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Study of agro ecological adaptations of sesame (*Sesamum indicum* (L).) lines to rice fallow based cropping pattern through diversity analysis

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Abstract
The component traits for rice fallow responsiveness of sesame crop was identified *viz*., germination percentage, crop establishment rate, low input responses, crop canopy coverage to smother weeds growth, growth and development under low moisture conditions (plant height, number of branches), and seed yield. Totally 96 genotypes were screened under rice fallow conditions without input applications and under zero tillage conditions with limited irrigations. PCV and GCV levels had very close relationship and higher Heritability was observed for the traits like number of capsules, seeds per capsules, 1000 seed weight and seed yield in sesame under rice fallow. Yield responses under rice fallow were very narrow, only few varieties responded to rice fallow conditions indicating stringent intrinsic factors for adaptations. Based on seed yield and cluster analysis, the variety, Thirukkattupalli local, showed better performance under rice fallow conditions without any input applications *viz*., with single plant yield of 8.2 g of seeds with normal growth and maturity and distinctively fallen into separate group among four clusters. In Cluster1, the following entries showed close relationship with moderate response to rice fallow adaptations *viz*., Thinnyam local Sengaraiyur local, Ariyur local, Semparai local, Mettukudi local, Anbil local which were collected from Lalgudi blocks of Tiruchirappalli dt. Among 95 genotypes evaluated, Thirukkattupalli local alone had maximum crop stand percentage. Hence, Thirukkattupalli local can be utilized in breeding programs as donor of component traits for development of rice fallow responsive sesame varieties.

Keywords: Zero tillage, relay cropping, low input responses, rice fallow, oil quality, sesame, diversity, heritability

1. Introduction

Sesame is one of the most important traditional oil seed crops of India being cultivated and consumed since Vedic period historically. India is the primary centre of origin for Sesame with much diversity within *Sesamum indicum* and between *Sesamum* species (De candole, 1885; Vavilov and Dorafeev, 1972; Nayar, 1995; Bedigian *et al*., 2003) [4, 27, 16, 3]. Sesame is well adapted to drought with marginal soil conditions with minimal management requirements. Sesame oil is containing >40% of poly unsaturated fatty acids in its composition having important health benefits towards heart related disorders. Sesame oil is considered as "Queen of Vegetable Oils" for its taste and wider consumption levels across different regions of the world. Sesame oil is used as culinary purposes as frying, and seasoning and salad purposes as dressing on the vegetables. Sesame oil is also containing health benefit components like anti-oxidants, Vitamin E, carotenoids etc. (Pathak *et al*., 2014) [18]. Sesame is not only cultivated in tropical countries like India, but was spread to Asian countries like china, Korea, Thailand, Vietnam and Japan, also to Europe and USA. In USA, It is grown in states like Texas, where cotton is predominant crop. It is becoming global importance tremendously owing to its health benefits (Langham and Wiemers, 2002; Gharby *et al*., 2015) [20, 7]. In India, it is cultivated in an area of 19.47 lakh ha area with production of 8.66 lakh tonnes with productivity of 413 kg/ha. Though India ranks first in production and cultivation area, the productivity is low to the world productivity, 535 kg/ha. The reasons for low productivity are mainly moisture stress caused due to cultivation under rainfed conditions in larger area with marginal soil fertility (Monpara *et al*., 2019; IOPEPC Kharif-2017 [15, 9]. Survey of Sesame Crop. Larger variability occurs in germplasm lines, cultivated varieties and local land races of sesame across India. Mostly, farmers maintain their own genetic stocks of Sesame through cultivation and sustenance. Variability exists for the yield, yield attributing traits and oil content.

Oil quality and content is highly influenced by Genotype X environmental interactions. Traits like plant height, number of branches, number of capsules per plant, number of seeds per capsule, 1000 seed weight and oil content. Principal component analysis of sesame lines revealed the different groups across the nation. Sesame ecotypes are grown in different agro climatic, soil and geographical pattern of the country consisting of almost all states.

