

lesion back to normalcy on basal medium are blocked by formaldehyde in the food. When confirmed, it will endow formaldehyde with an unusual kind of specificity in blocking repair/recovery of alterations at the yellow locus but not affecting lethal mutations on the same chromosome. It will also be interesting to see whether the increase observed for yellow mutations extends to other visible markers on the X-chromosome. This is now under investigation.

Division of Genetics, SUNANDA MAHAJANI.
Indian Agricultural Research. V. L. CHOPRA.
Institute,
New Delhi-110012, March 20, 1973.

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MUTAGENIC ACTION OF NITROSO METHYL UREA IN PEARL MILLET

HYBRID Bajra (*Pennisetum typhoides*), a widely cultivated millet, is losing popularity in recent years, because of its susceptibility to several diseases. Seeds of Tifton 23 A and BIL-3B, the female and male lines, respectively, of Hybrid Bajra-1 were treated with N-nitroso-N-methyl urea (NMU) to understand the mutagenic action and also to isolate disease resistant types, if any, in later generations. The present note describes the preliminary cytogenetical effects.

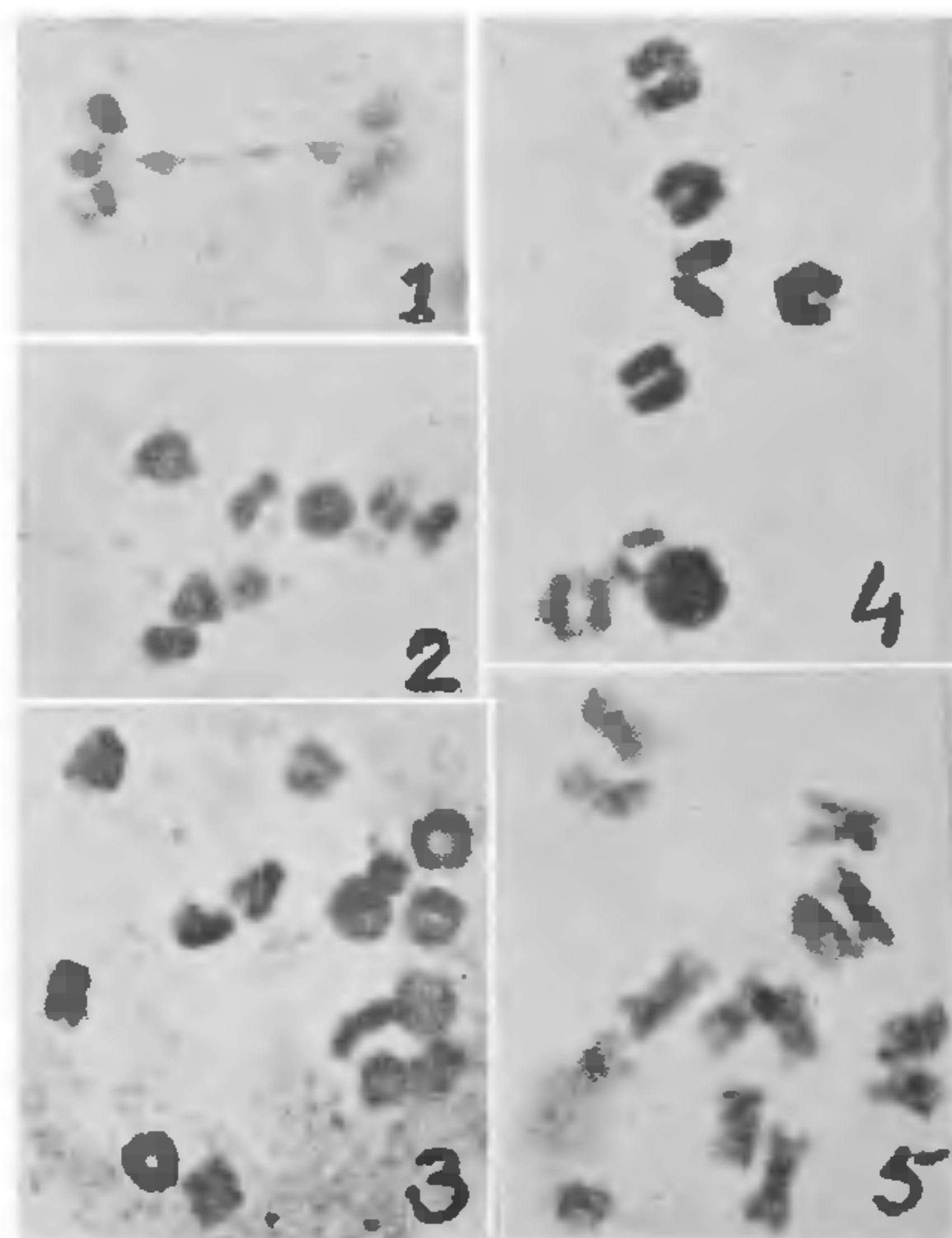
After pre-soaking for 9 hr in water, lots of 300 seeds each were treated with 0.005, 0.010 and 0.020% aqueous solution of NMU for 4 hr. Observations were recorded on germination, seedling height, mitosis, meiosis and M_2 chlorophyll mutation frequency and spectrum. The results are presented in Table I.

The data indicate that there is a progressive reduction in germination and seedling height with the increase in mutagen concentration and 0.02% NMU treatment proved to be almost lethal. The

LD 50 for both the strains was found to be around 0.015%, while the reduction in seedling height at a comparable dose was more in the case of BIL-3B than in 23-A.

Observations on mitosis recorded after fixing the roots at different intervals showed that the frequency of dividing cells dropped soon after the treatment. However, the root growth was restored and a high mitotic index was obtained with increase in post-treatment period. Besides inhibition of mitosis, stickiness, clumping and fragmentation of chromosomes was observed.

