The occurrence of todorokite from Adilabad manganese mines, Andhra Pradesh

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Todorokite (Na, Ca, K, Mn^7+)(Mn^{4+}, Mn^{2+}, Mg)_x O_12. 3H_2O, a rare manganese rich mineral has been observed from the Adilabad Manganese Mines (Penganga Beds, Proterozoics), Andhra Pradesh (19°39’78” 40’). This is the only record of todorokite from India.

The area under investigation is Gollughat-Gunjala, Tamsi-Hattigahat, Gotkur, Jamdapur and Metguda-Kanpa, a 32 km stretch with a discontinuous workable manganese body. The manganese ores occur in association with jasper, chert, shale, calcite and greyish-black limestone.

Ore microscopic studies of this deposit revealed the presence of psilomelane, pyrolusite, ramsdellite, groutite, hollandite, cryptomelane, braunite, birehhsite and todorokite minerals. Todorokite is white in colour, fibrous and the reflectivity is higher than pyrolusite and cryptomelane. It shows uneven extinction under crossed nicols. Todorokite is found as replacement of birehhsite, in the form of veins, which are parallel to jasper bands.

Electron microprobe analysis (Model Mar-2, USSR make, operating voltage 25 KV and specimen current 80-100) of todorokite shows Mn—69.11, CaO—2.00, Al_2O_3—1.57, Fe_2O_3—2.00, Na_2O—1.70, K_2O—0.65, MgO—0.33, Ni—0.05, Cu—0.31, Cr—0.12 and Co—0.10. X-ray analysis (Philips Rontgenerator, Cu Kα radiation) of todorokite shows characteristic d-spacings of 9.576 Å (65), 4.786 Å (24) and 2.434 Å (16), which are correlitive with Frondel et al., Straczewek et al.5 and Burns and Burns6.

The manganese ores of Adilabad are the youngest, compared to the other manganese deposits of Sausers, Eastern Ghats and Dharwars4.5. Fromboidal man-

ganse, also reported for the first time from this area6, represents the presence of some primitive life activity, which might have caused the primary deposition of manganese at least in part7.

Todorokite is found mostly in the recent marine basins and its occurrence is rare in continental deposits. The work is under progress in the delineation of the factors controlling the formation of todorokite.

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21 August 1984


Influence of hydration-dehydration treatments of rice seed on the growth of embryo-endosperm transplants

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Hydration-dehydration treatment of stored seeds would invigorate them and the treated seeds would maintain vigour and viability for longer periods than untreated seeds1. Germinability of a cereal seed primarily depends on the embryo which is believed to deteriorate more rapidly than endosperm2. The degree of deterioration of the endosperm also influences the
vigour of the seedling. An important consideration in this context would be the relative response of the embryo and endosperm to the hydration-dehydration treatments. Employing embryo-endosperm transplantation technique, the effects of hydration-dehydration treatments (soaking-drying and moisture equilibration-drying), which extend the viability of stored rice seeds, have been analyzed in this study in terms of deterioration of the embryo and endosperm. Seedling growth of reciprocally transplanted hydrated-dehydrated and control (untreated) embryos and endosperms gave an estimate of their relative influence on germinability.

The study was carried out with rice (Oryza sativa L. cv Jaya) seed. Soaking-drying (SD) and moisture equilibration-drying (MED) treatments were given to 6-month-old rice seeds following the method described by Basu and Pal. The treated seeds were subjected to accelerated ageing at 100% RH and 40°C for 10 days. Germination percentage and growth of the root and the shoot of aged and non-aged materials were recorded after germination for 7 days at 28 ± 1°C following the method of Punjabi and Basu. Before and after the accelerated ageing, embryos and endosperms were isolated from treated and untreated seeds for the reciprocal transplantation experiment. Reciprocal transplants were made by transplanting treated (hydrated-dehydrated) embryo on endosperm of untreated (control) seeds and the control embryo on endosperm of treated seeds and vice versa following the method described by Mandal and Basu. Data on the germination percentage and root and shoot growth of the transplants were recorded after 7 days.

Five replications were provided for each set of experiment and the results were statistically analyzed.

For the assay of α-amylase activity of treated and untreated rice seeds, before and after ageing, the method described by Mandal and Basu was followed. The test was based on the property of GA to induce α-amylase enzyme production in cereal grains.

