weeds during first 60 days of sowing. Similar findings was reported by Madhavi *et al.* (2013). Crop grown with weed management by two hand weeding at 20 and 40 DAS produced higher seed yield (5872 kg/ha) which was at par with application of atrazine 1.0 kg a.i./ha fb. hand weeding at 40 DAS (5800 kg/ha) and significantly superior to all other treatments (Table 1). However, net return was found to be higher with application of atrazine 1.0 kg a.i./ha fb. hand weeding at 40 DAS (Rs.56826/ha) which was at par with two hand weeding (Rs.55668/ha) and significantly higher than all other treatments. Kamble *et al.* (2005) also reported maximum return with application of pre emergence herbicide atrazine fb. hoeing and one hand weeding at 20DAS in Yavatmal, Maharshtra.

CONCLUSION

From the above study, it could be concluded that sowing hybrid maize by either conventional or minimum tillage and weed control by pre-emergence application of atrazine at 2 days after sowing followed by one hand weeding at 40DAS could fetch better yield and higher return in rainfed uplands of Easter India.

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Response of rice fallow sesame to tillage practices and graded fertilizer doses under varied soil types

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Rice fallow sesame practiced in the several states mostly during the spring season after *rabi* rice and to a limited extent in other states, is a step towards the horizontal expansion of sesame production in the country. However, its productivity remains abysmally low due to several factors ascompared to sole crop and concerted research efforts needs to be focused to enhance its productivity (Ramesh *et al.,* 2019 & 2020). Lowland rice flooding for over 2-3 months modifies the soil chemistryand the performance of sesame, under varied tillage is not known. Further, nutrients inputs are seldomapplied to a fallow crop unless a soaking rain event occurs; besides residual nutrients from rice wouldalso be added to the fallow sesame crop. Hence, an experiment was carried out at four soil ecologies (Telangana, Odisha, Tamil Naduand Andhra Pradesh) to findout there sponse of rice fallow sesame to tillage practices and nutrient doses.

METHODOLOGY

Field experiments were conducted with 3 tillage practices (reduced, conventional and zero tillage) and fertilizer dose (control, 25% RDF, 50% RDF, 75% RDF and 100% RDF) with three replications in asplit-plot design after the

harvest of the preceding rice at Tamil Nadu, Odisha, Andhra Pradesh andTelangana. For reduced tillage, cultivator was passed once while for conventional tillage, cultivatorwas passed twice followed by rotavator once. For zero tillage, seeds were hand dibbled by uprootinglittle part of soil with hand held iron dibbler and in other tillage, seeds were placed in lines drawn withline marker and covered with loose soil in all the centers except Telangana where seeds were sown inlines after pre-sowing irrigation. Weeds were managed with pre-emergence herbicide pendimethalin30 EC @ 0.5 kga.i./ha at3 DAS. Telangana and Tamil Nadu received the entire dose of nutrients asbasal, while Andhra Pradesh and Odisha followed split application of nitrogen in two splits (basal and25 DAS). Need based irrigation and plant protection measures were followed. Data was analyzedstatisticallyas per Gomezand Gomez (1984) and presented.

RESULTS

The results across four locations have clearly indicated that the performance of rice fallow sesame ispoor under zero till conditions as the sesame crop is poorly adapted to rice fallow regime (Harisudanand Sapre, 2019) and on an average, it reduced the productivity between 22 and 68%. Further, 100% RDF to the rice fallow sesame was on par with 75% RDF at Mahisapet, Odisha and Aduthurai, Tamil Nadu, while at Ragolu, Andhra Pradesh 50% RDF yielded statistically similar yield to that higherdoses. However at Hyderabad, Telangana 100% RDF showed superiority and stood alone. Probably the soil pressure under zero till is a constraint to sesame since a soil pressure of at least 1.1 kg/cm^2 is beneficial for sesame production (Gabriilides and Akritidis, 1970). It isclear that only appropriatel and management practices coupled with integrated nutrient management would ensure higher cropyields, in rice fallow sesame as well, although tillage systems are locations pecific (Patel *et al*. 2019).

