

GENETIC ANALYSIS OF **MULTILOCUED** POD CHARACTER IN SESAME

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Sesame (*Sesamum indicum* L.) is the most valued annual oil seed crop of Kerala, grown in an area of nearly 12,000 hectares, yielding 3560 tonnes of seed every year. The chief factor limiting the productivity of sesame in the State is the lack of high yielding varieties suited to the different seasons and tracts. The improved varieties of Kerala viz. **Kayamkulam—1** and **2** bear pods with four locules. Varieties of sesame with **multiloculed** condition (six to eight locules per pod) have already been identified. The higher seed production potential of multiloculed type over the four loculed is very evident and thus the character deserves special attention, in **breeding programmes**. An understanding of the genetic basis of this character will enable its profitable utilisation through recombination breeding.

Materials and Methods

Varieties of *Sesamum indicum* L. were collected from different sources and raised in observational plots at the College of Agriculture, Vellayani. Four types possessing different patterns of the **multiloculed** condition were selected. These four multiloculed types (**T₁** to **T₄**) and the four loculed standard variety **Kayamkulam—1** (**T₅**) were crossed in all combinations. The hybrids were raised along with the parents. The genetic basis of the multiloculed **character** was analysed by a comparative study of the hybrids and parents. The pod type in the hybrids between each of the four types and **Kayamkulam—1** indicated "the dominant recessive relationship between the multiloculed and four loculed character. When a hybrid of two multiloculed types exhibited the multiloculed condition, it was inferred that the two parents contained the same gene for the character. Conversely, if the **hybrid** of two multiloculed types expressed the four loculed condition it was inferred that the parents contained different genes.

Results and Discussion

The four multiloculed types differed in a number of morphological characters including the pod type (Table 1, Figure 2 and 3).

A comparative study of pod types in the hybrids and parents is presented in Table 2 and Figure 4.

AM the four multiloculed types when crossed with the four loculed **variety** produced plants with four loculed pods. This denotes the recessive

Table 1
Morphological characters of selected sesame varieties

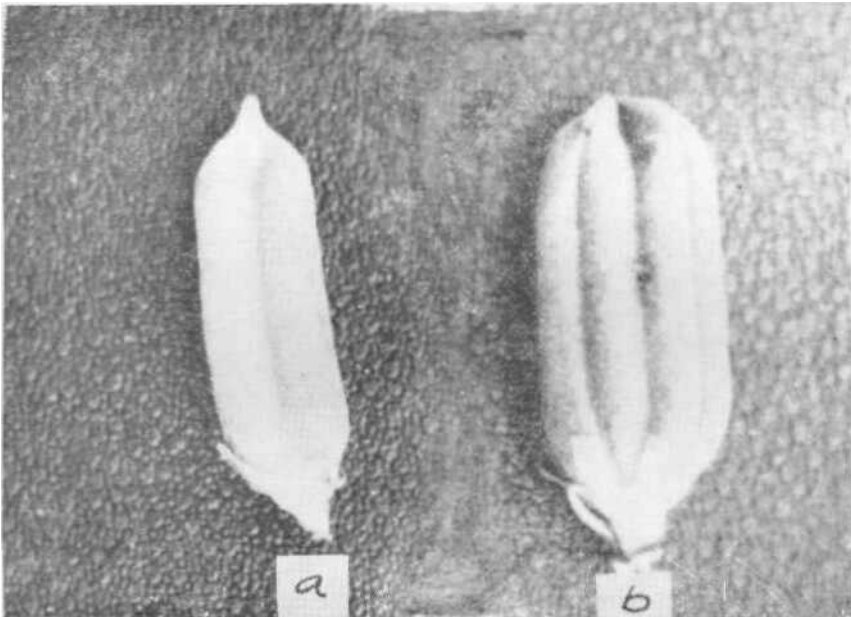
Types	T ₁	T ₂	T ₃	T ₄	T ₅ (Standard)
Stature	Medium	Medium	Tall	Dwarf	Medium
Branching	Low	Low	Medium	High	High
No. of axils per 30 cm	12	11	12	14	10
No. of fruiting nodes per plant	15	10	29	42	67
Pod length (cm)	2.50	2.50	2.75	2.50	2.50
No. of locules per pod	8	8	8	8	4
No. of seeds per locule	14	15	16	12	17
Seed colour	White	White	Brown	White	Black

