

AN EVALUATION OF THE PRODUCTIVITY OF CERTAIN SESAMUM GENOTYPES*

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Sesame (*Sesamum indicum* L.) is grown in an area of nearly 17,500 ha in Kerala state yielding about 4700 tonnes of seed. Traditionally the crop is grown in rice fallows during the summer and in uplands during the rabi season. Lack of high yielding varieties suited to different soil types and seasons one of the important factors limiting its production. The results of a study undertaken to evaluate the productivity of fifteen genotypes of sesame are presented in this paper.

Materials and Methods

Fifteen genotypes of sesame viz., S1 914-1, P 28-1, Mutant K 1, GP III-2-1, P 10-1, P 38-1, P 28-2, No. 32-1, P 23-1, Kayamkulam 1, PT 53-35-1, Culture 7-1, KRR 1, Kayamkulam 2, and 2 were employed (Table 1).

The varieties were subjected to a replicated trial in uplands at Vellayani, during August to November 1980 employing a randomised block design with two replications. Each plot was of size 2.4 mx 2.1 m consisting of seven rows of 17 plants. Thirty plants were selected at random from each plot for recording observations on following characters: 1) duration upto flowering, 2) period of maturity, 3) height of plants, 4) number of branches per plants 5) number of pods per axil, 6) number of pods per plant, 7) length of pod, 8) number of locules per pod, 9) number of seeds per pod, 10) seed yield per plant. Weight of 1000 seeds was ascertained and oil content estimated by the cold percolation method. The varieties were evaluated for their performance in rice fallows, having grown at the Rice Research Station, Kayamkulam.

The data collected in respect of the two trials in uplands and rice fallows were subjected to statistical analysis. Analysis of variance for each character was done separately for the two trials and also for the pooled data as proposed by Cochran and Cox (1957).

Results and Discussion

The high production potential of cultivars having three pods per axil and six to eight locules per pod in comparison with those possessing single poded capsules with four locules was obvious. The two improved strains of sesame under cultivation in Kerala are Kayamkulam 1 and Kayamkulam 2, the former having single pods and four locules whereas the latter has three pods with four locules.

The data relating to duration and plant characters are presented in Table 2. Highly significant differences for the number of days to flowering were observed. Trehan *et al.* (1975) reported similar results. Culture 7-1 was the earliest to flower in uplands (29.4 days) whereas Mutant 1 exhibited this characteristic in rice fallows (28.8 days). The maximum number of days to flower in uplands (33.9 days) and rice fallows (39.9 days) was represented by S1 9i4-1 and P 28-2 respectively. The advanced cultivar Kayamkulam 2 was on par with the earliest flowering Culture 7-1 in uplands. In rice fallow, both the recommended varieties were later in flowering than the earliest flowering Mutant K1.

The differences for the maturity period among the varieties were highly significant. Similar results were reported by Trehan *et al.* (1975). The earliest were KRR 1 in upland (74.1 days) and Mutant K 1 in rice fallow (71.1 days). Similarly, P 23-1 and P 2 -2 were the longest in duration in upland (88.0 days) and rice fallows (88.5 days) respectively. The varieties differed significantly from season to season with respect to crop duration. In uplands, the improved strains of Kayamkulam 1 and Kayamkulam 2 were on par with the earliest maturing KRR 1 whereas in rice fallows Kayamkulam 2 had an extended period of maturity.

Marked variation was exhibited in plant height among the varieties at both the locations. Kashi Ram (1930) and Trehan *et al.* (1975) reported similar results. Plants of P 28-2 were the tallest at both the locations (109.8 cm in upland and 99.8 cm in rice fallow respectively). In uplands, Kayamkulam 2 (76.8 cm) and in rice fallow P 38-1 (76.1 cm) recorded the minimum height of plant. The influence of seasons on plant height was noticed to be striking. In general, plant height attained the maximum expression in upland than in rice fallows. Plants of Kayamkulam 1 were on par with the shortest Kayamkulam 2 in upland whereas these were taller than P 38-1 the shortest variety when grown in rice fallow.

