P. vittata, followed by *D. esculentum* and *A. caudatum*. Rhizome extracts were more toxic compared to leaf extracts. It is probably due to antimicrobial principles, as the rhizomes of various ferns have been reported to contain toxic compounds such as cyanogenic glycoside [6,7]. It is likely that this or related compounds might be adversely affecting the growth and germination of fungal spores.

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Reduced volatile aldehyde production in wheat by seed invigoration treatments

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Highly significant negative correlations were noted between germinability of wheat (*Triticum aestivum* L. cv. Sonalika) seeds of different vigour status and volatile aldehyde production. Mid-term hydration–dehydration seed invigoration treatments, which effectively maintained vigour and viability of wheat seeds, showed a substantial reduction in post-ageing volatile aldehyde production.

AN association between volatile aldehyde production and seed vigour has been demonstrated in several seeds[1-6]. These volatile aldehydes are clearly products of lipid peroxidation and can be produced by autoxidation or through the mediation of lipoxygenase found in a wide variety of germinating seeds[1,5,7-9].

Lipid peroxidation is significantly reduced by hydration–dehydration of stored seeds[10-13]. If the higher percentage of germination of hydrated–dehydrated seed, compared to untreated seed, is attributable, at least in part, to reduced lipid peroxidation, it may be presumed that the production of volatile aldehydes is lowered by such seed invigoration treatments. To test this hypothesis, the effect of hydration–dehydration of seeds on the production of volatile aldehydes by germinating wheat has been studied.

The experiments were carried out with seeds of wheat (*Triticum aestivum* L.) cultivar Sonalika. Hydration–dehydration treatments, viz. soaking–drying, dipping–drying and moisture equilibration–drying, were given to 5-month-old medium-vigour wheat seeds (seed m.c. 9% on wet wt basis) following the method described by Basu and coworkers [14-16]. After treatment, one half portion each of treated and untreated seeds were stored in sealed glass vials in a refrigerator at –10°C to arrest the ageing process (before ageing set); the other half portions of seeds of the different treatments were subjected to accelerated ageing at 95% RH and 40°C for seven days (after ageing set). Before and after accelerated ageing, germination tests were carried out following the inclined glass plate method developed by Punjabi and Basu [17].

For the assay of volatile aldehydes in the gaseous emanations of germinating invigorated seeds before and after ageing, sterilized (by 0.05% mercuric chloride solution for 20 min) wheat seeds were placed in two rows (50 seeds in a row) on the upper portion of a moist blotter. The seeds were covered by a thin layer of moist absorbent cotton and placed on the inner surface of a wide-mouthed 1.3-litre capacity air-tight glass bottle containing 40 ml of water for continuous supply of moisture to the germinating wheat seeds. A 100 ml beaker containing 10 ml of 0.2% (w/v) 3-methyl-2-benzothiazolinone hydrazone (MBTH) solution was placed inside the larger bottle containing the germinated wheat seeds for absorption of volatile aldehydes. One control was taken in which there were no wheat seeds and only MBTH solution was placed. The wide-mouthed bottles were fitted with air-tight screw caps to prevent gas leakage. The bottles were kept in a temperature-controlled room at 25 ± 1°C. After 48 h, germination percentage and seedling growth of wheat were recorded and the volatile aldehyde trapped by the aldehyde-absorbing reagent MBTH was determined following the method of Wilson and McDonald[4] with some minor modifications. A 3 ml aliquot of the aldehyde trapping solution was collected from each bottle and taken into a test tube containing 2.5 ml of 0.23% (w/v) ferric chloride solution and incubated for 10 min. Then 2.5 ml of absolute acetone was added to each tube and the tubes closed with tightly fitting corks. After 30 min, absorbance of the reaction mixture was read as 635 nm. Correlation coefficients (r values) between germinability and volatile aldehyde production of wheat were worked out following standard statistical methodology[18].

The different hydration–dehydration treatments showed only minor improvements in germination percentage and seedling growth before ageing. But after accelerated ageing at 95% RH and 40°C for seven days, hydration–dehydration treatments resulted in greater vigour and viability of stored wheat seed (Figure 1). Soaking–drying gave greater germinability than dipping–drying and