Table 2
Comparative study of hybrids and parents

Parents	T ₁	T ₂	T ₃	T ₄	T ₅
T ₁	MuJti-loculed	Four loculed	Multi-loculed	Four loculed	Four loculed
T ₂		Multi-loculed	Four loculed	Multi-loculed	Four loculed
T ₃			Multi-loculed	Four loculed	Four loculed
T ₄	—		—	Multi-loculed	Four loculed
T ₅			—	—	Four loculed

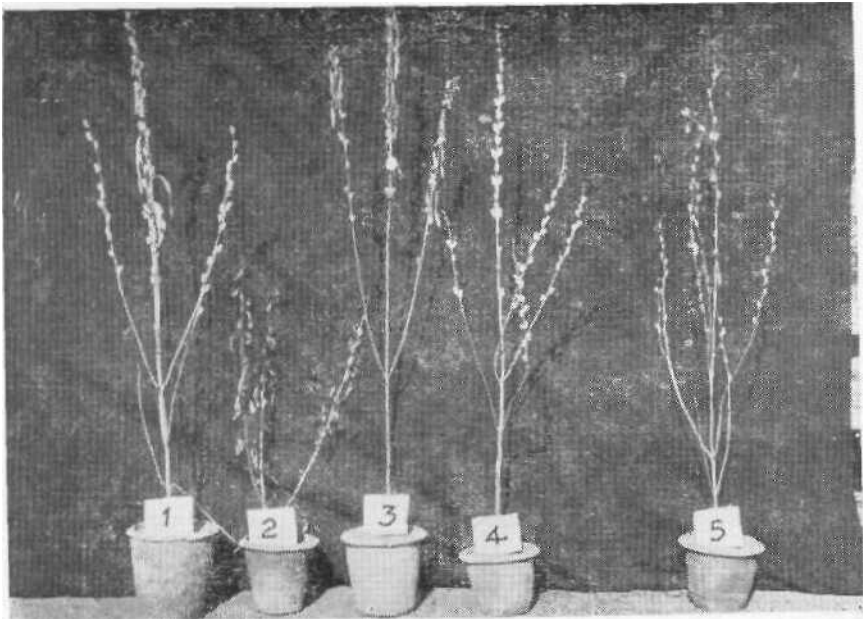
nature of the multiloculed to the four loculed condition, which is in agreement with the reports of Nohara (1933), John (1934) and Langham (1945) that the multiloculed condition is recessive to the four loculed condition. Tyagi (1972) also reported on the monogenic inheritance of locule number in castor. In crosses between the different multiloculed types, the hybrids in certain cases were multiloculed whereas in certain other cases were four loculed.

