

**STALKED OVARY :
A NEW MUTANT IN BARLEY INDUCED
BY EMS**

ABSTRACT

A new mutant, stalked ovary, was induced by EMS treatment in C 164 barley. This mutant trait was inherited as a single recessive gene designated as *so*. The mutant is characterised by the ovary having a long stalk and the efilamentous anthers borne around the base of the ovary.

This study deals with the induction and genetic analysis of a stalked-ovary mutant in barley.

Dry seeds of diploid hexastichous barley (*Hordeum vulgare* L., cv C 164) were treated with various doses of EMS, ⁶⁰Co gamma rays, ³²P and ³⁵S, as reported by Sethi and Gill (1969). The M₂ generation consisting of 6820 M₁ spike-progenies, was studied for various morphological and cytological abnormalities. Out of these, one progeny from 0.15% EMS treatment threw out 4 stalked-ovary mutants and 15 normal plants. The progenies of all the normal sib plants were raised in 1968-69 to find out the mode of inheritance of the trait under study. The progeny of the mutant was also grown. For meiotic studies of the mutant, anthers were fixed in acetic alcohol (1:3) and smeared in acetocarmine. Pollen stainability was studied by the acetocarmine glycerine method.

Out of 6820 M₁ spike-progenies studied in M₂, 1761 segregated for 173 types of mutations, including the one for the stalked-ovary mutations which is under study.

Morphology.—The mutant trait was characterized by the ovary having about 5 mm long stalk with the efilamentous anthers around the base of the ovary (Fig. 1). The character was expressed in the florets of only the four lateral rows whereas those of the central rows of the spike were normal. Grain development occurred only in florets of the central rows. The mutant in other respects was normal and yielded about 40% of the control.

Cytology.—The mutant was meiotically normal with 7 bivalents at diakinesis followed by regular metaphase and anaphase stages. The pollen grains of the mutant were fertile as indexed by their stainability with acetocarmine. This showed that, at least, no gross chromosome aberration was associated with the mutant trait.

Genetics.—Four out of the 15 M₃ progenies segregated for the trait under study and threw out 24 mutants and 94 normal plants. This segregation conforms to the expected 3:1 ratio

($\chi^2 = 1.15$; 0.30 P 0.25) suggesting that the mutant trait is monogenic recessive. The first appearance of the mutant in the M₂ generation and that too in the segregation ratio of 21% (4 mutants and 15 normal plants) also supports the same hypothesis. Also, the progeny of the mutant bred true to the type. The recessive allele may be designated as *so*.



FIG. 1. The ovary having a long stalk and the filamentous anthers borne at the base of the ovary.

The stalked-ovary phenotype is interesting because it has not been reported earlier in any species of Gramineae. This trait may find a significant place in genetic research.

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1. Sethi, G. S. and Gill, K. S., "Doubling-tendency morphological change induced by different mutagens in barley," *Rad. Bot.*, 1969, 9, 415.

**MAMMALIAN TOXICITY OF ERGOT OF
BAJRA**

BAJRA (*Pennisetum typhoides*, B & S) is one of the staple food crops in India and it is severely infected by the ergot pathogen, *Claviceps microcephala* (Wallr.) Tul. The grains are often contaminated with the ergots. While mammalian toxicity of ergots from rye¹ is well known, the toxic effect of the ergot of *C. microcephala* from bajra is not known. In the present studies the mammalian toxicity of the ergots from bajra is reported.

Guinea pigs of equal age and weight were fed with different doses of fully matured ergots daily. The sclerotia were mixed with the millet grains and fed to the pigs. Pigs fed with the grains alone were kept as control and large number of animals were kept for replications. After 10 days, the weight of the guinea pigs was recorded and then the guinea pigs were killed and dissected out and changes in various organs were recorded. Heart, kidneys and

reproductive organs did not show any change due to the ergot feeding. But liver and lungs seemed to be much affected (Fig. 1 and Table I).

