TABLE I

Rf values, colour and spectral properties of phytoalexins of Mucuna utils

Tests	Phytoalexins			
	A	B	C	D
Rf values :				
Chloroform–ethanol (100–3, v/v)	0·05	0·09	0·13	0·24
Benzene-ethyl acetate-methanol (25–8–4, v/v)	0·45	0·58	0·63	C·68
Colour after DNA spray	Orange yellow	Bright orange	Orange yellow	Orange yellow
UV spectra :				
λ_{max}–EtOH (nm)	285	293	288	290
λ_{max}–ethanolic NaOH	..	330	..	..

of *M. deeringianum* inoculated with *H. carbonum*. We did not find any of these substances. *Phaseolus vulgaris*, another legume produced large quantities of kievitone, when inoculated with *Rhizoctonia solani*[6]. Evidently kievitone is one of the general phytoalexins[7] produced by leguminous plants.

The authors are grateful to Dr. E. K. Janaki Ammal, Emeritus Scientist, for providing the seeds. One of the authors is thankful to the University Grants Commission for the award of a fellowship.

May 4, 1981.

1. Mahadevan, A., *J. Scient. Ind. Res.*, 1979, 38, 156.
2. —, *Biochem. Rev.*, 1978, 49, 51.
3. Ingham, J. L., *Z. Naturforsch.*, 1979, 34B, 159.
4. Randerath, K., *Thin-Layer Chromatography*. Academic Press, New York, 1964, p. 249.
5. Mahadevan, A., *Methods in Physiological Plant Pathology*, Sivakami Publications, Madras, 1975, p. 82.
6. Smith, D. A., Van Etter, H. O. and Bateman, D. F., *Physiol. Plant Path.*, 1975, 5, 51.
7. Mahadevan, A., *Acta Phytopath.*, 1973, 8, 391.

CYTOMORPHOLOGICAL BEHAVIOUR OF DOUBLE TRISOMIC IN PEARL MILLET [*PENNISETUM AMERICANUM* (L.) K. SCHUM]

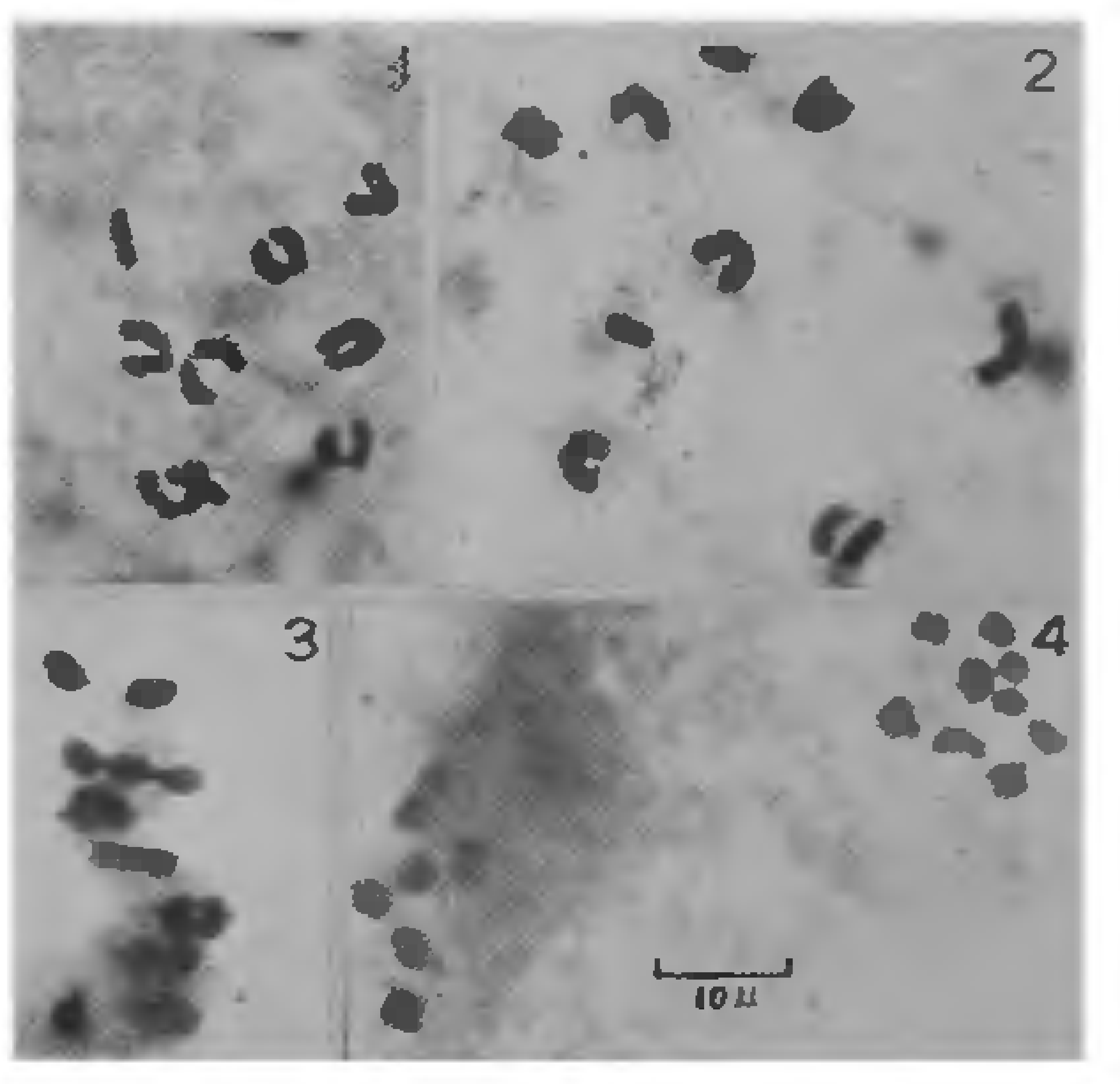
R. SAI KUMAR, U. P. SINGH, R. B. SINGH* AND R. M. SINGH