Fig. 1 The pod types in sesamum



- (a) Four loculed
- (b) Multiloculed

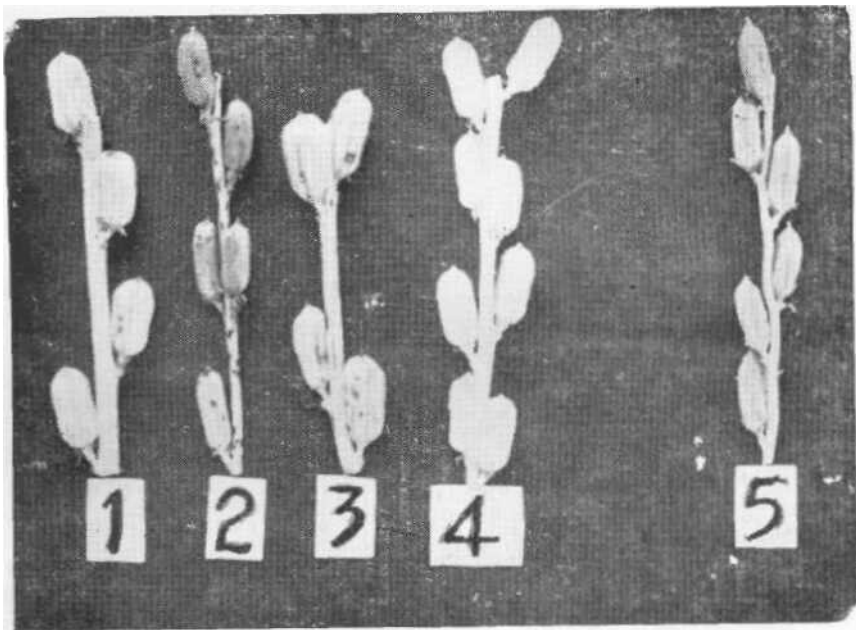
Fig, 2 Multiloculed types and the standard



1-4: Multiloculed types (T_1-T_4)

5 ; Four loculed type, standard (T_5)

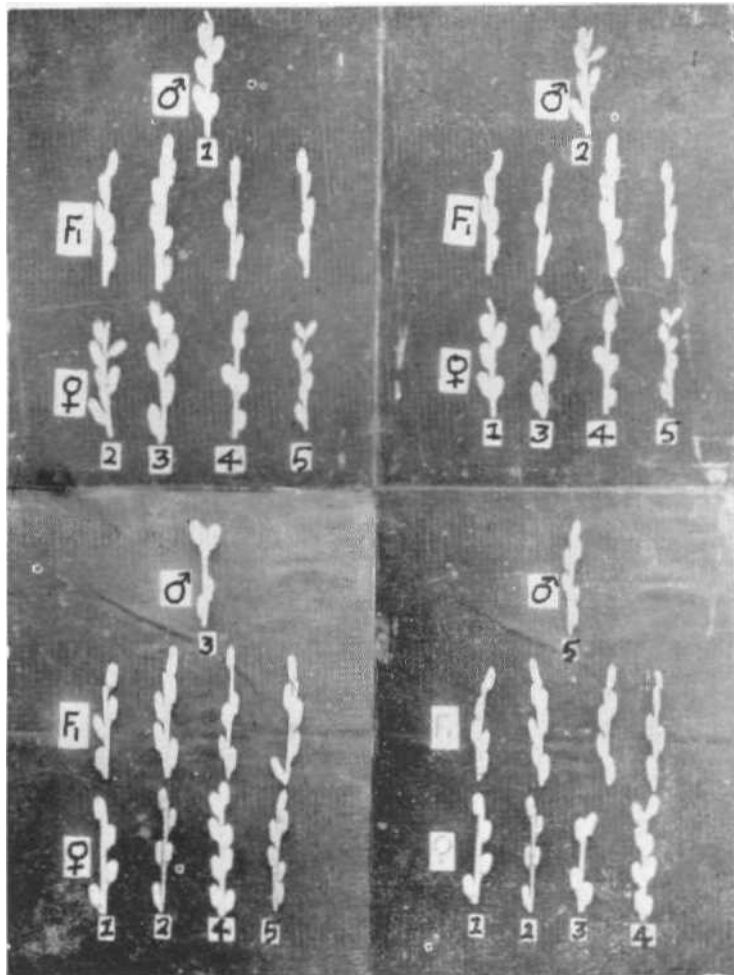
Fig. 3 Pod types of the multiloculed and the standard



1-4: Multiloculed (T, -T,)

