IODINE TREATMENT OF MUNGBEAN SEEDS FOR THE MAINTENANCE OF VIGOUR AND VIABILITY

SOAKING of stored seeds of a number of cereals, oilseeds, fibre crops and vegetables, with or without chemicals for 2–6 hours, followed by drying back, has shown great efficacy in controlling seed deterioration[1–3]. In seeds of pulses, however, the results are not very consistent. Soaking injury during rapid imbibition of water and also injury during dehydration have posed serious limitations in the adoption of hydration-dehydration treatments in controlling deterioration of seeds of mungbean, soybean, lentil and several other pulses. Moisture equilibration with a saturated atmosphere of water followed by slow drying of stored seeds has given some success but the effects are not comparable to those obtained with cereals, oilseeds and non-leguminous vegetable seeds.

Lipid peroxidation and free radical rections are believed to be the basic reasons of deteriorative senescence[4] and physico-chemical methods of controlling free radical reactions have shown promising results[5–7]. Incorporation of effective chemicals into the seed by the organic solvent infusion method[8] has not been successful in mungbean, because the solvents adversely affect germinability. Experiments were, therefore, undertaken to study the effect of iodine vapour in the maintenance of vigour and viability of mungbean seeds. Iodine, which is readily taken up by unsaturated fatty acid components, should stabilize them and extend seed longevity by reducing free radical and lipid peroxidation reactions.

Seeds of mungbean [*Vigna radiata*] (L) Wilczek cv. B_1) were dried to a moisture content of 10% and stored in unsealed glass bottles for 18 months before treatment. Iodination was done at room temperature ($25 \pm 2°$ C) by exposing the seeds to a partially saturated iodine vapour environment in a 5·5-litre glass desiccator containing 100 mg of iodine for 8, 16, 24 and 48 hr. The seeds were then taken out and dried at $36 \pm 1°$ C for 24 hr and stored in a desiccator over fused calcium chloride for 4 days. The control seeds (not treated with iodine) were dried in the same fashion. The iodine-treated and control seeds were thereafter subjected to different ageing and stress conditions. Germination tests were done on glass plates and the data on germination percentage and root and shoot lengths were recorded after germination for 120 hr[9].

In germination tests conducted before subjecting the seeds to different stress conditions, no significant improvement in germination percentage and vigour of seedlings could be noted. Highly beneficial effect of iodine treatment on germinability was noted after accelerated ageing for 20 days at 95% RH and 40°C. Even when the dry seeds (moisture content 5 to 10%)