CONCLUSION

It is a matter-of-facttoen courage sesame as apromising succeeding crop to *kharif/rabi* rice with some forms of till-

Table 1. Cropping details of the experiment at four locations

Particulars	IIRR-ICRISAT, Hyderabad	TNAU-TRRI, Aduthurai	ANGRAU,ARS, Ragolu	OUAT, AICRP-S Dhenkanal
Location	17^{0}N 78^0 E	17^{0}N 79^0 E	18^{0}N 83^{0}E	20^{0}N 85^{0}E
Soiltype	Sandyclay loam	Clayloam	Redsandyclayloam	Sandyloams
Rice variety	Pooja	CR 1009sub 1	Swarna	DRRH1
RDFfor rice (kgN-P-K/ha)	120:60:50	150:50:50	120:60:50	80:40:40
Dateof riceharvest	31.01.20	30.01.20	20.12.19	26.12.19
Sesame variety	Swethatil	VRI-3	YLM66	Smarak
RDF for sesame (kgN-P-K/ha)	30: 30:20	35:23:23	40:40:20	50:30:20
Date of sowing	07.02.2020	11.02.20	27.12.19	16.03.20
Date of harvest	14.05.2020	05.05.20	13.04.20	10.06.20

RDF: Recommended dose of fertilizers

Table 2. Sesame yield as influenced by tillage and fertilizer doses under rice fallow ecologies

Treatment	Productivity (kg/ha)			
	Mahisapet, Odisha	Ragolu, Andhra Pradesh	Aduthurai, Tamil Nadu	Hyderabad, Telangana
Tillage practice				
Reduce dtillage	441	233	477	268
Convention altillage	462	458	408	307
Zerotillage	349	179	334	97
SEm±	17	13	16	14.8
CD(P=0.05)	65	53	65	41
Fertilizer				
Control	322	247	366	90
25% RDF	353	281	390	146
50% RDF	379	287	406	240
75% RDF	489	310	422	260
100% RDF	544	325	447	384
SEm±	22	15	9	20.3
CD (P=0.05)	65	43	27	42
Interaction	NS	NS	NS	NS

age. It is concluded that rice fallow sesame needs soil disturbance either in the form of reduced or conventional tillage with aminimum of 50% recommended doseof fertilizer forincreasing the sesame productivity. However, neither the tillage practices, nor the fertilizer doses, havebeen enough against a low productivity of rice fallow sesame and additional research is necessary to manage the soil physical properties to build the rice fallow sesame crop.

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Performance of castor based cropping systems as influenced by conservation agricultural practices under rainfed conditions

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Conservation Agriculture (CA) is an ecosystem approach for regenerative sustainable agriculture and land management based on the practical application of context-specific and locally adapted three interlinked principles of: (i) minimum mechanical soil disturbance (no-till seeding/planting, and minimum soil disturbance with all other farm operations); (ii) permanent maintenance of soil mulch cover (crop biomass, stubble and cover crops); and (iii) diversification of cropping system (economically, environmentally and socially adapted rotations and/or sequences and/or associations involving annuals and/or perennials, including legumes and cover crops), along with other complementary good agricultural production and land management practices (FAO, 2020). CA systems have not been extensively tried or promoted in other major agro-ecoregions like rainfed semi-arid tropics where oilseed crops are primarily grown. Since, the CA practices are dependent on resource endowments of the location and on the prevalent crops and cropping systems, site specific research is essential for the development of CA practices. Assessing the impact of tillage practices and crop residues on performance of castor based cropping systems in Alfisols under rainfed conditions is one of the main objectives of the present study.

METHODOLOGY

A fixed-plot field experiment was initiated during *kharif* 2019-20 at Narkhoda research farm of the ICAR-Indian Institute of Oilseeds Research, Hyderabad, Telangana State on Alfisols under rainfed conditions. The eco-region is characterized as semi-arid tropical (SAT) climate and the soil has been classified as red sandy loam. Initial soil fertility analyses indicated that the soil reaction (pH 8.1) and salinity levels (EC 0.29 dS/m) are normal for the cultivation of oilseed crops. The experimental soil was low in soil organic carbon (0.38%) available N (212 kg/ha); medium in available phosphorus (17.2 kg/ha) and high in available K (280 kg/ha), sulphur (15.6 mg/kg) and micronutrient (Zn, Cu, Fe, Mn) content were in the sufficient range (1.68-7.10 mg/kg).

Three tillage treatments *viz.,* conventional tillage -one disc plough+ two cultivators +rota tiller; reduced tillage – one cultivator + one rota tiller (no disc plough) ; zero tillage-no tillage and in main plots and four intercropping systems in sub-plots *viz.,* sole castor (cv.ICH-66); castor+ redgram (cv.PRG-176) (for grain and cut *in situ* spread) (1:1); castor+ greengram (cv.WGG-42) (for grain and uprooted and *insitu* spread) (1:3) and castor + groundnut (cv.K-6) (1:3) were imposed in shallow Alfisols . Normal crop