Rice fallow sesame cultivation can be most important for farmers for crop diversification and increased area under oil seeds production. The annual oil import from foreign countries for edible oil is 140.3 lakh tonnes which costs Rs. 1.57 trillion. India is still not self-reliant in oil seeds production. Bulk of the oil is imported to avoid issues of food and nutritional security. Rice fallow sesame cultivation can be a boon to farmers for increasing their farm income, as the seeds of sesame always fetch higher prices with assured and stable income (India Oil Seeds mission, 2019; Javeeda and Dhandapani, 2021) [11, 12]. Area under sesame can be increased tremendously which will result in increased production of seeds and further processing of oils. Rice fallow system involves sowing of seeds of short duration crops like blackgram, greengram, lathyrus and cotton prior to harvest of paddy crop or after the harvest, dibbling in the rice stubbles with adequate moisture without following tillage operations like field preparations and manual weeding, a complete zero tillage method of cultivation. Sesame variety with duration 65-75 days' duration with rice fallow responsiveness can be successfully utilized for cultivation. so far, no sesame variety identified for rice fallow conditions. Rice fallow responsiveness include crop establishment, growth and development, flowering and maturity and finally economical yield of produces. Cropping pattern includes paddy/ rice fallow crop as relay cropping. Hence, the rice fallow crop must have the adaptive traits of low input responses, germination in non-tilled soils, faster growth rate to suppress the weed growth, mobilization of nutrients and tolerance to abiotic stresses like low/ high temperature, drought and salinity. The proposed study aimed to test the rice fallow responsiveness of sesame lines by evaluation under rice fallow conditions and performing genetic analysis for adaptive traits.

2. Materials and Methods

2.1 Screening under rice fallow conditions

Paddy variety, Improved white ponni was raised in field number, F1 of F block of Central, Farm, Agricultural Engineering College and Research Institute, TNAU, Kumulur during Late Samba 2019-20 (October-February). After mechanical harvest of paddy crop, the paddy straw was left it in the field. The field was irrigated once and drained properly. The field was allowed to reduce the wetness of the soil considerably. Under optimum wetness of the soil, seeds of the sesame entries were sown near the rice stubbles by mixing seeds with fine sand. Seeds germinated 5 days after sowing (Fig 1). Excess seedlings were thinned out and one seedling was allowed to grow.

2.2 Details of sesame lines used in the experiment

The entries constituted with germplasm lines and popular varieties received from Regional Research Station, TNAU, Viridhachalam, local land races collected from lalgudi (tricy dt), and krishnagiri district were used. The eco types of Thirukkattupalli local were collected from sembarai, thirukkattupalli, lalgudi (Trichy dt) was purified by pureline selection and used in the experiment. The popular varieties used in the study are *viz*., VRI2, Thirukkattupalli Local, TMV4, TMV6 and Paiyur 1.

2.3 Experimental design and Statistical analysis

The experimental trial was laid out in augmented design with 5 blocks. Each block consisted of 19 varieties. 5 checks were used *viz*., VRI2, Thirukkattupalli Local, TMV4, TMV6 and Paiyur 1. Statistical analysis was performed with R statistical package. "Agricolae" package was used to estimate the analysis of variance. "Biotools" package were used for D^2 diversity analysis. Package "Vegan" used for visualization of the clustering pattern.