The significant variation for the number of branches per plant observed at both the locations was in conformity with the reports of Kashi Ram (1930) and Gupta (1975). The entries S1 9i4-1 and Mutant K1 produced maximum number of branches in upland culture (4.67) and in rice fallows (2.97) respectively, whereas P 10-1 and Kayamkulam 2 produced the minimum number of branches when grown in upland (2.45) and rice fallows (1.47) respectively. The number of branches per plant varied being vulnerable to seasonal influences. In general, branching was of a higher order in upland grown plants than those raised under rice fallow conditions. The lowest branching type was Kayamkulam 2.

The data relating to pod characters are presented in Table 3. Full expression of three pods in each axil was not presented by the varieties known for this characteristic. Joshi (1961) reported similar results. The number of pods per axil also varied between the varieties grown at both the locations. The variety Kayamkulam 2 produced maximum number of pods per axil at both the locations indicating that this variety is the most stable for this character. On the other hand, GP III-2-1 in

Table 1
Characterisation of sesame cultivars

Genotypes	Maturity period (days)	Height of plant (cm)	No. Of pods per axil	No. Of locules per pod	Length of pod	No. of seeds per pod	Colour of seed
S1 914-1	78	105	1-3	4	Short (1.8 cm to 2.2 cm)	56	Brown
P 28-1	82	95	1-3	4	Medium (2.3 cm to 2.5 cm)	63	White
Mutant K1	83	83	1-3	4	Medium	55	Black
GP III-2-1	84	85	1-3	4	Short	57	Black
P 10-1	85	93	1-3	4	Medium	60	White
P 38-1	88	115	1	6-8	Short	103	White
P 28-2	86	110	1	4-8	Long (above 2.5 cm)	100	White
No. 42-1	86	108	1	6-8	Medium	101	Dirty brown
P 23-1	92	100	1	4-8	Medium	97	White
Kayamkulam 1	75	95	1	4	Medium	55	Black
PT58-35-1	76	85	1-3	4	Medium	53	Brown
Culture 7-1	76	100	1-3	4	Medium	58	Brown
KRR 1	74	110	1	4	Medium	55	Brown
Kayamkulam 2	75	83	1-3	4	Medium	63	Brown
TMV 2	76	105	1-3	4	Medium	64	Black

Table 2
Duration and plant characters

Genotypes	No. of days to flowering		No. of days to maturity		Height of plant (cm)		No. of branches	
	Upland	Rice fallow	Upland	Rice fallow	Upland	Ricefallow	Upland	Rice fallow
S1 914-1	38.9	34.4	78.5	72.9	97.9	89.1	4,67	2.56
P 28-1	30.2	32.1	81.2	81.5	94.6	90.6	3.95	2.72
Mutant K1	31.3	28.8	81.6	71.1	80.8	76.9	4,58	2.97
GP ill-2-1	32.9	31.9	84,3	73.3	82.0	80.1	4.55	2,63
P 10-1	32.0	32.7	84,3	81.2	95.8	78.4	2.45	2.42
P 38-1	33.8	33.0	87.5	82.9	106.0	76.1	3.63	2.26
P 28-2	32.2	39.9	84.7	98,5	109.8	99.8	3.57	2.78
No. 42-1	32.5	32.0	85.7	81.0	103.9	84.0	3.57	2.40
P 23-1	38.1	36.5	89.3	83.6	106.4	76.1	3.95	1.70
Kayamkulam1	31.2	30.9	75.8	72.3	79.4	84.4	4.10	2.60
PT 38-35-1	30.0	31.4	74.4	73.7	79.8	87.9	3.82	2.93
Culture 7-1	29,4	32.6	75.0	73,4	93.5	85.2	3.97	1.92
KRR 1	29.8	33.0	74r1	72.8	104.1	80.0	4.50	2,11
Kayamkulam2	30.3	34.4	74.9	73.3	76.8	90.8	2.68	1.47
TMV 2	32.7	34.6	75.4	73.2	104,0	89.8	4.18	2.56
CD (0.01)	1.06	1.54	1.94	1.35	13.37	7.27	0.744	0.527