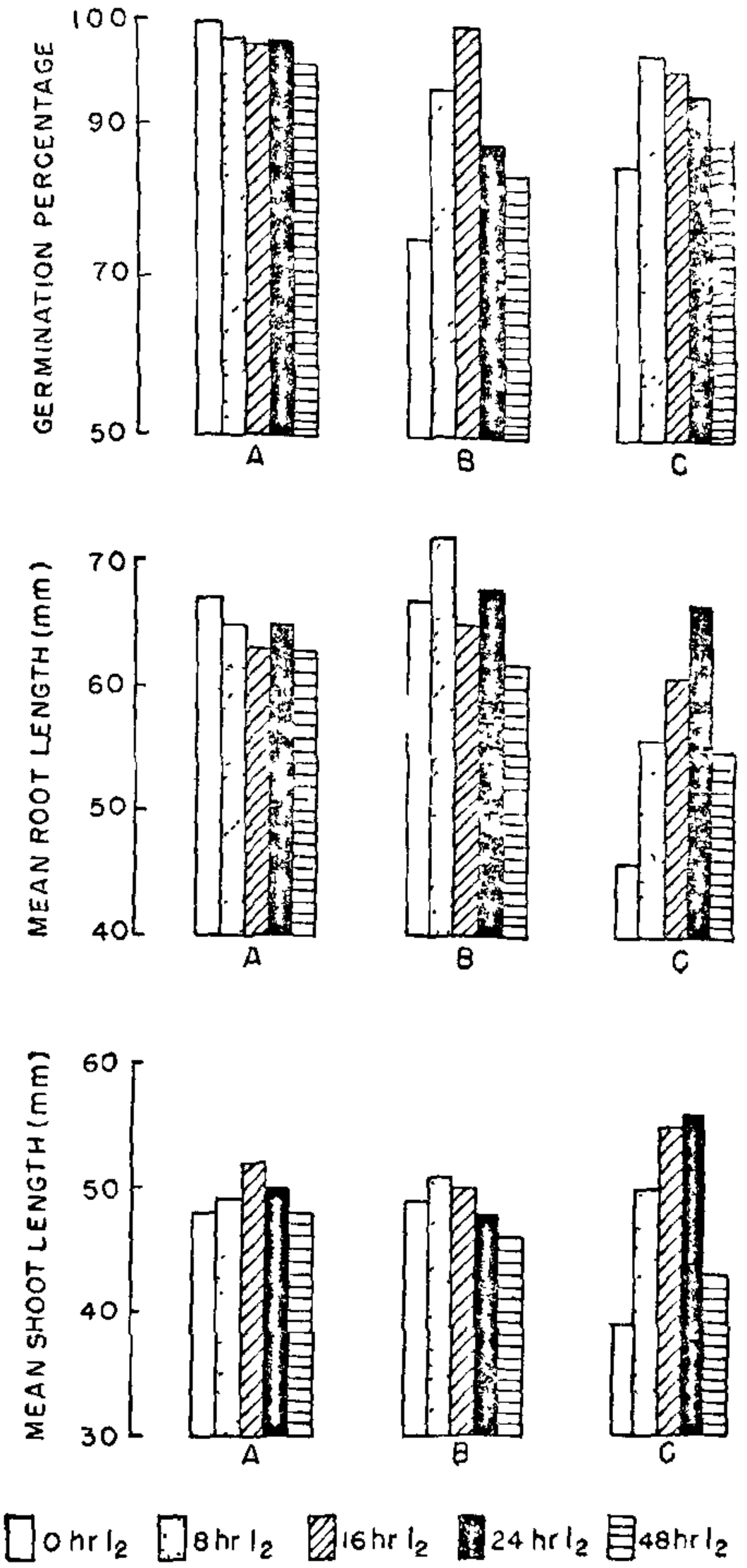

FIG. 1. Effect of iodination for various durations (0, 8, 16, 24 and 48 hours of iodine treatment) on germination percentage, mean root length (in mm) and mean shoot length (in mm) under different ageing conditions : A—before ageing (immediately after treatment), B—ageing at 95% RH and 40° C for 20 days, C—heated at 100° C for 45 minutes.

were subjected to a severe temperature stress by putting them in a thermostatic oven at 100 C for 45 min, the iodine treated seeds showed much greater heat resistance than the control (non-iodinated but heated) seeds. It may be mentioned here that the dry seeds are considerably heat-resistant but when the seed moisture content is high they are rapidly killed by heating. Beofre germination tests, however, the seeds should

be brought down to room temperature otherwise rapid uptake of water by the heated seed would cause damage to the seed.

In the accelerated ageing test, iodination for 8 and 16 hr proved better than other durations but iodine treatment for 24 hr showed the maximum effect in the counteraction of heat injury. In the case of alleviation of heat injury the effect of iodine was more pronounced on seedling vigour.

The antimicrobial action of iodine may account partly for the beneficial effect under warm-humid storage conditions favouring microbial invasion of stored seeds. The significant beneficial effect of pre-iodination in overcoming heat injury would, however, indicate that iodine exerted its beneficial effect in ways other than a mere control of pathological deterioration. Perhaps, the stabilization of olefinic bonds of unsaturated fatty acid moieties of lipoprotein components of the cell membranes rendered them less susceptible to lipid peroxidation and free radical reactions.