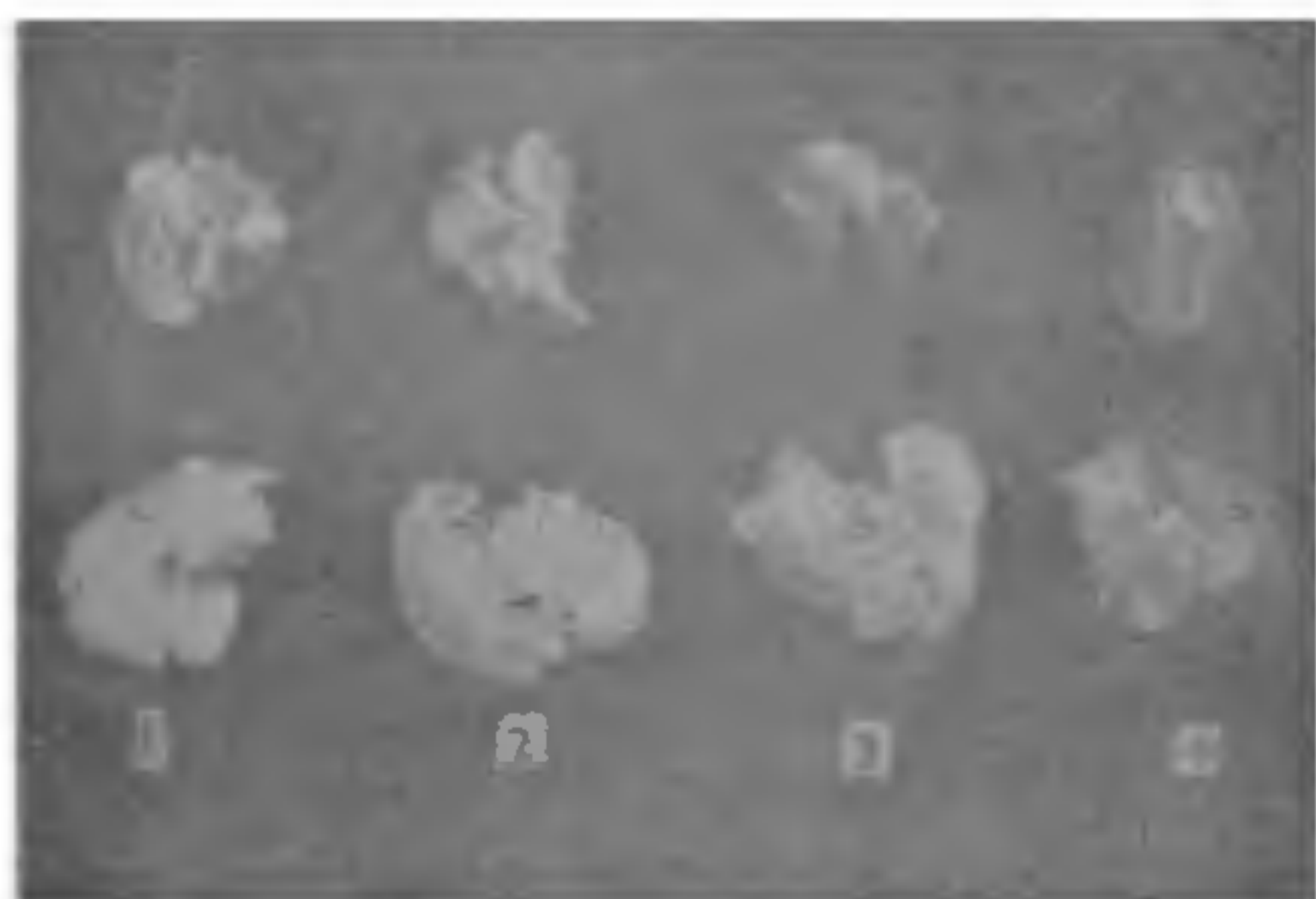


FIG. 1. Toxicity of bajra ergots to lungs and liver of guinea pigs. Top row: Lungs. Bottom row: Liver. 1. Control. 2. 0.5 g ergots/day. 3. 2.0 g ergots/day. 4. 3.0 g ergots/day.

TABLE I

Toxicity of Bajra ergots to guinea pigs

Dosage of ergots fed to guinea pigs	Percentage increase (+) or decrease (-) in body weight of guinea pigs over the initial weight	Colour of the liver	Colour of the lungs
Control	+ 9.2	Light red	Dark red
0.5 g/day	- 17.8	Light brown	Scattered black necrotic spots
2.0 g/day	- 19.5	Dark brown	Complete black
3.0 g/day	- 29.0	"	"

The presence of various toxic alkaloids in the ergots was assessed by paper chromatography². Three alkaloids, ergometrine, ergotamine and ergokryptine were detected. The quantity of total and water-soluble alkaloids content of the ergots was estimated by using DU Beckman spectrophotometer³. The quantity of alkaloids was assessed at different stages of the ergot development on the earhead by spray inoculating the conidial suspension of the pathogen on the bajra earhead (Table II).

The results indicated that well-matured ergots contained more alkaloids.

Ergots of *C. purpurea*⁴, *C. paspali*⁵ and *C. fusiformis*⁶ have been reported to be poisonous to livestock. Shone *et al.*⁷ reported the presence of ergotoxine, ergotamine and ergometrine in the ergots of *C. fusiformis* from

TABLE II
Total and water-soluble alkaloids content in bajra ergots

Days after spray inoculation	Percentage of alkaloids in the ergots on dry weight basis	
	Total alkaloids	Water-soluble alkaloids
7	0.081	0.037
10	0.125	0.062
15	0.153	0.081
20	0.275	0.087
25	0.506	0.097
30	0.625	0.156

bajra. Riggs *et al.*⁸ observed ergometrine, ergometrinine, ergotamine, ergocornine and ergocristinine, in rye ergots. In the present studies, ergometrine, ergotamine and ergokryptine have been detected in *C. microcephala* ergots.

Shinde and Bhide⁹ observed 0.42% of total alkaloids in *C. microcephala* ergots while, Mantle⁶ reported 0.32% of total alkaloids in *C. fusiformis* ergots and Bekesy¹⁰ observed 1.0% of total alkaloids in *C. purpurea* ergots. The present studies revealed that the alkaloids content of *C. microcephala* ergots varied according to the stages of ergot development and a maximum of 0.625% alkaloids was observed in the advanced stages of sclerotial development. *C. purpurea* sclerotia contained only 0.01% water-soluble alkaloids¹¹ while *C. microcephala* sclerotia were observed to contain upto the maximum of 0.156% water-soluble alkaloids.

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