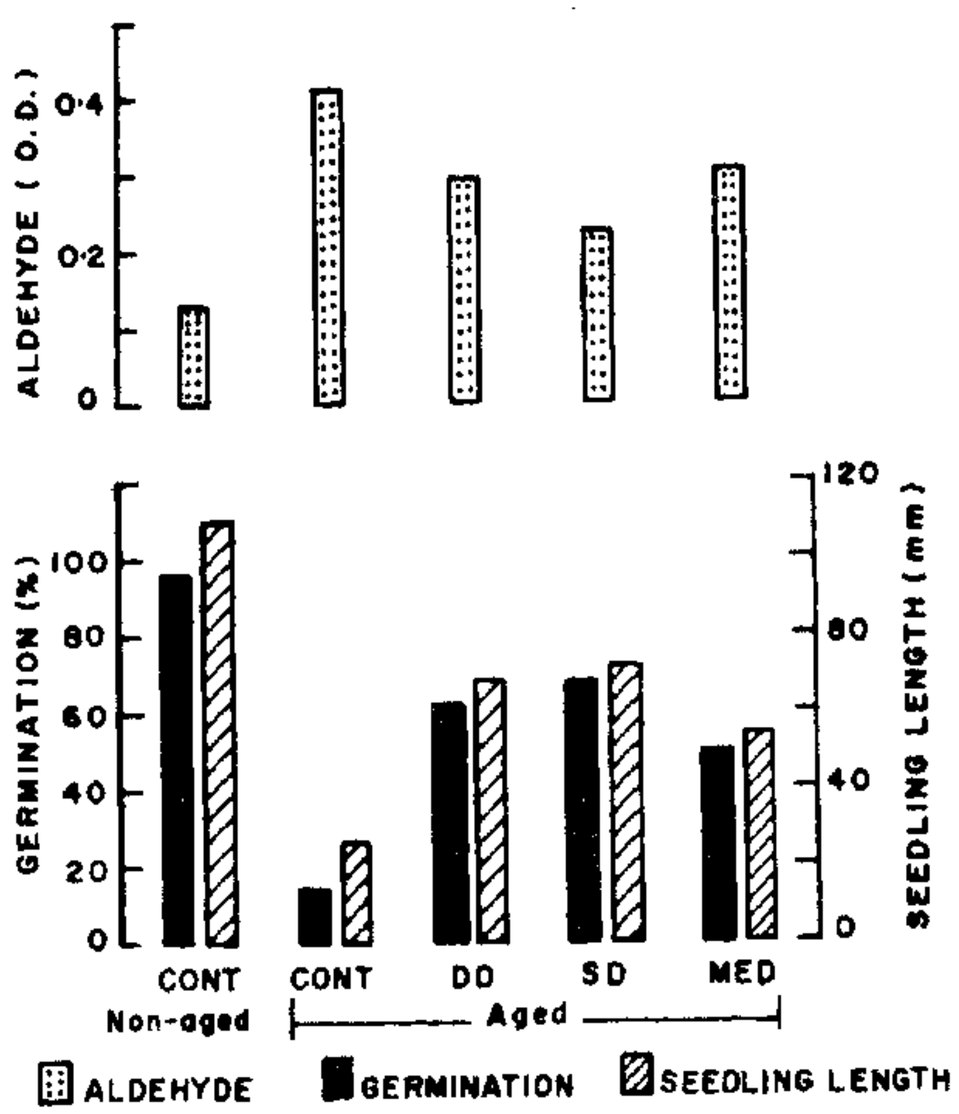

Figure 1. Germinability and volatile aldehyde production by wheat seeds after different hydration–dehydration treatments. The treatments, are CONT (non-aged), seeds stored at – 10°C; CONT (aged), accelerated ageing at 95% RH and 40°C for 7 days; DD, diping-drying; SD, soaking–drying; MED, moisture equilibration–drying. Seeds of DD SD and MED were also subjected to accelerated ageing at 95% RH and 40°C for 7 days.

moisture equilibration–drying treatments.

Immediately after hydration–dehydration treatment (before ageing), volatile aldehyde production from germinated wheat seeds was only slightly lower than in the control and the lowest production of volatile aldehyde was observed in germinating refrigerator-stored (nonaged control) seeds.

Ageing considerably increased the production of volatile aldehydes in wheat seed. Hydration–dehydration treatments effectively reduced the production of such volatile aldehydes and soaking–drying was better than the other treatments (Figure 1). Highly significant negative correlations were noted between germination percentage of wheat and volatile aldehyde production ($r = -0.9291$) and between seedling growth and aldehyde release ($r = -0.9910$).

The present study clearly shows that the hydration–dehydration treatments effectively reduced the post-ageing production of volatile aldehydes by wheat seeds. This would imply that lipid peroxidation, either through autoxidation in dry storage or through the mediation of lipoxygenase during germination, or both, is involved in wheat seed deterioration. This lends support to our earlier reports[10] that the hydration–dehyration seed invigoration treatments maintain greater germinability by reducing lipid peroxide formation in stored seeds.

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Ascorbic acid 2-sulphate, storage form of ascorbic acid in rats

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Ascorbic acid (AA) and ascorbic acid 2-sulphate (AAS) concentrations in rat tissues increased with increase in dietary level of AA. On feeding a high dose of AA to rats for 15 days, AAS levels and ascorbic acid sulphotransferase activity were significantly increased, whereas ascorbic acid-2-sulphate sulphohydrolase activity was reduced. On withdrawing AA, AAS levels and AA sulphotransferase activity were drastically reduced, but AAS sulphohydrolase activity was increased. AAS may be a storage form of vitamin C even in antiscorbutic animals.

ASCORBIC acid sulphate was first isolated and purified from the undeveloped cyst of brine shrimp by Mead and