5 ; Four loculed, standard

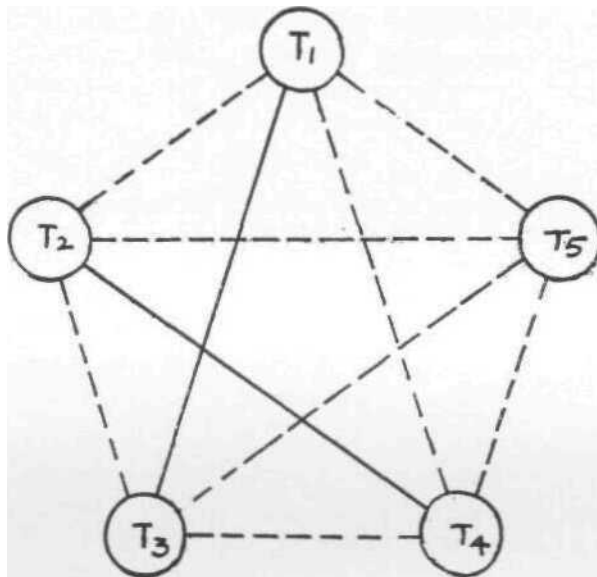
Fig. 4 F₁ of cyclic crosses between multiloculed types and the standard



1-4: Multiloculed types (T_1 - T_4)
5 : Four loculed standard (T_5)

Figure. 5

Genetic analysis of multiloculed condition



—— Multiloculed
---- Four loculed

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The genetic relationship between the five parents is represented diagrammatically in Figure 5. The solid lines indicate that the hybrid between the concerned types has multiloculed pods whereas broken lines indicate that the hybrid has four loculed pods. It is clear from the diagram that the types 1 with 3 and 2 with 4 produce multiloculed hybrids. This indicates that the types T_1 and T_3 have the same recessive gene for the multiloculed condition, whereas the other two types T_2 and T_4 have the same recessive gene. This indicates the existence of two independent recessive genes governing the multiloculed character. The four multiloculed parents could thus be grouped into two viz. Group I including types T_1 and T_3 and Group II including types T_2 and T_4 . It can be inferred that the types 1 and 3 have the same recessive gene for the multiloculed condition whereas the other two types (2 and 4) have a different recessive gene. Therefore, the present results indicate that two independent recessive genes control this character. These genes can be symbolised as i_1 and i_2 . Either of them in the homozygous condition produces the multiloculed condition.

Combination of the two genes ' i_1 ' and ' i_2 ' into a single genotype can be achieved through hybridization between two multiloculed types having different genes for this character and selecting the double recessive segregants with maximum multiloculed expression.

Summary

Genetic analysis of the multiloculed condition in sesame was undertaken. Four multiloculed types isolated from a varietal collection and the four loculed type (Kayamkulam-1) were crossed in all possible combinations. The pod type in the hybrids was compared with that of the parents and conclusions drawn.

The multiloculed condition was recessive to the four loculed condition. Estimation of the number of genes responsible for this character revealed the operation of two independent recessive genes symbolised as i_1 and i_2 . Either of these in homozygous condition produced multilocular expression. Presence of these two genes together in a genotype in the double recessive condition can produce a better expression of this character.

സംഗ്രഹം

കായംകുളളിൽ നാല് അറകളുള്ള കായങ്കുളം-1 എന്ന എളളിനവും നാലിൽ കൂടുതൽ അറകളുള്ള മറ്റ് നാല് ഇനങ്ങളും തമ്മിൽ സംയോഗസങ്കരണം നടത്തി. സങ്കര ഇനങ്ങളെ മാതൃപിതൃ ഇനങ്ങളുമായി താരതമ്യ പഠനം നടത്തുകയുണ്ടായി. നാലിൽ കൂടുതൽ അറകളുള്ള സ്വഭാവം നാല് അറകളുള്ള സ്വഭാവത്തിന് അപ്രകടം ആണ്. ' i_1 ' ' i_2 '

രണ്ടു ജീനുകളുടെ സ്വഭാവത്തിനെ
കുറിച്ചു പഠിക്കുന്നതിനുവേണ്ടിയുള്ള
പ്രകടനാധിഷ്ഠിതമായ പഠനം

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