Simple chemical techniques to distinguish a *basmati* plant from normal plants would be useful in breeding programs utilising the scented trait. Therefore, the KOH technique devised for rice[1] was tried on sorghum. Leaf discs weighing approximately 2 g were taken from normal cultivars and from scented cultivar KEP 472 and treated with 10 ml of 1·7% KOH solution for 5 minutes. A distinct and strong aroma from the tubes containing *basmati* leaf discs was noticed in contrast to those with the normal sorghums. Similar results were obtained with midrib, stalk, panicle branches, and flour from the *basmati* cultivar indicating that the entire plant is scented. Transfer of the scented character from this local type to a good agronomic background should be of value.

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OCCURRENCE OF MIXED INFECTIONS OF VIRUS AND PROTOZOA IN TWO SPECIES OF LEPIDOPTERA

THOUGH mixed infections of insects with different types of pathogenic bacteria are rare, double infections with viruses and/or protozoans have been observed in many lepidopteran insects.[1] In India, Jacob *et al.*[2] have reported the occurrence of nuclear polyhedrosis and granulosis viruses in the black hairy caterpillar, *Pericallia ricini* L. (Arctiidae). Recently some laboratory-cultured and field-collected black hairy caterpillar and tobacco caterpillar, *Spodoptera litura* F. (Noctuidae) were found to die due to double infections of pathogens. The larvae of *P. ricini* were bloated in appearance showing mixed infections of granulosis virus and nosemosis. The fat bodies changed to cream colour from the normal white and translucent in appearance. A whitish body fluid oozed out from the cadavers even on slight injury which on examination under a phase-contrast microscope (900 ×) revealed the presence of numerous binucleate spores of *Nosema* sp. measuring 3·1 × 1·75μ in size, and large number of minute dark coloured granules. The spores and granules were separated by differential centrifugation at 5000 rpm for *Nosema* sp. and at 10,000 to 20,000 rpm for granulosis virus respectively. Similar mixed infections of granulosis virus and microsporidia have been reported in *Sesamia cretica*[3], *Samia cynthia* and *Bombyx mori*[4] and *Agrotis* (*Euxoa*) *segetum*[5]. In the case of *S. litura*, Ramakrishnan and Tiwari[6] have reported the occurrence of a nuclear polyhedrosis virus. Recently some laboratory-reared larvae of *S. litura* died with mixed infections of nuclear polyhedrosis virus and *Nosema* sp. On examination, the fat body smear revealed numerous binucleate spores of *Nosema* sp. and polyhedral inclusion bodies. Earlier workers have reported such mixed infections of nuclear polyhedrosis virus and microsporidia in *Samia cynthia* and *Bombyx mori*[4], and *Heliothis zea*[7].

This is the first record of the mixed infections of granulosis virus and *Nosema* sp. in *P. ricini*, and nuclear polyhedrosis virus and *Nosema* sp. in *S. litura* in India.

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HETEROSIS IN INTER-MUTANT HYBRIDS OF *SESAMUM INDICUM* L.

DRY seeds of sesame (*Sesamum indicum* L.), variety N-62-32 were exposed to gamma rays from a ^{60}Co source with the aim to induce agronomically desirable mutants. The M_1 plants were harvested individually and the M_2 generation was raised as plant progenies. Among the mutants isolated in the M_3, which bred true in the subsequent generation were the mutants with

(*a*) multilocular pods (Nos. 1, 2 and 3)
(*b*) multipods (Nos. 5, 6, 7, 8 and 11)
(*c*) bold pods and bold seeds (No. 13).

While these mutants are still under evaluation for their yield potential and oil content, crossing between the true breeding mutant lines was undertaken in the M_4 generation to combine the desirable traits. Significant heterotic effect in seed yield and other character observed in the F_1 hybrids, involving two multilocular mutants is reported in this communication. This appears to be the first report of heterosis in inter-mutant crosses in sesame.

Seeds from each capsule obtained after crossing were planted separately along with the respective mutant parents and the original cultivar. Each of the F_1 plants along with the mutant parents were harvested individually and observations were recorded for plant height, number of branches, number of pods, seed yield and 1000 seed weight. In all, six different F_1 crosses were studied, out of which only three crosses in which one of the parents was a multilocular mutant (Nos. 1 and 2), showed significant heterotic effect in seed yield over the better parent and the control (Table I).

yield components given in Table I. Other observations indicate that the increase in the yield was due to higher number of seeds per capsule in hybrid compared to the two parents. Heterotic effects in intervarietal hybrids in sesame have been reported[1-3]. In these studies also heterosis was highest for seed yield and number of capsules per plant.