3. Results and Discussion

3.1 Variability

Analysis of variance revealed the there is significant differences among the genotypes screened for rice fallow responses in the study (Table 1). Higher levels of PCV and GCV were observed for plant height, number of capsules per plant and seed yield. PCV and GCV were closely associated in this study. Higher heritability and genetic advances were observed for plant height, number of capsules per plant and seed yield. But in contrary, most of the studies showed higher levels of PCV with less GCV indicating environmental influence on expression of these characters. Moderate to higher Phenotypic coefficients of variation exhibited for all yield attributing traits with close relation of genotypic coefficients of variation. Highest coefficients of variation (phenotypic and genotypic) were exhibited by capsule per plant, seed yield/plant (Ganesan, 2005: Manjunatha *et al*., 2008; Sumathi and Murlidharan, 2010; Parameshwarappa *et al*., 2009; Sudhakar *et al*. 2007; Solanki and Gupta, 2003; Saha *et al*., 2012; Gidey *et al*., 2013; Iqbal and Iqbal *et al*., 2016) [6, 14, 24, 17, 23, 22, 21, 8, 10]. High and moderate levels of PCV and GCV were present in the sesame germplasm lines screened under upper land shaded conditions for most of the yield attributing traits. Highest PCV and lowest GCV were present in number of capsules per plant and 1000 seed weight indicating more proportion of GE interactions for the attributing traits (Thangavel *et al*., 2000; Sonaki *et al*., 2003; Valarmathi *et al*., 2004; Abhajitha *et al*., 2017) [25, 22, 26, 1]. Expressions of these traits involve higher high proportion of environmental interactions and selection for these traits should be prolonged till homozygosity and evaluation trials should be focused for the adaptability. Sesame being an important oil seed crops with much health benefits, needs attention towards genetic improvement to improve the yield and quality of oil. Development of eco types suited to particular agro geographical regions will increase the agro diversity and crop intensification. Rice fallow cropping is one such important cultivation method in which soil is conserved through zero tillage method *viz*., prevention of erosion, improving microbial activity, zero/low input responses, increasing the crop area and production which will increase the food security. Rice fallow sesame (Indian oil seed mission, 2021) [11] is one such option to increase the area under sesame for realizing self-sufficiency in oil production. But there is no cultivation of sesame under rice fallow agro ecological conditions. It is mainly because of lack of suitable cultivars with adaptive traits suitable under rice fallow conditions. Hence, screening the genotypes under rice fallow conditions will help to identify the efficient genotypes, also it is possible to identify the key component traits of adaptations. Assessment of genetic variability and gene action *viz*., phenotypic coefficient of variation (PCV), Genotypic co efficient of variation (GCV), heritability (h^2) and Genetic advance (GA) have to be analysed for selecting the parents for breeding programme and designing the selection methods in segregating populations. Genetic diversity analysis for the yield and yield attributing traits, days to flowering, days to maturity, plant height during flowering, number of capsules per plant, number of seeds per capsule, seed weight and seed yield. GCV values were low for the traits like number of capsules per plant, number of seeds per capsule, seed weight and seed yield, but PCV estimates were higher for the same traits studied indicating non additive variance influence of traits inheritance, also the GE interactions in previously published reports. But in contrary, due to uniform poor responses on yield and yield attributing traits, the mean values did not follow normal distribution, as only few genotypes of out of 95 lines responded to rice fallow adaptations, the PCV and GCV values always closely associated with combined with higher heritability and genetic advance values. In segregating populations, the same trend will follow and selection will be unidirectional with disruptive selection with higher heritability and genetic advances. It is assumed that larger number of F2 progenies have to be screened under typical rice fallow conditions from the crosses involving Thirukkattupalli local as donor for isolating superior segregants.

3.2 Diversity analysis

Cluster analysis based on D2 values were grouped 95 genotypes into three clusters. Clustering pattern revealed that Cluster I had 93 genotypes, forming the largest cluster which might be due to their similar ecotype, cluster II and III had single genotype in each cluster. The distinct divergence of Thirukkattupalli local into a separate cluster (cluster II) among 95 genotypes tested under rice fallow conditions (Table 4; Table 5, Fig 2).

Intra-cluster D2 value of Cluster I was 3394.56 while Cluster II and III had zero intra-cluster distance, as they had only one genotype each. Diversity among the clusters ranged from 20983 to 62373.09. Cluster II and cluster III showed maximum inter-cluster distance (62373.09) which suggested that the genotypes in these clusters had a significant degree of genetic diversity, and that crossings between the genotypes in these clusters would produce desirable transgressive segregants.

