

TABLE I
Q-values in MeV at the different angles for the energy levels of B¹⁰

Neutron group Angle	1	2	3	4	5	6
0°	.. 4.37±0.11	3.02±0.10	2.59±0.08	2.18±0.06	1.56±0.10	0.65±0.05
90°	.. 4.32±0.10	3.66±0.06	2.56±0.06	2.12±0.05	1.46±0.11	0.69±0.09
150°	.. 4.39±0.09	3.60±0.06	2.66±0.08	2.20±0.06	1.50±0.07	0.66±0.09

The Q-values for the various levels of B¹⁰ at the different angles have been tabulated in Table I along with the probable error. The Q-value for transition to the ground state 4.36 ± 0.1 MeV is in good agreement with the value of 4.36 MeV reported by Ajzenberg *et al.* (1959) from recent nuclear masses.

Evidence has thus been produced for levels in B¹⁰ at excitations of 0.73, 1.76, 2.19, 2.85 and 3.69 MeV besides the ground state. The neutron group corresponding to the 2.85 MeV level is clearly resolved. Further evidence for this level is being sought from plates at angles of 45°, 60°, 120° and 135° which are now being scanned.

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INCREASED EFFICIENCY OF TREATMENTS WITH ETHYL METHANE SULPHONATE ADMINISTERED UNDER PRESSURE

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SEVERAL chemical mutagens have proved rather effective in barley and wheat but not in rice presumably because of the hull or the inability of the chemical to penetrate the water-resistant corky layer of the bran.¹ The seedcoat barrier in rice was overcome by using dehulled seeds suitably treated with effective fungicides such as captan.² Further studies on the effect of dehusking on mutation frequency also revealed that treatments with mutagens, chemicals in particular, showed an enhanced mutation frequency in dehusked seeds.³ By getting the seeds into a metabolically active state by presoaking for longer periods, Mikaelson and Navaratna¹ could enhance treatment efficiency. Experiments on the use of the chemical carrier di-methyl sulphoxide in combination with chemical mutagens and colchicine revealed that the cell permeability is enhanced by the treatment in rice and barley.^{4,5} The present report gives the results

of treatments of seeds with chemical mutagens under varied pressure levels.

Seeds of the japonica rice variety, Tainan 3, presoaked in water for four hours were treated with 0.5% aqueous solution of EMS for five hours under pressure levels ranging from vacuum to 20 atmospheres (including normal atmosphere). Another set soaked in water and subjected to the same range of pressure levels was kept as control.

The material thus treated was germinated under controlled light and temperature. The effects of treatments were measured by percentage reduction of survival and growth rate. The results are presented in Figs. 1, 2 and 3.

It is evident from the data that treatment with EMS under different pressure levels invariably showed more reduction in survival and growth rate than treatments under normal pressure level. Further, the data indicated