In general, heterosis was found to be higher in Indian × exotic than in Indian × Indian and exotic × exotic varieties of sesame.[2] In the present study, since the F_1 hybrids were even better than the original parental cultivar (Table 1), the heterotic effect observed in the inter mutant crosses is of considerable interest. Heterosis in intermutant or mutant × parent crosses is reported in groundnut[4,5], tomato[6], peas[7] and sweet clover[8].

TABLE I

Seed yield and other characters in the mutants and their F_1 hybrids in sesame

Cross No.		No. of plants	Seed yield (gms)	1000 seed wt. (gms)	Capsules (nos)	Plant height (cms)	Branches (nos)
	Control	175	3·00 ± 0·22	3·53 ± 0·13	..	..	..
1.	Multilocular 2	13	2·18 ± 0·31	2·64 ± 0·10	19·9 ± 1·8	52·8 ± 1·7	2·3 ± 0·8
	Bold 13	20	2·58 ± 0·29	3·12 ± 0·08	19·6 ± 1·8	66·6 ± 1·4	2·3 ± 0·4
	F_1 2 × 13	32	3·32 ± 0·28	3·40 ± 0·09	20·3 ± 1·5	69·4 ± 2·0	1·9 ± 0·2
	% increase over						
	(i) better parent		28·68	8·97	2·01	4·20	0
	(ii) control		10·67	0	..	..	..
2.	Bold 13	14	2·73 ± 0·25	3·25 ± 0·09	22·8 ± 2·7	78·1 ± 2·3	3·1 ± 0·3
	Multilocular 1	13	1·39 ± 0·21	2·80 ± 0·17	15·8 ± 1·6	48·6 ± 1·8	2·1 ± 0·2
	F_1 13 × 1	36	4·80 ± 0·38	3·61 ± 0·07	30·2 ± 1·8	77·2 ± 1·4	3·0 ± 0·3
	% increase over						
	(i) better parent		75·82	11·07	32·47	0	0
	(ii) control		60·00	2·27	..	..	..
3.	Multipod 8	25	2·61 ± 0·31	3·77 ± 0·07	20·9 ± 1·6	72·5 ± 1·8	2·1 ± 0·3
	Multilocular 1	25	1·41 ± 0·15	3·07 ± 0·06	13·8 ± 0·8	50·2 ± 0·8	2·2 ± 0·2
	F_1 8 × 1	21	3·39 ± 0·34	3·71 ± 0·05	20·8 ± 1·6	70·3 ± 2·0	1·8 ± 0·2
	% increase over						
	(i) better parent		29·88	0	0	0	0
	(ii) control		13·00	5·10	..	..	..

All the three F_1 crosses yielded more than the respective better parent. In crosses 1 and 2, the 1000 seed weight and the number of capsules of F_1 plants were higher when compared to the better parents. Only in cross 1, a slight increase was noticed in the F_1 plant height. Heterotic effect was not observed in any cross for the number of branches. In cross No. 3, heterotic effect in seed yield was not contributed by any of the

The present results show that the multilocular sesame mutants 1 and 2 show high degree of heterosis for seed yield when crossed with four-loculed sister mutants. In peas, fasciated mutants resulted in high heterosis when crossed with the non-fasciated mutants[7]. Different degrees of fasciation in stem, leaves, corolla, stamens and gynoecium was also observed in the two multilocular mutants used for hybridization in the present study (Figs. 1 and 2). Demir[9] while reporting the inheritance of carpel numbers in sesame mentioned that quadricarpellatum (multilocular capsules) character was associated with fasciation. It is of interest that both in sesame mutants and in pea mutants[7] only the fasciated types showed significant heterosis.

