being uplifted in relation to a sinking southwestern block.

The damage to property due to the two Khardi earthquakes is not significant. It is mainly in the form of vertical to highly inclined cracks that, in houses, are developed along doors and window frames, and at wall intersections. Anticlockwise rotation of bricks through 10° to 15° is also recorded. In a few cases plaster has been dislodged from walls. The field surveys undertaken, suggest that both the earthquakes have their epicentres at Khardi with the 'felt area' upto a distance of about 50 and 130 km in respective cases. At Khardi, the maximum intensity (Io) of the earthquake of 15 September was VI on the modified Mercalli scale. The isoseismal pattern is elongated in a direction parallel to the lineament belt (figure 1).

The Bhatsa dam, located within the lineament belt, is 938 m long and about 60 m in height, with the river-bed level being 58 m. The water level which was about 92.5 m on 20 June 1983 rose to a little more than 110 m one month later. A seismograph was installed on Bhatsa dam on 1 July 1983 and in the ensuing two and half months, more than a thousand shocks, down to magnitude -1, were recorded. The majority of these, including the two strong shocks of 17 August and 15 September 1983, were recorded after the water level had exceeded 110 m. There is thus an evident relationship between water-level in the Bhatsa reservoir and seismicity.

Since the first record, in 1938, of seismicity due to water impoundment, at Lake Mead, Colorado, USA[2], over 70 cases of reservoir-induced seismicity have been reported[3], including those at Hsinfengchiang, China (1962)[4], Kariba, Zambia-Zimbabwe (1963)[5,6], Kremasta, Greece (1966)[7] and Koyna, India (1967)[6,8,9] which were of magnitude greater than 6 on Richter scale.

Significantly like Bhatsa, the reservoirs at Kariba, Kremasta and Koyna are situated in regions having a volcanic history, and are located on sinking blocks[10]. It is evident that the impoundment of a large volume of water, in a structurally unstable zone, where the permeability is necessarily high, has been one of the factors responsible for the Khardi earthquakes. The occurrence of earthquakes, following rapid increase of water level to peak reservoir load, shows that though the water load may not have been directly responsible for the earthquakes, it possibly triggered off the release of pre-existing strain. It is suggested that percolation of water along fractures resulted in a build-up of pore-water pressure which was transmitted downwards to a stress zone with a potential to slip. Consequent reduction in the effective stress (tectonic stress-pore pressure) induced the earthquakes.

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ON THE KOMATIITE OF PALASBANI, SINGHBHUM DISTRICT, BIHAR

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OCCURRENCE of Komatiite has been reported from Palasbani (22° 22′ 54″ : 86° 28′ 00″) in the Singhbhum district of Bihar[1]. Komatiite occurs within the Dhanjori metabasalt which itself is in general tholeiite in nature[2,3] (including alkaline, ultramafic and

Komatiitic affinities[4]) and represents a regional tensional phase. The Komatiite, described here is greyish black in colour with hypidiomorphic granular texture. It is vesicular in nature and has chilled margin. Mineralogically it is composed of yellowish green amphibole and chlorite. Amphiboles occur as slender prisms (X = colourless; Y = yellowish green; Z = green; Z $\wedge$ C = 14°–22°) which are secondary after pyroxene. Chlorite occurs as free flakes in the matrix of the rock (X = deep green, Z = light green, optically negative, birefringence = 0.004, high 2V) and the species is comparable to antigorite. The typical spinifex texture is however not seen; possibly it was destroyed by metamorphism. Chemical analysis of Palasbani Komatiite is given along with those of South African and Indian Komatiites for comparison.

Table 1 *Chemical analysis of Palasbani Komatiite*

Serial No.	A	B	C	D	E	F
SiO_2	47.06	47.37	49.19	52.73	50.66	50.48
TiO_2	0.24	0.46	0.43	0.85	0.63	0.37
Al_2O_3	2.94	6.76	3.76	9.83	7.16	9.38
FeO	11.38	8.08	—	9.70	10.72	10.07
Fe_2O_3	4.17	1.18	11.00	1.23	4.78	0.90
MnO	0.10	0.19	0.17	0.22	0.06	0.07
MgO	21.36	20.39	20.03	10.10	10.51	12.88
CaO	10.34	8.31	9.51	9.99	12.60	13.12
Na_2O	1.80	0.39	0.10	2.65	1.68	1.57
K_2O	0.54	0.06	0.02	0.46	0.28	0.39
P_2O_5	0.11	—	—	—	—	0.02
H_2O^+	—	5.26	—	1.87	0.92	0.56
H_2O^-	—	—	—	—	—	0.06

A. Palasbani Komatiite, analysis on anhydrous basis; B. Average high-alumina Geluk type Komatiite[5]; C. Average low-alumina Geluk type Komatiite[5]; D. Average Berberton type basaltic Komatiite[5]; E. Metabasalt from Kulamera, Bihar[6]; F. Basaltic Komatiite dykes (average of three analyses). Dodkanya; Karnataka[7].

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CLONAL PROPAGATION OF *DALBERGIA SISSOO* ROXB THROUGH TISSUE CULTURE

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SINCE the report that orchids can be propagated on a large scale by meristem culture[1], apical meristems and shoot tips have been cultured extensively for rapid propagation of various ornamentals, horticultural and forest trees[2], especially in plant species which are not amenable for vegetative propagation by conventional methods[3]. However, only limited success has been obtained so far, with shoot tip and bud culture of mature woody plants[4]. In this communication, we report the formation of whole plants from cultured axillary buds of *Dalbergia sissoo*, an important timber wood tree which cannot be propagated by vegetative methods. Axillary buds (0.2–0.4 cm) from 30–50-year old trees of *D. sissoo* were collected in aqueous solution containing 200 mg/l ascorbic acid. The buds were immersed in 95% ethanol for 2–3 sec and sterilised in 0.1% $HgCl_2$ solution for 5–7 min. After washing in sterile distilled water, the explants were cultured in modified MS medium[5]. The basal medium comprised MS salts supplemented with $NaH_2PO_4 \cdot 2H_2O$ (170 mg/l), thiamine HCl (1 mg/l), meso inositol (100 mg/l), sucrose (3%) and different concentrations of the growth regulators (table 1). Activated charcoal (1%) was added to all the media as it prevents browning of the medium and favours organogenesis[6-8]. The pH of the media was adjusted to 5.7 before adding agar (8 g/l). All the media were sterilised by autoclaving at 1 kg/cm² pressure for 15 min. The cultures were incubated at 27 ± 1°C under constant illumination of 2500 lux light intensity. The plantlets with well-developed roots were transferred to pots containing sterilised sand and irrigated with half strength MS[5] salt solution.