Diversity analysis will reveal the distinct adaptations, genetic relatedness and amount of variability present in the germplasm if it is screened under particular geographical region. Diversity analysis represents the sum of variability existing and expressed under particular geographical region representing the soil and agro climatic patterns (Kim *et al*., 2002; Pham *et al*., 2009; Zhang *et al*., 2010; Zhang *et al*., 2012; Dossa *et al*., 2016; Adu-Gyamfi., *et al*., 2019) [13, 19, 29, 28, 5, 2]. Diversity analysis performed in sesame accessions collected from different regions of Africa and Asian countries using molecular markers. The accessions collected from Asian regions had more diversity. African region had less diversity compared to its Asian counterpart. Accessions from Southern Asia (SAs), Eastern Asia (EAs), and Western Africa (WAf) were highly diversified, while those from Western Asia (WAs), Northern Africa (NAf), and Southeastern Africa (SAf) had the lowest diversity. It reveals the primary centre of origin for *Sesamum indicum* showing much diversity in Indian region (Dossa *et al*., 2016) [5].

Table 1: Analysis of variance for variability parameters

SOV	DF	SL	RL	GP	SVI	TSW	PH	DFF	DM	CPP	SPY
Replication	2	0.002	0.025	0.210	303	0.002	0.405	0.513	2.661	0.138	0.0001
Genotypes	94	3.09 **	26.55 **	372.19 **	396366 **	3.93 **	305.62 **	19.012 **	16.35 **	112.78 **	5.56 **
Error	188	0.006	0.040	1.540	575	0.009	1.094	1.125	3.224	0.081	0.003

Table 2: Estimation of variability parameters of sesame lines raised under rice fallow conditions

Traits	Min	Max	Mean	GCV	PCV	ECV	Heritability	Genetic advance	Genetic advance as percentage of mean
Shoot length (cm)	1.44	6.16	2.49 ± 0.04	40.75	40.86	2.99	99.46	2.08	83.71
Root length (cm)	1.57	30.62	6.39 ± 0.11	46.52	46.63	3.11	99.55	6.11	95.63
Germination Percentage	24.46	90.72	49.63 ± 0.72	22.40	22.53	2.50	98.77	22.76	45.85
Seedling vigour index	224.57	2112.86	738.83 ± 13.84	49.16	49.27	3.24	99.57	746.61	101.05
1000 seed weight	1.93	8.22	3.43 ± 0.06	33.34	33.45	2.78	99.31	2.35	68.44
Plant height (cm)	22.49	77.42	43.33 ± 0.60	23.25	23.38	2.41	98.93	20.64	47.64
Days to 50% flowering	24.90	49.30	42.52 ± 0.61	5.74	6.26	2.49	84.13	4.61	10.85
Days to maturity	64.34	80.57	72.13 ± 1.04	2.90	3.82	2.49	57.59	3.27	4.53
Number of capsules per plant	0.98	41.90	6.95 ± 0.16	88.19	88.29	4.11	99.78	12.61	181.48
Seed yield per plant	0.19	8.21	1.87 ± 0.03	72.87	72.92	2.75	99.86	2.80	150.00

Table 3: Mean values of yield and yield attributing traits of sesame lines used in the variability studies

S No	Name of the accession	SL	RL	GP	SVI	TSW	PH	DFF	DM	CPP	SPY
1	VRI(SV)2	5.3	1.8	25	251.95	3.0	42.7	46	65	4.8	1.2
2	JLT26	5.9	1.9	60	672.6	3.0	47	40	76	4.8	1.6
3	Mettupatti local	5.9	2.9	90	1587.744	3.0	40.0	40	73	5.0	1.8
4	JT-8	2.5	6.5	55	893.75	3.0	44.3	42	70	2.5	0.6
5	Sengaraiyur local	3.8	4.6	40	699.2	2.0	28.0	45	69	5.3	2.1
6	Uma	3.9	3.3	25	321.75	3.0	44.3	42	73	1.0	0.4
7	Tilak	4.0	3	60	720	2.0	37.0	47	78	5.0	2.5
8	GT-2	2.8	5.3	40	593.6	4.0	44.3	43	76	5.0	2.1