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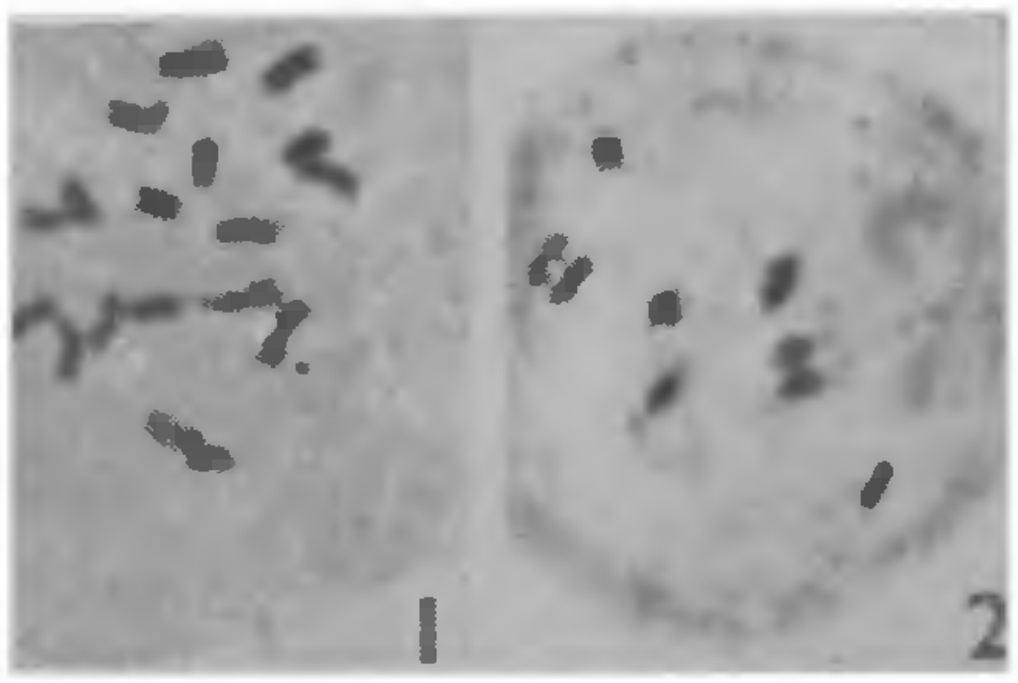
1. Basu, R. N., Chattopadhyay, K. and Pal, P., *Indian Agric.*, 1974, **18**, 75.
2. —, and Dasgupta, M., *Ibid.*, 1974, **18**, 285.
3. —, *Seed Res.*, 1976, **4**, 15.
4. Tappel, A. L., *Fed. Proc.*, 1973, **32**, 1870.
5. Molnar, K., *Mech. Age. Dev.*, 1973, **1**, 319.
6. Pammenter, N. W., Adamson, J. H. and Berjak, P., *Science*, 1974, **186**, 11.
7. Basu, R. N. and Dasgupta, M., *Indian J. exp. Biol.*, 1978, **16**, 1070.
8. Khan, A. A., *The Physiology and Biochemistry of Seed Dormancy and Germination* (ed. Khan, A. A.), North-Holland, Amsterdam, 1977, p. 289.
9. Dasgupta, M., Basu, P. and Basu, R. N., *Indian Agric.*, 1976, **20**, 26.

CYTOLOGICAL STUDIES IN *COELACHYRUM LAGOPOIDES*, (POACEAE)

Coelachyrum Hochst. and Nees. is a small genus containing about five species distributed in N. tropical Africa and S.W. Asia[1]. One species of this genus *C. lagopoides* (Burm.) Senat. is found in India and Ceylon[2]. It is an annual, prostrate grass, rooting at nodes and usually found in sandy soil. The chromosome number has been reported to be $2n = 36$ by Krishnaswamy and Ayyangar[3]. Present investigation, however, shows the number as $2n = 18$. It is obvious that this species has diploid and tetraploid races. Karyotype and meiotic behaviour have not been investigated. This communication deals with these aspects in the diploid taxon.

Seeds were collected by the author near Belgaum (Karnataka State). Plants were raised in the glass house. Root tips were excised from the potted plants and pre-treated with 0·002 molar 8-hydroxyquinoline for 3 hours at 10 to 15° C. They were stained with Schiff's reagent and squashed in 0·5% acetocarmine. Spikes were fixed in Carnoy's fluid (6 : 3 : 1) and microsporocytes were stained with 1% acetocarmine. The slides were made permanent using acetic acid–butanol series and mounted in euparal. For description of karyotype method followed by Levan *et al.*[4] has been adopted. The type of chromosomes were determined using arm ratio (r) and centromeric index (i) as parameters.



FIGS. 1–2. Fig. 1. Somatic metaphase plate showing $2n = 18$ chromosomes. Fig. 2. Metaphase I with 9 bivalents. All Figs., × 900.

Eighteen chromosomes were counted from the root tip cells. Somatic chromosomes are shown in Fig. 1. They are medium sized. The difference between longest and shortest chromosome in the compliment is very small; therefore, they cannot be categorized into long, medium and short chromosomes. They form a gradual series. Karyotype has three types of chromosomes. They are a single pair of satellited submedian chromosome with SAT on short arm, six pairs of median chromosomes and two pairs of chromosomes with submedian centromere. The satellite is very small and measures about 0·2 micron. The chromosome length ranges from 1·3 to 2·7 microns with an absolute length of 16·82 microns. The details of karyotype are given in Table I. Like most diploid grasses, meiosis is also normal in this taxon. Nine bivalents are observed at diakinesis and metaphase I (Fig. 2). A single nucleolar bivalent is usually noticed. Dis-