	Gross income (Rs./ha)	Net income (Rs./ha)
Location 1	12000	41200	29200	13500	35721	22221
Location 2	12000	42400	30400	13500	39690	26190
Location 3	12000	44800	29800	13500	37170	23670
Location 4	12000	37600	25600	13500	40320	26820
Location 5	12000	45600	29600	13500	36540	23040
Location 6	12000	38800	26800	13500	34020	20520
Location 7	12000	43600	31600	13500	39690	26190
Location 8	12000	41600	29600	13500	42840	20340
Location 8	12000	47200	30200	13500	40320	21820
Location 10	12000	44800	32800	13500	45990	22490
Average	12000	42760	29200	13500	39230.1	22221

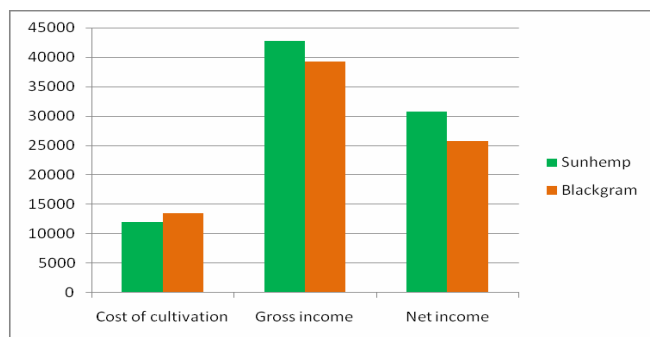


Fig. 2: Economics of sunhemp seed production and blackgram cultivation in rice fallows of Srikakulam district for 2020-21 and 2021-22

pattern in the study of influence of spacing and topping practices in sunhemp.

Conclusion :

According to the results obtained above study revealed that the sunhemp crop performed better in rice fallow situation in relation to growth and seed yield, Biomass production, grossincome, net come ad benefit cost ratio. so that it was concluded that sunhemp crop was ideal to take up as green manure and for seed production during *Rabi* in rice fallow situation and the same seed may be utilized for green manuring in pre *Kharif* season to enrich the soil fertility at farmers level

in the district.

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