9	Nirmala	2.0	6	50	600	5.0	37.0	43	70	6.0	3.0
10	TKG306	2.6	6.1	50	793	6.0	37.0	43	76	1.0	0.2
11	Paiyur 1	2.4	5.8	60	835.2	5.0	44.3	43	70	8.0	3.2
12	CO1	2.4	8.2	50	984	4.0	29.0	43	70	3.5	1.2
13	TKG55	2.1	6.3	50	661.5	3.0	44.6	43	76	3.5	0.6
14	JT-2	3.8	4.6	40	699.2	3.0	33.0	43	70	3.5	1.2
15	Kanak	2.0	5.1	50	510	3.0	29.0	43	70	8.0	2.5
16	VS-01-034	1.5	7.4	40	444	3.0	30.0	43	76	5.3	1.5
17	Punavasal local	2.5	7.4	60	1110	3.0	42.0	43	73	3.5	1.2
18	Vinayak	1.8	7.6	80	1094.4	3.0	44.3	43	73	3.5	0.6
19	T13	4.6	7.4	60	2042.4	3.0	30.0	43	70	8.0	2.6
20	Tarun	2.6	1.8	60	280.8	3.0	32.0	43	69	8.5	3.0
21	T4	1.9	6.8	35	452.2	3.0	44.2	43	69	8.5	3.2
22	Pragathi	1.5	3.6	60	324	3.0	30.0	43	72	4.5	1.2
23	RT54	1.9	6.8	40	516.8	3.0	42.0	43	69	8.0	2.0
24	Varagha	2	5.8	60	696	2.0	57.4	43	69	16	4.0
25	N32	1.7	5.3	50	450.5	3.0	60.0	43	72	14.25	3.8
26	Chandana	1.9	4.42	50	419.9	3.0	29.0	43	73	2.0	0.6
27	RT 103	4.3	2.3	60	593.4	3.0	26.5	43	74	5.0	1.5
28	TKG22	1.9	6.8	50	646	3.0	34.0	43	74	4.0	1.2
29	VS-07-023	1.7	6.9	40	469.2	4.0	59.9	43	74	7.75	1.2
30	NIC 8502	5.9	2.9	40	684.4	3.0	42.0	43	73	7.8	1.6
31	NIC8509	2.5	6.5	30	487.5	3.0	48.0	43	70	7.0	1.4
32	RT125	4.5	3.5	40	630	3.0	39.0	43	70	5.0	0.8
33	Rajeswari	2.8	5.3	40	593.6	3.0	45.0	43	70	4.0	1.2
34	Thilotama	2	6	60	720	3.0	66.2	43	74	13.0	2.8
35	RT-127	2.6	1.6	70	291.2	6.0	66.0	43	74	8.0	2.7
36	E-8	2.4	5.8	40	556.8	3.0	66.0	43	70	3.5	0.8
37	RT-146	2.3	8.8	80	1619.2	3.0	37.5	43	70	15	4.2
38	Sirumayankudi local	1.7	7.2	50	612	3.0	66.6	43	73	9.75	3.4
39	Thirukkattupalli local	2.16	5.16	60	668.736	8.0	76.0	37	73	40.8	8.2
40	PKDS-12	3.2	5.7	50	912	3.0	53.0	41	73	4.5	1.2
41	Sheker	2.2	6.12	40	538.56	3.0	68.0	42	70	3.8	0.5
42	Ariyur local	1.5	7.4	50	555	3.0	28	42	73	16	2.8
43	Krishna	1.8	7.6	35	478.8	3.0	55.0	38	73	22.5	4.8
44	NIC7939	4.6	7.4	50	1702	3.0	49.0	45	75	6.5	1.2
45	Anbil local	2.6	6.18	50	803.4	8.0	43.0	47	75	6.5	1.0
46	NIC8315	1.8	6.5	60	702	3.0	47.0	44	70	2	0.5
47	NIC7934	1.7	5.3	50	450.5	2.0	28.0	44	70	3.	1.0
48	NIC5432	2	5.8	40	464	2.0	55.0	45	72	2.3	0.5
49	NIC74185	1.7	5.3	40	360.4	6.0	41.0	45	72	2.3	1.2
50	IC43177	1.9	4.4	50	418	6.0	42.0	44	72	3.0	1.2
51	IC4316	3.3	5.6	50	924	6.0	48.5	44	74	3.0	1.2
52	RJS78	1.7	6.9	50	586.5	5.0	32.6	25	74	3.5	1.2
53	RJS80	1.8	6.9	50	621	5.0	34.5	39	72	5.5	2.2
54	DS-1	1.9	7	35	465.5	2.0	23.0	41	72	9.0	3.2
55	N8	2	7.9	35	553	3.0	39.75	43	73	6.0	1.2
56	Hima	2	7.6	50	760	3.0	39.0	42	70	4.0	2.0
57	VRI(SV)1	1.8	7.6	40	547.2	3.0	47.6	45	70	6.5	2.1
58	Usha	2.8	2.08	40	232.96	3.0	44.0	45	70	5.2	1.2
59	KM6	1.9	9	50	855	3.0	36.0	43	73	2.3	0.6
60	KM8	1.8	6.2	50	558	3.0	49.0	45	73	4.5	0.6
61	KM10	2	7	45	630	3.0	47.0	41	76	4.0	1.2
62	KMS-4-396	2.4	6.5	50	780	3.0	40.0	43	76	7.0	2.1
63	KMS-4--393	2.2	7.3	50	803	3.0	39.0	45	76	1.6	0.5
64	ES-13101	2	6.5	50	650	3.0	42.0	44	76	2.0	0.8
65	RJS108	2	5.7	60	684	3.0	42.0	44	76	1.0	0.4
66	TMV7	1.7	5.8	60	591.6	3.0	48.6	42	70	8.0	2.1
67	SWETHA	3.3	6.6	40	871.2	3.0	48.0	42	70	5.0	1.1
68	G-TIL-1	1.6	6	30	288	3.0	39.0	44	73	1.0	0.4
69	JET-7	2	29.5	35	2065	3.0	33.5	45	73	4.0	1.2
70	PRACHI	2.3	6.4	35	515.2	3.0	38.5	45	73	16.3	4.2
71	EC-303446	2.3	7.2	35	579.6	3.0	43.0	45	73	2.0	0.5
72	07-Oct	1.7	6.8	50	578	3.0	42.0	39	72	2.0	0.5
73	ES-31	1.9	6.8	50	646	3.0	38.0	45	72	16.0	3.4
74	TMV-4	2	5.8	40	464	2.0	48.0	45	74	2.0	1.0
75	GOPI	1.7	5.3	40	360.4	3.0	43.0	42	73	4.5	2.2