Meiotic preparations of several M_1 plants indicated abnormalities like lagging chromosomes, anaphase bridges (Fig. 1), unequal anaphase



FIGS. 1-5. Meiotic stages. Fig. 1. Anaphase bridge. Fig. 2. Chromosome fragmentation. Fig. 3. Cell with fourteen bivalents. Fig. 4. Normal cell with seven bivalents. Fig. 5. PMC with 14 mitotic chromosomes.

TABLE I

Treatment	Germination %		Seedling height (cm)		Frequency of chlorophyll mutations in BIL-3B			
	23-A	BIL-3B	23-A	BIL-3B	No. of M_2 families		No. of M_2 plants	
					scored segregating	scored	segregating	Mutants %
Control	65	65	17.4	23.6	30	..	3020	..
0.005%	56	61	17.4	15.5	31	21	3271	2.48
0.010%	49	54	13.1	14.5	30	11	3625	1.17
0.020%	2	1	0.7	0.5	4	4	303	2.95

segregation and fragmentation of chromosomes (Fig. 2). The meiotic behaviour of one plant of BIL-3B at 0.02% treatment was quite interesting. Some of the anthers in this case had P.M.Cs. with 14 bivalents (Fig. 3) instead of the normal 7 (Fig. 4), while other anthers had a mixture of both normal and polyploid P.M.Cs. Still some other P.M.Cs. were having 14 mitotic type of chromosomes rather than bivalents (Fig. 5).

All the 3 concentrations induced high frequency of chlorophyll mutations and the spectrum was very wide which included several types like chlorina, xantha, viridis, albina, striata, maculata and pale green.

NMU is a polyfunctional alkylating agent having an active methyl group and nitroso group. The carcinogenic, radiomimetic and mutagenic effects of NMU are said to be due to its alkylating properties¹. Chromosomal aberrations and mutations may arise by alkylation of DNA in the chromosomes. It may interfere with DNA duplication when the phosphate groups are alkylated; may break the phosphate-sugar backbone; DNA duplication may get inhibited when some bases are alkylated, or it may make the DNA more labile for breakage by depurination². One or more of the above-mentioned mechanisms might have been responsible for the chromosomal aberrations and mutations observed in the present investigation.

Division of Genetics,
Indian Agricultural
Research Institute,
New Delhi-110012,
March 9, 1973.

S. TARA MOHAN.
D. SRINIVASACHAR.
R. N. RAUT.

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INFLUENCE OF ABSCISIC ACID ON THE ENDOGENOUS GIBBERELLIN LEVEL OF *PHASEOLUS RADIATUS*, LINN. SEEDLINGS

ABSCISIC acid (ABA) has been considered to be a potent growth inhibitor, inhibiting the germination of seeds of peach¹, grasses², lettuce and *Lepidium*³. Wareing *et al.*⁴ suggested that ABA may antagonize the effects of auxins, gibberellins and cytokinins. They observed a significant reduction in the endogenous level of gibberellin-like substances in both normal and dwarf segregants of corn (*Zea mays*) by ABA treatment and thus suggested that ABA may antagonize the effects of gibberellins by affecting their biosynthesis.

Extensive studies on the interaction between ABA and IAA, GA₃ or Kinetin in various growth tests indicate that ABA and the growth promoting substances were acting independently⁵. In the present investigation the biological activity of the endogenous gibberellin-like substances was determined in the *Phaseolus radiatus*, Linn. seedlings treated with ABA, as also ABA plus GA₃, in order to assess the influence of ABA on the endogenous gibberellin level.

Uniform seeds were sown in petriplates (6" dia) moistened with (1) 10 ml of distilled water (control), (2) 10 ml of 25 ppm ABA and (3) 10 ml of 25 ppm ABA plus 250 ppm GA₃ solutions, and kept in the dark at 30 ± 2° C. The solutions, and filter-papers were changed everyday until 96 hours, when the hypocotyl length was measured. Then, the seedlings were washed thoroughly with distilled water to remove any ABA or GA₃ adhering to them. The endogenous gibberellins were extracted in 50% acetone from 5.0 gm (fresh material) each of control, ABA and ABA plus GA₃ seedlings, following the method of Corcoran and Phinney⁶. The extracts were chromatographed on Whatman No. 1 paper in the ammoniacal isopropanol solvent⁷. The biological activity of the eluates was determined using the rice second leaf sheath bioassay test⁸⁻⁹.

At the time of the extraction of gibberellin-like substances (*i.e.*, 96 hours) the mean hypocotyl growth in control, ABA and ABA plus GA₃ treated seedlings were 8.3, 1.9 and 9.6 cm respectively. The histograms of the rice second leaf sheath growth represent the activity of gibberellin-like substances from 5.0 gm fresh weight of the seedlings (Fig. 1). The activity of the gibberellins at Rfs 0.1-0.4 showed marked difference between control and ABA treatment, in that the former showed greater activity than the latter. Conversely, the inhibitor activity was more in ABA-treated seedlings than in control, as observed clearly at Rfs 0.0-0.1 and 0.7-0.9. In the seedlings treated with ABA plus GA₃ there was marked gibberellin activity at Rf 0.6-0.7; it may also be noted that the inhibitor content was also higher than in control, especially at Rfs 0.2-0.4.

Thus, although the total gibberellin level (considering all Rfs) in the ABA treatment appeared to be almost similar to that in control, the hypocotyl growth in the former was markedly inhibited (1.9 cm as against 8.3 cm in control), which might be due to the antagonizing effect of the total inhibitor by virtue of its being in higher level than in control. If ABA has any effect on the biosynthesis of gibberellins as postulated by Wareing