Department of Genetics and Plant Breeding
Institute of Agricultural Sciences
Banaras Hindu University, Varanasi-221 005, India

* Present address: Regional IBPGR Officer, FAO, Phra Atit Road, Bangkok (Thailand).

THE progressive increase in the number of chromosomes is rather common in polyploid plants; but it is relatively rare in diploids (Darlington[1]). In studies reported here two double trisomics were isolated in the progeny of triploid pearl millet. Although the occurrence of such plants was reported previously by Gill *et al.*[2] no detailed observations on their cytomorphology have been made. Both double trisomics studied here are distinguishable from their diploid sibs by their reduced plant height, leaf length, width, ear length and width. But number of tillers in both cases were significantly very high.

The frequencies of various configurations observed at diakinesis and MI (Figs. 1 to 3) are given in Table I. From the data it can be seen that about 55% PMC's of diakinesis and 76% of MI form $5^{II} + 2^{III}$ in the



FIGS. 1–4. Different chromosome associations at diakinesis and Metaphase I and distribution of chromosomes at Anaphase I in double trisomic of *Pennisetum americanum*. Fig. 1. Diakinesis, $6^{II} + 1^{III}$ (4-shaped) + 1^{I}. Fig. 2. Diakinesis, $7^{II} + 2^{I}$. Fig. 3. Metaphase I, $6^{II} + 1^{III} + 1^{I}$. Fig. 4. Anaphase I, 9-7 distribution of chromosomes.

TABLE I

Cytological observations on two double trisomics in pearl millet (Pennisetum americanum)

No. of stock	No. of cells analysed		$5^{II} + 2^{III}$		$6^{II} + 1^{III} + 1^{I}$		$7^{II} + 2^{I}$		AI distribution of chromosomes			
	Dia	MI	Dia	Mi	Dia	MI	Dia	MI	8-8	9–7	8–1–7	Total number of cells observed
I	40	50	22	38	12	7	6	5	28	18	4	50
	Mean per cent		55	76	30	14	15	10	56	36	8	
II	30	45	3	6	12	15	15	24	10	12	3	25
	Mean per cent		10	13·33	40	33·33	50	53·34	40	48	12	