76	SI-1248	1.9	4.4	50	418	3.0	52.0	42	70	4.5	2.2
77	IS-39-A	4.3	5.3	50	1139.5	4.0	41.0	42	72	3.2	1.1
78	NIC-8317	1.9	6.8	50	646	5.0	42.0	41	72	3.2	1.1
79	IS-153A	1.7	6.9	50	586.5	5.0	42.0	41	74	4.2	1.5
80	IS-562-B	2	7.8	50	780	3.0	37.8	41	72	3.8	0.9
81	IS-80-A	2	7.9	50	790	3.0	37.5	41	74	4.2	1.2
82	SI-506-B	1.8	7.6	50	684	3.0	37.5	41	72	4.2	1.2
83	RJS-175	2.2	8.8	60	1161.6	3.0	37.5	41	69	4.5	1.2
84	TC-25	1.9	9	60	1026	3.0	48.0	41	69	16.2	3.8
85	GT-10	2	9.5	50	950	3.0	38.5	41	70	8.8	2.1
86	GRT-8359	2.5	8	50	1000	3.0	33.0	41	72	2.8	1.2
87	OMT-21-A	2.4	6.5	50	780	3.0	42.5	41	70	4.9	1.2
88	Thinniyam local	2.3	8	70	1288	3.0	48.0	41	74	16.5	3.5
89	Sengaraiyur local	2.3	6.4	50	736	3.0	49.0	43	69	18.5	4.2
90	Ariyur local	2.3	7.2	60	993.6	3.0	48.5	43	70	18.5	4.2
91	Sembarai local	4.1	7	60	1722	4.0	48.5	42	70	16.5	4.1
92	Mettukkudi local	2.2	8	60	1056	4.0	52.0	41	70	19.8	4.5
93	Anbil local	2.3	7.2	60	993.6	4.0	56.0	41	70	19.8	4.8
94	Thilthara	3.1	9.5	50	1472.5	5.0	56.0	41	74	4.8	1.2
95	OMT-21-A	2.1	7.1	50	745.5	5.0	39.5	41	74	3.5	0.5