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Table 3
Pod characters

Genotypes	No. of pods per axil		No. of pods perplant		Length of pod(cm)			No. of locules per pod	
	Upland	Rice fallow	Upland	Rice fallow	Upland	Rice fallow	Pooled	Upland	Rice fallow
S1 914-1	1.20	1.19	19.4	21.8	2.16	1.99	2.06	4.00	4.00
P 28-1	1.18	1.16	22.0	26.1	2.39	2.40	2.39	4.00	4.00
Mutant K 1	1.21	1.20	22.5	24.3	2.30	2.03	2.14	4.00	4.00
GP III-2-1	1.17	1.20	19.1	21.2	2.19	2.07	2.12	4.00	4.00
P 10-1	1.30	1.15	20.0	22.6	2.36	2.27	2.31	4.00	4.00
P 38-1	1.00	1.00	19.0	15.1	2.23	2.12	2.16	6.82	7.27
P28-2	1.00	1.00	26.5	23.7	2.57	2.41	2.48	5.21	5.09
No. 42-1	1.00	1.00	26.4	21.0	2.39	2.27	2.32	6.74	7.19
P23-1	1.00	1.00	24.9	11.7	2.36	2.03	2.16	6.42	5.60
Kayamkulam 1	1.00	1.00	20.2	24.4	2.31	2.12	2.20	4.00	4.00
PT 58-35-1	1.24	1.15	20.7	29.5	2.27	2.13	2.19	4.00	4.00
Culture 7-1	1.21	1.29	18.1	21.8	2.34	2.29	2.31	4.00	4.00
KRR 1	1.00	1.00	18.9	18.3	2.27	2.13	2.19	4.00	4.00
Kayamkulam 2	1.33	1.38	18.9	20.2	2.33	2.24	2.27	4.00	4.00
TMV 2	1.23	1.21	20.0	21.6	2.34	2.27	2.30	4.00	4.00
CD (0.01)	0.044	0.068	3.73	3.41	0.129	0.132	0.094	0.139	0.139

Table 4

Seed yield and seed characters

Genotypes	Seed yield per plant (g)		Seed yield per ha (kg)		No. of seeds per pod		Weight of 1 000 seeds (g)			Oil content (%)
	Upland	Rice fallow	Upland	Rice fallow	Upland	Rice fallow	Upland	Rice fallow	Pooled	
S1 914-1	2.21	2.41	401	449	55.1	53.2	2.64	2.64	2.64	47.3
P 23-1	2.38	2.89	461	566	62.9	63.6	3.09	3.07	3.08	50.4
Mutant K 1	2.47	2.75	438	490	55.0	53.0	2.67	2.65	2.66	47.7
CP III-2-1	2.16	2.61	514	630	55.8	58.4	2.77	2.78	2.78	47.3
P 10-1	2.24	2.50	395	447	59.9	59.4	2.50	2.51	2.51	51.9
P 38-1	5.61	4.49	1014	769	103.4	100.8	3.83	3.82	3.83	49.9
P 28-2	4.98	4.31	914	807	101.9	90.7	2.80	2.77	2.78	51.2
No. 42-1	5.40	5.17	1062	1029	101.1	103.0	3.54	3.55	3.55	54.0
P 23-1	4.80	2.41	925	474	97.3	90.4	2.88	2.89	2.88	51.1
Kayamkulam 1	2.19	2.82	456	589	56.4	54.6	2.79	2.79	2.79	49.9
PT58-35-1	2.51	3.76	463	723	54.1	58.1	2.76	2.78	2.77	48.3
Culture 7-1	2.17	2.25	442	589	56.5	56.9	2.87	2.88	2.88	50.0
KRR 1	2.12	2.29	524	562	53.8	52.3	2.86	2.87	2.87	50.5
Kayamkulam 3	2.18	2.74	480	606	63.3	59.7	2.83	2.84	2.84	54.9
1111 VZ	2.58	3.12	555	661	63.5	59.8	3.11	3.11	3.11	51.2
CD (0.01)	0.519	0.725	114.8	63.2	3.43	3.20	0.106	0.146	0.098	1.76

uplands (1.17 pods per axil) and P 10-1 in rice fallow (1.15 pods per axil) had the lowest number of pods per axil, the two being classed as varieties producing multi-pods. This character was found to be influenced both by locations and seasons.