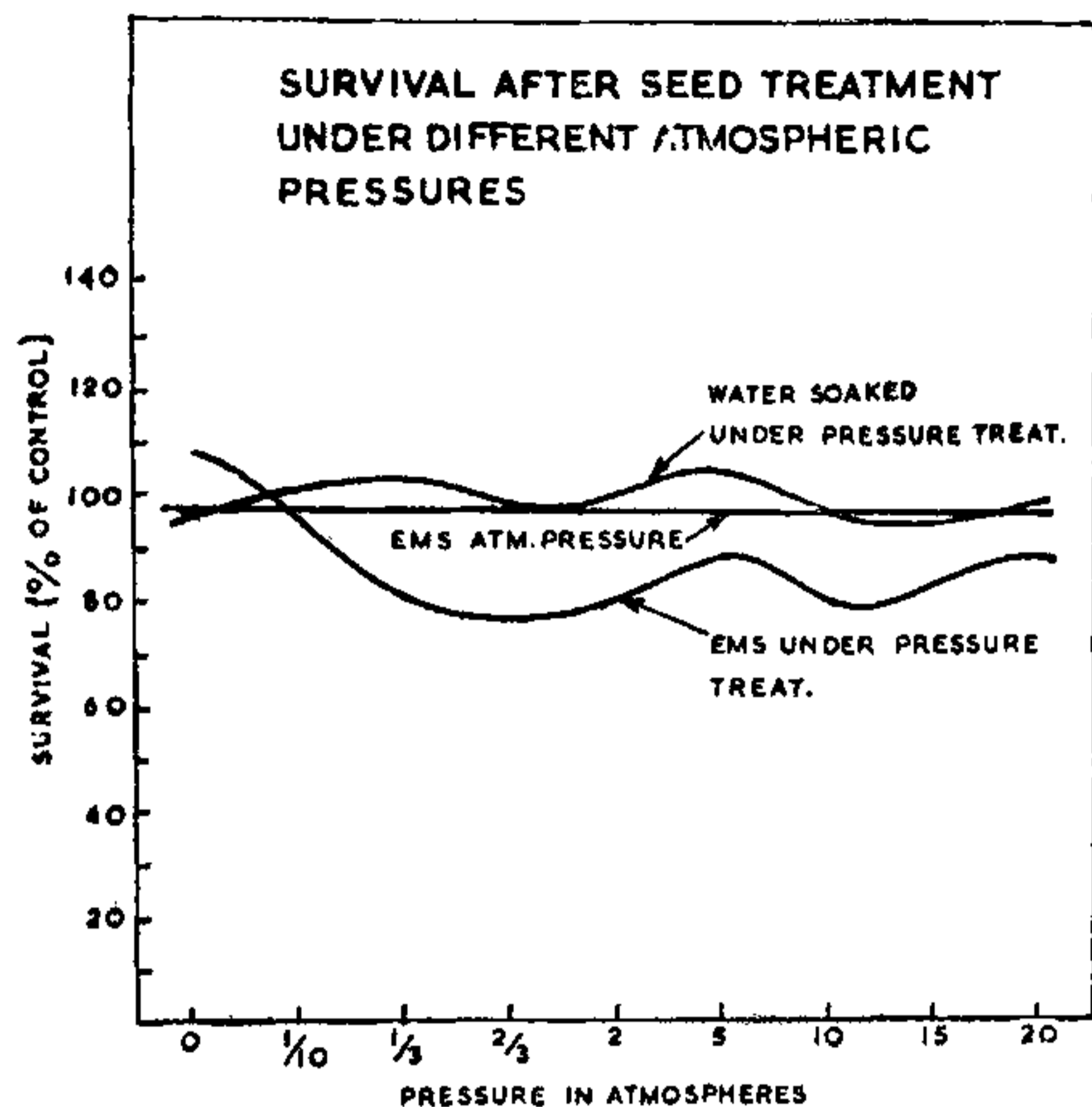


FIG. 1

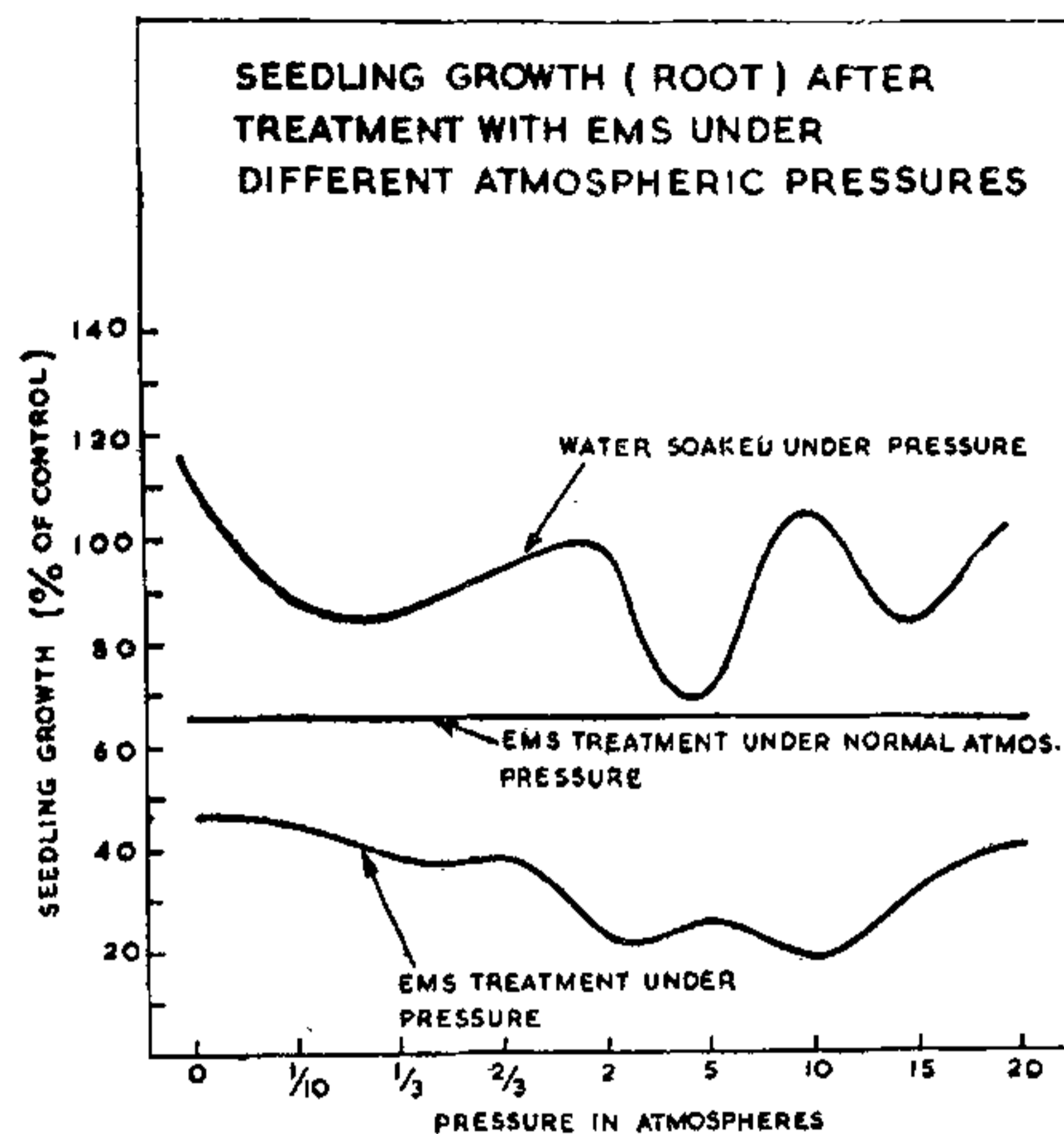


FIG. 3

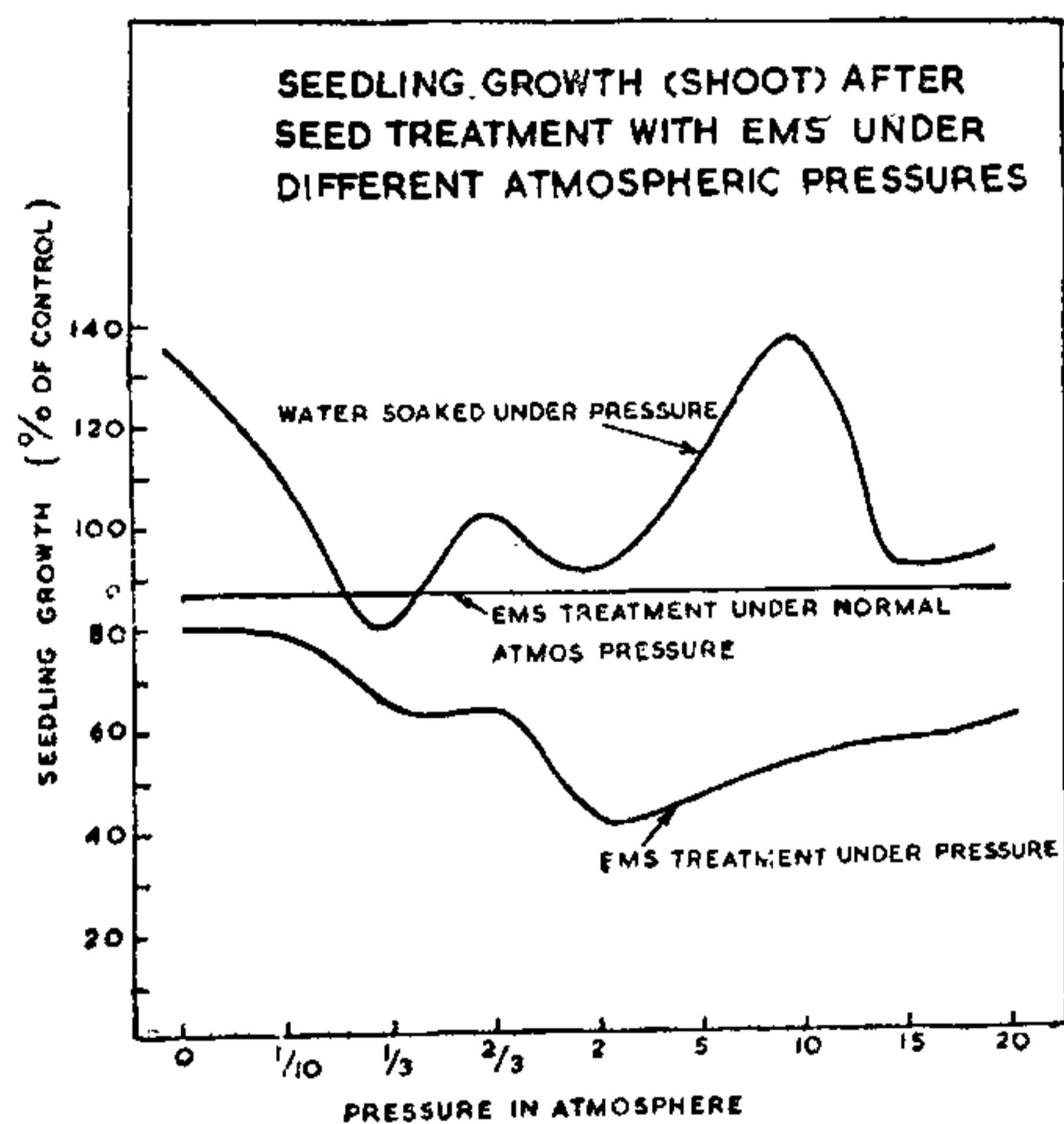


FIG. 2

that there was a gradual increase in the seedling injury from vacuum to 2 atmospheres in the case of shoot and 2 to 10 in root. Beyond this level, the injury became lower. A non-linear dose dependent response observed in the present case appears to be similar to the observation of Moutschen-Dahmen *et al.*⁶ in their study on the mutagenic effect of oxygen at different pressure levels. In the absence of oxygen, the influence of pressure during treatment with the chemical mutagen seems to be a physical phenomenon, as a result of enhanced

permeability of cell membrane facilitating the entry of the chemical with ease.

The data further suggested that there was enhanced growth rate and survival over control at certain levels of pressure and decreased rates at others in water-soaked seeds, presumably as a result of the influence of pressure on the growth-promoting principles which in turn affected cell volume. Whatever be the factors responsible for the non-linear response to dose, it appears that diffusion of chemical mutagens into the tissue could be achieved by administering the mutagen treatment at standardised pressure levels.

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