Table 4: Cluster composition of 95 genotypes of sesame

Cluster 1	Cluster 2	Cluster 3
VRI(SV) 2, JLT26, METTUPATTI JT-8 Sengaraiyur Uma Tilak GT-2 Nirmala TKG306 PAIYUR 1 CO1 TKG55 JT-2 Kanak VS-01-034 Punavasal local Vinayak T13 Tarun T4 Pragathi RT54 Varagha N32 Chandana RT 103 TKG22 vs-o7-023 NIC 8502 NIC8509 RT125 RAJESWARI TILOTAMA RT-127 E-8 RT-146 Sirumayankudi local PKDS-12 Sheker Ariyur Local Krishna NIC7939 ANBIL NIC8315 NIC7934 NIC5432	Thirukattupalli Local	JET-7

NIC74185 IC43177 IC4316 RJS78 RJS80 DS-1 N8 HIMA VRI(SV)1 Usha KM6 KM8 KM10 KMS-4-396 KMS-4--393 ES-13101 RJS108 TMV7 Swetha G-TIL-1 Prachi EC-303446 07-Oct ES-31 TMV-4 GOPI SI-1248 IS-39-A NIC-8317 IS-153A IS-562-B IS-80-A, SI-506-B, RJS-175, TC-25, GT-10, GRT-8359, 0MT-21-A, Thinnyam local Sengaraiyur local, Ariyur local, Semparai local, Mettukudi local, Anbil, local Thilthara, 0MT-21-A		

Table 5: Inter and intra cluster distance based on D^2 analysis

	Cluster 1	Cluster 2	Cluster 3
Cluster 1	3394.56	35638.58	20983.00
Cluster 2		0.00	62373.09
Cluster 3			0

Fig 1: Evaluation of sesame lines under rice fallow conditions

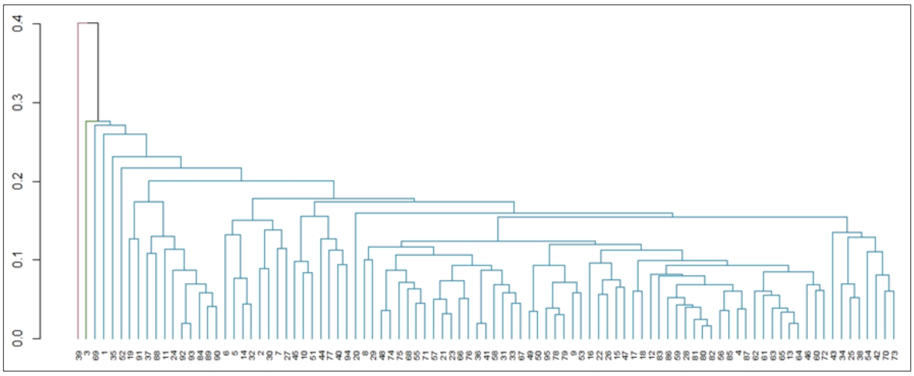

Fig 2: Dendrogram showing the distribution of 95 genotypes in clusters

4. Conclusion

Rice fallow cropping responsiveness of Sesame involves seedling establishment, growth, development and maturity under zero tillage and low input conditions. Out of 96 sesame lines tested for its responsiveness, the entry Thirukattupalli local showed better responses and it was grouped distinctively in one cluster revealing its responsiveness. The variety, Thirukkattupalli evolved through farmer's selection over longer period of time in Thirukkattupalli region (Thanjavur dt, Budalur block, Tamil Nadu) and adapted to Rice-Sesame cropping pattern. This study showed the rice fallow adaptations is highly genotypic specific. The variety, Thirukkattupalli can be successfully utilized in development of high yielding sesame varieties suitable under summer rice fallow conditions.

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