The number of pods per plant was found to be highly variable. Similar report was made by Trehan *et al.* (1975). The entries P 28-2 (26.5) and PT 58-35-1 (29.5) produced maximum number of pods per plant in upland and rice fallow respectively. Culture 7-1 (18.1) and P 23-1 (11.7) produced minimum number of pods per plant in upland and rice fallow respectively. In upland, the two varieties Kayamkulam 1 and 2 were on par with Culture 7-1. In rice fallow, Kayamkulam 1 and 2 were superior to P 23-1. However, Kayamkulam 1 produced more number of pods per plant when compared to Kayamkulam 2. The varieties responded to seasons with respect to the manifestation of this character.

Significant difference for length of pod was observed which confirms to the results of Trehan *et al.* (1975). The maximum length of pod was exhibited by P 28-2 at both the locations. Similarly S1 914-1 produced the shortest pods. Seasonal influence on pod length was not appreciable. In uplands, Kayamkulam 1 and Kayamkulam 2 produced longer pods than S1 914-1, whereas in rice fallows, Kayamkulam 2 alone produced longer pods.

The number of locules per pod in the varieties also suffered from recognisable deviations. Pods with multi-locules were invariably borne singly in leaf axils (Kashi Ram 1930). The variety P 38-1 consistently recorded maximum number of locules per pod at both the locations and P 28-2 among multi-loculed accessions recorded the minimum number of locules per pod. Seasonal influence on this character was found to be considerable.

The data relating to seed characters are presented in Table 4. The number of seeds per pod exhibited profound variation. This was in conformity with the results obtained by Debral and Holker (1971) and Trehan *et al.* (1975). Among the varieties having multi-locules 38-1 (103.4) and No. 42-1 (103.0) yielded maximum number of seeds per pod in upland and rice fallow culture respectively, whereas P 23-1 produced minimum number of seeds per pod at both the locations. Among the four-loculed varieties, TMV 2 grown in upland (63.5) and P 28-1 in rice fallow (63.6) produced maximum number of seeds per pod. In contrast to the findings of Krishnamurthy *et al.* (1960), the number of seeds per pod was found to be influenced by seasons. The variety Kayamkulam 1 was on par with KRR 1 whereas Kayamkulam 2 produced more number of seeds per pod at both the locations than KRR 1.

Weight of 1000 seeds varied significantly in the varieties. Debral and Holker (1971) and Trehan *et al.* (1975) made similar reports. Seasons, probably had no effect on this character. Maximum seed weight was realised in P 38-1 (3.83 g in upland and 2.51 g in rice fallow) at both the location.

The data on seed yield and oil content are presented in Table 4. Considerable variation in seed yield per plant was observed among plants of the 15 varieties

This was in conformity with the results obtained by Debraj and Holker (1971) and Gupta (1975). In general, multiloculed varieties produced higher seed yield; P 38-1 in upland (5.61g) and No. 42-1 in rice fallow (5.17 g) gave maximum seed yield per plant. The minimum seed yield was by KRR 1 at both the locations. Seasons had considerably influenced the expression of this character. The improved varieties Kayamkulam 1 and Kayamkulam 2 were on par with the lowest yielding KRR 1 at both the locations.

Inconsistency in seed yield per hectare was observed among the 15 varieties grown at both the locations. Similar results were observed by Nakagawa *et al.* (1978). The maximum seed yield was recorded by No. 42-1 at both the locations (1 062 kg/ha in upland and 1029 kg/ha in rice fallow). The lowest in seed yield was by P 10-1 at both the locations. Multiloculed varieties in general produced higher seed yield. Seasons had significant effect on yield. Kayamkulam 1 and Kayamkulam 2 were on par with the lowest yielding P 10-1 in upland whereas, these two varieties produced significantly higher seed yield than P 10-1 in rice fallows.