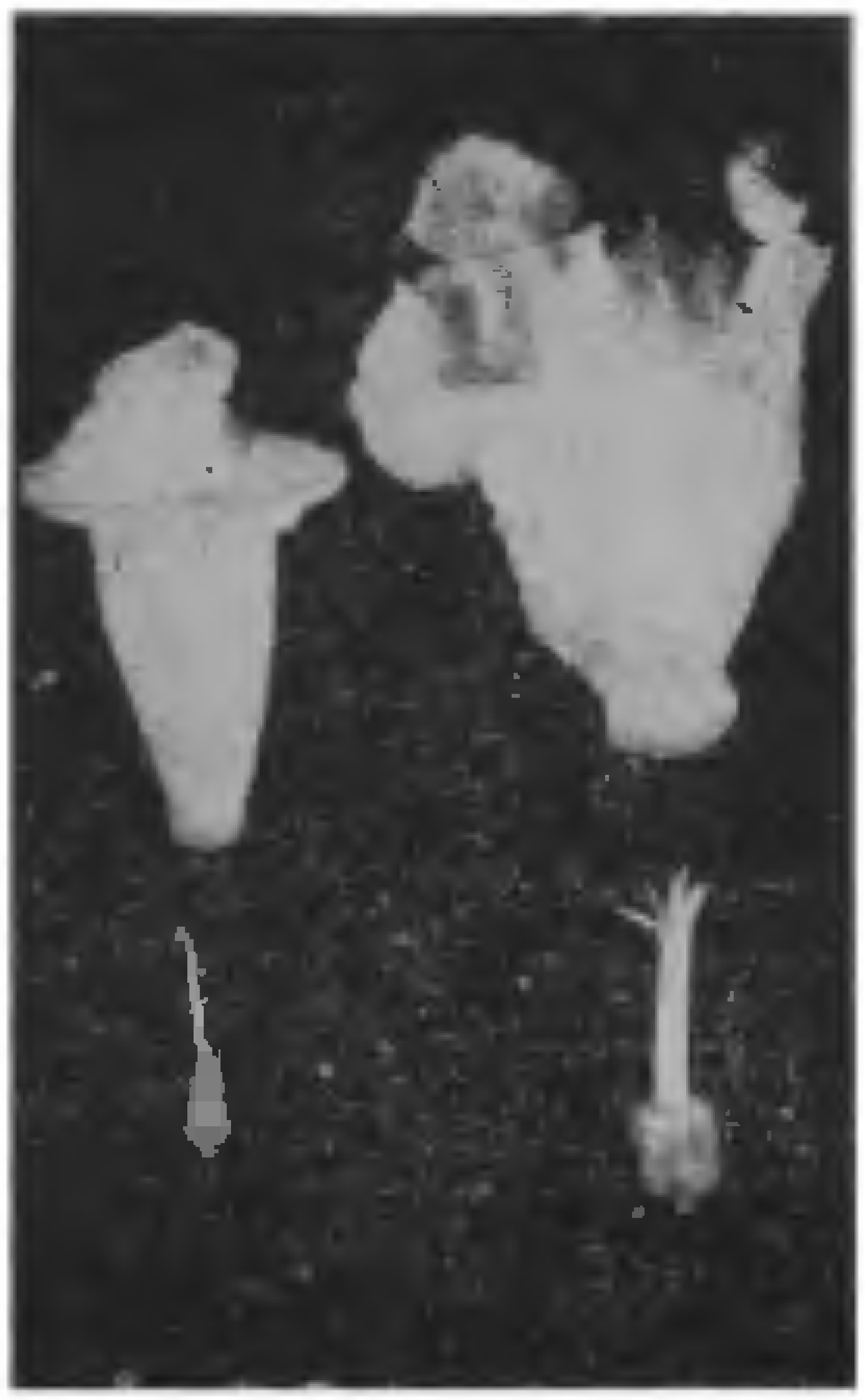

FIG. 1. Left—Corolla (top) and gynoecium (bottom) of control. Right—Fasciated corolla (top) and gynoecium (bottom) of mutant.

FIG. 2. Left—Stamen of control. Right—Stamen of mutant with fasciated anthers.

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THE TRIGEMINAL NERVE AND ITS BRANCHES IN A NON-POISONOUS SNAKE, *NATRIX PISCATOR PISCATOR* SCHNEID. AND A POISONOUS SNAKE. *NAJA NAJA NAJA* LINN.

THE morphology of the trigeminus group of muscles has been studied in several ophidian groups (Belogolowy[3] Haas[8], Frazzetta[6], Dullemeijer[6], Save-Soderberg[10]); also information about the general disposition of the trigeminal nerve and its branches in several snakes (Agarwal[1], Datt[4], Gans[7], Seth[11]) exists. But a comparative account of the trigeminal nerve and its innervation in non-poisonous and poisonous snakes is not hitherto available.

In the non-poisonous snake, *Natrix piscator* Fig. 1), the three branches of the trigeminal nerve come out of the cranium each by a separate foramen. The *ramus ophthalmicus* emerges from the pro-otic foramen, reaches the postero-dorsal margin of the orbit and gives out a branch, the *r. frontalis*, to innervate the skin of the dorsal and posterior of the orbit. It continues forwards as the *r. nasalis* to innervate the (nasal epithelium, as in *Eryx johnii johnii* (Badhawan[2] and in *Ptyas mucosus* (Agarwal[1], Datt[4]). The *ramus maxillaris*, soon after its origin, gives a motor branch which divides into two branches to innervate the adductor externus superior muscle. Beyond it, the main branch runs to reach the postero-ventral angle of the orbit and through separate branches,