Immediately after treatment (before ageing), hydration-dehydration did not show any significant effect on germinability. After accelerated ageing at 100% RH and 40°C for 10 days, however, SD and MED treatments showed 88 and 86% germination respectively against 65% in control. Mean root and shoot lengths were also significantly higher in SD and MED than in the untreated control. Similar observations were made in the case of homotransplants (treated and untreated embryos on treated and untreated endosperms, respectively). Reciprocal embryo-endosperm transplantations employing treated embryos on untreated endosperms and untreated embryos on treated endosperms clearly showed that hydration-dehydration treatments (SD and MED) not only retained the vigour and viability of the embryo but also significantly improved the capacity of the endosperm to nourish the growing embryo transplanted on it (table 1).

The hydration-dehydration treatments significantly improved the post-ageing gibberellic acid induced α-amylase synthesis in the endosperm of the whole seed, GA-induced α-amylase induction was also studied in embryoless treated and untreated half seeds (table 2). This was done to eliminate the direct effect of the embryo which itself has a large controlling in-

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<th>Table 1 Effect of hydration-dehydration on reciprocally transplanted embryo and endosperm of rice seed after accelerated ageing at 100% RH and 40°C for 10 days</th>
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<tr>
<td>Transplants (Embryo + Endosperm)</td>
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<td>---------------------------------</td>
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<tr>
<td>Cont + Cont</td>
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<td>Cont + SD</td>
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<td><strong>CD at 0.01P</strong></td>
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<td><strong>CD at 0.05P</strong></td>
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Cont, control; SD, soaking-drying; MED, moisture equilibration-drying
Table 2 Effect of hydration-dehydration on α-amylase activity* of rice seed after accelerated ageing at 100%, RH and 40°C for 10 days

<table>
<thead>
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<th>Full seed**</th>
<th>Half seed***</th>
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<tr>
<td></td>
<td>Without GA</td>
<td>With GA</td>
</tr>
<tr>
<td>Cont</td>
<td>80</td>
<td>161</td>
</tr>
<tr>
<td>SD</td>
<td>125</td>
<td>320</td>
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<td>MED</td>
<td>122</td>
<td>302</td>
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* Values expressed as μg of starch hydrolyzed by enzyme equivalent one half-seed.
** Full seed was allowed to sprout without GA (in water) or with GA (5 x 10^{-4}M) for 48 hr at 25 ± 1°C and then one-half of the seed (embryo-less half) was taken for enzyme extraction.
*** One-half of the dry seed (embryo-less) was incubated for 48 hr at 25 ± 1°C with or without GA (5 x 10^{-4}M) followed by extraction and assay of enzyme.

fluence on the synthesis of α-amylase in the endosperm. In an earlier study, Mandal and Basu showed that ageing adversely affected the α-amylase synthesis by the aleurone cells of the endosperm.

The present study clearly showed that the hydration-dehydration treatment besides benefiting the embryo, effectively prevented a decline in the functional activity of the aleurone cells of the endosperm during ageing and it resulted a greater α-amylase production by the endosperm and consequent solubilization of the starch reserves and improved nourishment of the embryo transplanted on it.

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THE RECORD OF CURVULARIA LUNATA BOEDIJN CAUSING A LEAF-SPOT OF EUPHORBIA GENICULATA ORTEG IN POONA.

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EUPHORBIA GENICULATA Orteg were found heavily infected with leaf-spot disease in Poona Agricultural College campus during the monsoon season in 1984, the disease appearing in the form of dark brown, round to irregular spots on the leaves.

Isolations made from the lesions on potato-dextrose agar medium at 28 ± 1°C, yielded a species of Curvularia Boedijn. Hyphae, was well-developed, branched, septate, sub-hyaline to dark brown; Conidiophores brown except towards the tip where they are paler, simple, unbranched, septate, 3–6 μ broad and variable in length, geniculate towards the tip. Conidia, boat-shaped, brown, 3-septate, the third cell from the base conspicuously larger, broader and darker, curved or some times straight, each with a sub-hyaline rounded apical cell bearing a scar indicating the point of attachment to the conidiophore, 22.5 x 9.5 μ (19.0–26.3 x 7.6–11.4 μ).

All the characters given above agree well with those of Curvularia lunata1,2.

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BACILLUS SUBTILIS AS ANTAGONIST TO VASCULAR WILT PATHOGENS

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Decline in disease incidence with the introduction of Bacillus subtilis into the soil, aerial spray or as seed treatment, has been reported for varied groups of fungal plant diseases1–4. This soil-inhabiting bacterium holds great promise in the biological control of