Considerable variation was noticed in oil content, Singh and Gupta (1973) reported similar results. The highest oil content of 54.0 per cent was in No. 42-1 whereas S1 914-1 and GP III-2-1 gave the lowest percentage of 47.3. In Kayamkulam 1 and Kayamkulam 2, the oil content was intermediate.

Only length of pod and 1000 seed weight were not influenced by the seasons. The variety, No. 42-1 was the highest yielder and was of medium duration at both the locations. It had the highest oil content also. In upland, the variety No. 42-1 was on par with P 38-1 in seed yield. The genotype P 23-1 was on par with P 28-2 and was next to No. 42-1. In rice fallows, P 28-2 was on par with P 38-1 and was next to No. 42-1. In general, multiloculed varieties gave higher seed yield and oil and were longer in duration than the four foculed varieties at both the locations. Among the four loculed varieties, TMV 2 and PT58-35-1 were better in seed yield. The two recommended varieties, Kayamkulam 1 and Kayamkulam 2 were poor in seed yield, particularly under cultivation in uplands.

The highest yielding genotype No. 42-1 was tall and comparatively less branching in rice fallows. The highest seed yielding potential of this multiloculed variety may be attributed to large number of pods per plant (particularly in uplands), longer pods, larger number of locules and seeds per pod and higher 1000 seed weight. This variety is medium in duration and has the maximum oil content among the 15 varieties. Thus this multiloculed type has the potentiality of being developed into an improved strain.

Summary

Fifteen genotypes of sesame were evaluated in replicated trials at two locations viz., upland during rabi at Veliyani and rice fallow during summer at Kayamkulam. Data collected on 13 characters were subjected to statistical scrutiny. Significant differences were observed for most of the characters at

each location and also between locations. Length of pod and 1000 seed weight were not found to be influenced by seasons. The multiloculed varieties gave higher yield than the four loculed ones at both the locations. The variety No. 42-1 giving maximum seed yield per hectare at both the locations had larger number of pods (especially in upland), longer pods, larger number of seeds per pod and higher seed weight. Medium in duration and with the highest oil content and possessing multiloculed capsules, this variety holds promise for being enhanced as an improved strain for general cultivation, pending further trials on its stability in performance.

സംഗ്രഹം

തിരഞ്ഞെടുത്ത 15 എള്ളിനങ്ങൾ കരപ്രദേശത്തും നെൽപ്പാടങ്ങളിലും വ്യത്യസ്ത സാഹചര്യങ്ങളിൽ താരതമ്യപഠനം നടത്തി. പ. railin ുന്ന് വിഭിന്ന സ്വഭാവങ്ങൾ നിരീക്ഷണ വിധേയമാക്കിയതിൽ, കായ്നീളം, വിത്ത് തൂക്കം എന്നിവ മാത്രം രണ്ടു സാഹചര്യങ്ങളിലും വ്യത്യാസമില്ലാതെ കണ്ടു. ബഹുഅംഗപ്രത്യുപങ്ങൾ നാലംഗപ്രത്യുപങ്ങളോടൊന്നും പൊതുവെ അധികവിളവ് rowj^rmajauoaim". നമ്പർ 42-1 എന്നയിനം ഏറ്റവും കൂടുതൽ വിളവും എണ്ണയും തരുന്നു. ഈ ഇനം ചെടികളിൽ, വലുപ്പമുള്ള കൂടുതൽ കായ്കൾ ഉണ്ടാവുകയും ഓരോ കായിലും ഓരോമുള്ള കൂടുതൽ വിത്തുകൾ അടങ്ങിയിരിക്കുകയും ചെയ്യുന്നു. അത്യുൽപാദനശേഷിയുള്ള ഒരു പുതിയ എള്ളിനമായി ഇതിനെ വികസിപ്പിച്ചെടുക്കുവാൻ സാദ്ധ്യതയുണ്ട്.

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