first double trisomic while only 10% of PMC's were seen with such association in second case. The frequency of cells with $7^{II} + 2^{I}$ was maximum (54%) followed by 40% of cells with $6^{II} + 1^{III} + 1^{I}$ in second double trisomic (Fig. 3). Concomitantly a complete absence of $6^{II} + 1^{IV}$ or 8^{II} in cytological preparations of these stocks excludes the possibility of their becoming tetrasomic types. The occurrence of high frequency of $5^{II} + 2^{III}$ and a rare frequency of univalents with bivalents in first double trisomic is indicative of involvement of both extra chromosomes as the longer chromosomes of the set. Contrarily, the low frequency of trivalents and a high frequency of univalents in the second double trisome suggest that at least one extra chromosome of this stock is shorter one. At AI 8:8 disjunction was noticed in 56% and 40% cells of first and second double trisomics respectively. But the high incidence of univalents has probably caused the frequent distribution (48%) of 9:7 chromosomes (Fig. 4) and formation of univalent laggard in second trisome. Though equal (8:8) and unequal (9:7) distribution should be equally frequent in both kinds of associations of cells, *i.e.*, either with $5^{II} + 2^{III}$ or with $6^{II} + 1^{III} + 1^{I}$ in prophase I. However, it seems as though there is built in division mechanism which results in a tendency for equal number of chromosomes to go to the poles (Michel and Burnham[3]). The studies reported here show the high frequency of equal disjunction and involvement of both longer extra chromosomes in first stock which eventually result into complete sterility of both pollen and ovules due to their trisomic nature. But the relatively higher incidence of 9:7 disjunction has led to some fertility of gametes (approx. 10%) as well as some degree of seed set in the second stock. However, no double trisomic could be recovered probably due to lack of simultaneous transmission of both extra chromosomes in the small progeny population of second double trisomic studied.

April 10, 1981.

1. Darlington, C. D., *Evolution of Genetic System*, 2nd edn., Edinburgh, Oliver and Boyd, 1958.
2. Gill, B. S., Virmani, S. S. and Minocha, J. L., *Can. J. Genet. Cytol.*, 1970, **12**, 474.
3. Michel, K. E. and Burnham, C., *Genetics*, 1969, **63**, 851.

RELEVANCE OF THE MEMBRANE RESTING POTENTIAL FOR THE STUDY OF DROUGHT RESISTANCE IN WHEAT (*TRITICUM AESTIVUM* L.) CULTIVARS

A. Ravindran, J. Ashraf and M. Amin*

School of Life Sciences, Jawaharlal Nehru University, New Delhi 110 067, India

* Address for correspondence.

Certain electrophysiological parameters have been recently found to be of considerable relevance for the behaviour under stress of various plants. The permeability of the cell membrane to diverse organic and inorganic molecules and the membrane resting potential have been observed to vary systematically in relation to cellular injury[1], frost hardiness[2], passive and active transport of ionic and non-ionic species, hormone action[3], as well as disease resistance[4].

Present work compares the resting membrane potentials (V_0) of two wheat cultivars known to be differing in their resistance to drought, in order to see whether V_0 can serve as an electrophysiological index of drought resistance. Resting potential being the outcome of ionic concentration gradients and the relative permeability of the membrane to the ions involved as well as of electrogenic pumps, it is liable to change under the influence of such environmental stresses, which affect these variables.

The ability to adjust their internal osmotic pressure and thus turgor pressure in response to salt and water stress, has been observed in many plant cells[5,6]. In the case of halophytes it has been found that they possess low permeability to cations and make use of low molecular weight organic compounds as osmotica[7]. The drought resistant varieties apart from having an initial stock of osmotica are capable of uptake of K^+ with the simultaneous generation of proline and malate as organic counterions when they are subjected to water stress. However, so long drought conditions do not exist, the inside concentration of K^+ is kept low in order to maintain proper turgor pressure[8-10] Under such conditions the K-diffusion potential given by Nernst's equation would give a higher value for the membrane resting potential;

$$V^{in} - V^{out} = V_0 = \frac{RT}{F} \ln \frac{K^{out}}{K^{in}}$$

It is therefore expected that the plants adapted to arid and saline environment would show a high value of V_0, *i.e.*, low absolute value of V_0, under normal conditions.

Working on the above hypothesis, we studied the resting potentials of two cultivars of wheat known for